Mathematica
Progress Together

MIRROR
GROUP

BILL & MELINDA GATES foundation

Education-to-Workforce Indicator Framework

Using Data to Promote Equity and Economic Security for All

This page has been left blank for double-sided copying.

Contents

Contents

Exhibits

Acknowledgments

This report was made possible with financial support from the Bill & Melinda Gates Foundation.

Authors

The report was written by the following staff from Mathematica, the Bill & Melinda Gates Foundation, and Mirror Group:

- **Mathematica:** Naihobe Gonzalez, Elizabeth Alberty, Stacey Brockman, Tutrang Nguyen, Matthew Johnson, Sheldon Bond, Krista O'Connell, Adrianna Corriveau, Megan Shoji, and Megan Streeter
- **Bill & Melinda Gates Foundation:** Jennifer Engle and Chelsea Goodly
- **Mirror Group:** Adrian N. Neely, Mary Aleta White, Mindelyn Anderson, Channing Matthews, Leana Mason, and Sheryl Felecia Means

Contributors

Several individuals, including current and former staff at the Bill & Melinda Gates Foundation, contributed to this report. We would like to give special thanks to Jennifer Engle, Chelsea Goodly, Nicole Ifill, and Grant Nguyen for their project leadership and guidance. We are also grateful to the members of the Education-to-Workforce (E-W) Framework Internal Working Group, listed below, who helped shape the vision and content of this framework by participating in regular discussions, pointing us to additional resources and research, and reviewing draft materials. Other current or former Bill & Melinda Gates Foundation staff also supported the development of the framework in various ways, including Sara Allan, Kimberly Brown, Marquita Davis, Isa Ellis, Jill Hawley, Darryl Hill, Amy Jiravisitcul, Karen Johnson, Snow Li, Phoebe Lipkis, Lindsay Lovlien, Christine Marson, Elizabeth Mokyr Horner, Isabel Muñoz-Colon, Juan Sanchez, Marie Sauter, Karol Sihite, Olita Terry, Bill Tucker, Isabella Velásquez, Sarah Weber, and Carina Wong. We are grateful for their contributions.

Bill & Melinda Gates Foundation internal working group members

- Jacklyn Altuna Willard, Early Education and Pathways
- Leah Bradford Francis, Washington State Initiative
- Julia Gray, Postsecondary Success
- Kosar Jahani, Economic Mobility and Opportunity
- Mariana Preciado, K–12 Education
- Tafaya Ransom, Postsecondary Success
- Jamey Rorison, Postsecondary Success
- Brandee Tate, K–12 Education

We also thank our external partners who contributed to the framework, including members of the E-W Framework External Advisory Board, listed below, who shared their expertise with us through regular convenings and written feedback. We are grateful to other E-W experts who also shared their expertise on a subset of indicators, including Richard Arum (University of California, Irvine and Next Generation Undergraduate Success Measurement Project), Dale Richards (Child Trends), and Nakeisha Ricks-Pettyjohn (National Skills Coalition). We are also grateful to the staff and partners of five collective

impact organizations who met with us to share their insights on E-W data systems in their communities: Atlanta Thrive, Baltimore's Promise, Graduate Tacoma, Public Education Fund Chattanooga, and Rio Grande Valley Focus.

External Advisory Board members

- Tauheedah Baker-Jones, Atlanta Public Schools
- Keith Catone, Center for Youth & Community Leadership in Education (CYCLE) at Roger Williams University
- Sagar Desai, StriveTogether
- Afet Dundar, National Student Clearinghouse
- Maria Echaveste, The Opportunity Institute
- Nikki Edgecombe, Community College Research Center at Teachers College, Columbia University
- Orville Jackson, GreatSchools
- Carlise King, Child Trends
- David Montes de Oca, CORE Districts
- Ryan Reyna, Education Strategy Group
- Zelphine Smith-Dixon, special education policymaker and school improvement expert
- Mamie Voight, Institute for Higher Education Policy
- Rachel Vilsack, National Skills Coalition
- Terra Wallin, The Education Trust
- Kelia Washington, Data Quality Campaign

Finally, we are grateful to our colleagues at Mathematica who contributed to the development of the E-W Framework and this report. We thank Julie Bruch and Lindsay Fox for sharing their expertise on K–12 data and research, and Vanessa Quince for engaging with the collective impact organizations and developing recommendations for the framework based on their input. We are deeply grateful to Lama Hassoun Ayoub and Elias Walsh for carefully reviewing the framework contents and providing detailed feedback as part of an independent quality assurance review. We also thank Liah Caravalho for providing input on the dissemination of the framework. Jennifer Brown, Jim Cameron, and Molly Cameron edited the report, and Sheena Flowers and Sheryl Friedlander worked on the design and formatting.

Without everyone's contributions, this report would not have been possible. However, although many people provided their input throughout the development of this report, the recommendations presented here are those of the authors alone.

Key terms

Framework context	
Asset framing	Using language that focuses on the strengths, rather than deficits, of individuals or communities. Asset framing is the opposite of deficit framing.
Community	A place, institution, or group that includes individuals with similar characteristics, interests, or experiences (such as a neighborhood, school, or church).
Data	Distinct pieces of information, usually collected, stored, and processed for a specific purpose. They can be either quantitative or qualitative.
Data users	Individuals within organizations who collect and analyze data to inform decisions, including policymakers, administrators, educators, community leaders, and researchers, among others.
Disparities	Documented differences in outcomes between groups.
Economic mobility and security	The conditions that arise when individuals have the income and assets needed to attain and preserve their economic independence; possess power and autonomy over their lives; and feel the respect, dignity, and sense of belonging that come from contributing to one's community.
Equity	Just and fair inclusion in a society in which all can participate, prosper, and reach their full potential. Equity is achieved when structural barriers based on race, ethnicity, gender, sexual orientation, zip code, class, disability, and other factors are dismantled so an individual's background and identities no longer predict their outcomes in life.
Inequities	The conditions that arise when policies, practices, attitudes, or cultural messages make it harder for some individuals—and easier for others—to fully participate, contribute, and take advantage of opportunities and resources based on their identities and background traits. Inequities are apparent when identities or background traits such as race, ethnicity, gender, sexual orientation, zip code, class, or disability statistically predict outcomes.
Priority communities	In the context of the E-W Indicator Framework, priority communities are identified as Black, Indigenous, and other communities of color, and communities experiencing poverty. Priority communities may differ depending on the context and locale in which the framework is used.
Proximate leaders	Community advocates who share similar values and experiences of others within their communities and are respected by community members as leaders and representatives.
Source frameworks	Indicator frameworks from leading organizations used to identify candidate indicators for inclusion in the E-W Framework.
Framework components	
Data equity principles	Practices for centering equity in the collection, analysis, reporting, and application of E-W data.
Disaggregates	Key characteristics that E-W systems should use to disaggregate outcomes and system conditions to assess and address inequities.
Evidence-based practices	Practices that have been shown to move the needle on key E-W outcomes based on multiple high-quality causal studies consistently demonstrating positive impacts for a diverse population of individuals—particularly priority communities.
Indicators	The information data systems should measure along the pre-K-to-workforce continuum to assess inequities and track progress in key outcomes and conditions.

Indicator types	
Adjacent system conditions	Key experiences, situations, and circumstances outside of E-W systems that help or hinder positive E-W outcomes.
E-W system conditions	Key institutional or systemic environments, policies, and practices that help or hinder an individual's ability to achieve positive E-W outcomes.
Outcomes and milestones	Key outcomes and milestones along the E-W continuum strongly related to achieving economic mobility and security.

I. Introduction and approach

A. Overview

At the time of this writing, the education and workforce sectors face a generation-defining moment of challenge and opportunity. The COVID-19 pandemic exacerbated pre-existing inequities that had already persisted far too long, changing how individuals engage with pre-K programs, schools, colleges, employers, and the world at large. The impacts of these disruptions are only beginning to be understood, but early evidence suggests a toll on student learning, educational attainment, employment, and physical and mental well-being that has disproportionately affected communities of color and communities experiencing poverty.[1, 2, 3, 4, 5] Although much is still to be learned, we know that a return to the status quo will not be sufficient to effectively assess and address deep-seated inequities. Education, workforce, and adjacent systems will need to collaborate to develop responses grounded in equity and evidence.

Many states and localities have already been working toward this goal. Building on decades-long efforts, various place-based collective impact initiatives have emerged seeking to improve the systems that affect individuals' journeys from cradle to career and beyond. Their focus is on *systems change*—that is, shifting conditions that have produced and maintained racial and socioeconomic disparities. A key component of successful systems change is a data infrastructure that can produce insights to help partners across sectors continuously learn, adapt, and improve.[6] To address this need, more and more states are building, expanding, or modernizing state longitudinal data systems to understand the experiences and outcomes of individuals seamlessly across four core sectors—pre-K, K–12, postsecondary, and workforce systems—and in some cases expanding to include additional adjacent sectors, such as social services. For example, many states are developing early childhood integrated data systems to collect and link information across multiple public agencies that serve young children.[7] Currently, 18 states have a longitudinal data system that connects data from all four core sectors,[8] and 29 states have proposed using federal funds from the Elementary and Secondary School Emergency Relief Fund (ESSER) to link or improve their state data systems.[9] Underlying these efforts is an acknowledgment that "what gets measured gets done," but also a realization that siloed data and action are not enough to shift the systems that produce inequitable outcomes.

The Education-to-Workforce Indicator Framework (E-W Framework), commissioned by the Bill & Melinda Gates Foundation and developed in partnership with leading experts representing more than 15 national and community organizations, is designed to encourage greater cross-sector collaboration and alignment across local, state, and national data systems by promoting the use of a common set of metrics and principles to assess and address disparities along the pre-K-to-workforce continuum. Based on a review of leading frameworks and research, together with significant input from experts, the E-W Framework offers holistic guidance for translating data into action to identify and address disparities through detailed guidance on the following:

- Data equity principles to support ethical data use across the data life cycle
- Essential questions that every E-W data system should be equipped to answer
- Indicators that matter most along the E-W continuum for states and localities to measure
- Key student characteristics to inform data disaggregation
- Illustrative evidenced-based practices shown to move the needle on key outcomes

Through improved data systems, policies, and practices, policymakers, administrators, practitioners, community organizations, and researchers will be better poised to support the individuals least well served by current education and workforce systems in achieving economic mobility and security.

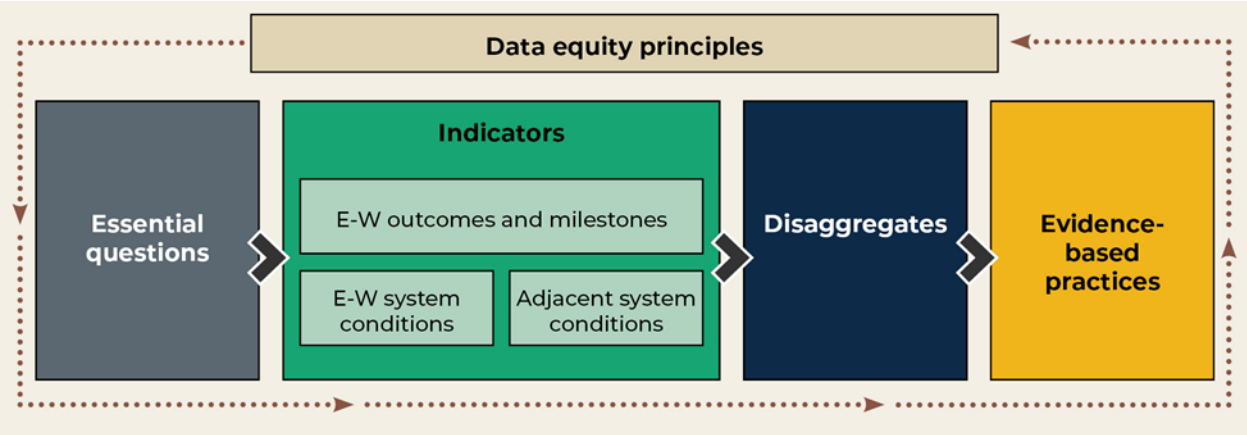
The framework's North Star

Economic mobility and security are achieved when individuals have the income and assets needed to attain and preserve their economic independence; possess power and autonomy over their lives; and feel the respect, dignity, and sense of belonging that come from contributing to one's community. **Equity** is achieved when structural barriers based on race, ethnicity, gender, sexual orientation, zip code, class, disability, and other factors are dismantled so an individual's background and identities no longer predict their outcomes in life.

B. Why this framework?

The E-W Framework synthesizes the best thinking in the field to provide a coherent set of indicators and guidance that center equity and reflect the full pre-K-to-workforce continuum. It builds on and highlights existing research and policy efforts taking place across the country to measure and act on what matters most. Many other valuable indicator frameworks are available from leading organizations, such as the National Academies of Sciences, Engineering, and Medicine; Council of Great City Schools; Education Strategy Group; Urban Institute; StriveTogether; Institute for Higher Education Policy; and CORE Districts Data Collaborative, among others. Our goal was to develop a holistic framework for measuring when and why individuals gain and lose momentum along their journey from pre-K to the workforce. We reviewed more than 40 frameworks (Appendix A) and consulted with E-W researchers, policymakers, practitioners, and community advocates to bring together perspectives from multiple sectors and identify areas of convergence as well as areas for further development in the field. The result is a single, comprehensive framework that includes five components: (1) essential questions, (2) indicators, (3) disaggregates, (4) evidence-based practices, and (5) data equity principles (Exhibit I.1). Together, these framework components provide the guidance E-W systems need to use data to promote equity.

Exhibit I.1. Components of the E-W Framework



The **essential questions** component provides a list of 20 questions we see as essential for E-W data systems to answer about how students are performing and progressing through their education journeys from pre-K into the workforce. Each of these questions can be mapped back to key indicators

that appear in the E-W Framework. To decide which indicators to prioritize for data collection and analysis, states and localities must start with a list of the essential questions that require data to answer.

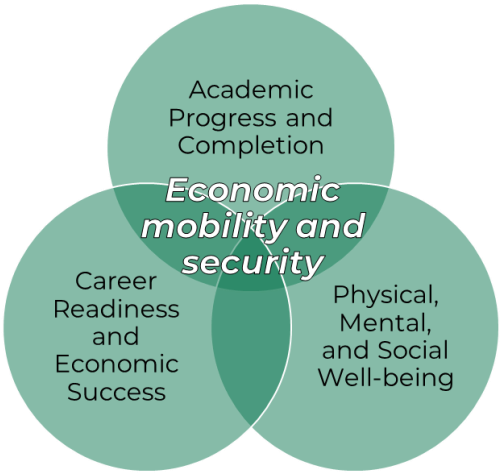
The **indicators** component provides definitions and ways to measure E-W student outcomes and milestones and institutional and system conditions associated with economic mobility and security. To drive change, E-W data systems must measure how students are performing and progressing toward key outcomes, as well as how underlying conditions may be driving disparities and impeding students' chances for success. Failing to examine both individual and system-level data carries the risk of neglecting the role that systems play in shaping the racial and socioeconomic inequities that influence outcomes. For this reason, the E-W Framework includes three types of indicators:

1. **Outcomes and milestones.** Key outcomes and milestones along the E-W continuum strongly associated with individuals achieving economic mobility and security.
2. **E-W system conditions.** Key institutional or systemic environments, policies, and practices within E-W systems that support positive E-W outcomes.
3. **Adjacent system conditions.** Key experiences, situations, and circumstances outside of E-W systems that support positive E-W outcomes.

Alongside each recommended indicator, the framework presents a detailed synthesis of published research and policy expertise to substantiate its inclusion within the framework, provide recommended standard metric(s), and offer measurement considerations across sectors. The indicators included in this framework were selected because they have the power to inform local, state, and federal policy and practice. They emphasize the importance of **academic progress and completion; physical, mental, and social well-being;** and **career readiness and economic success** in achieving this end goal (Exhibit I.2). The indicators are organized by these three interrelated domain areas that affect individuals' journeys toward economic mobility and security.

The **disaggregates** component includes key background characteristics that E-W systems should use to disaggregate data and assess disparities, along with guidance on how best to collect the information necessary for disaggregation. By disaggregating outcomes and systems indicators, data users can identify disparities, target solutions, and measure progress toward greater equity. When we couple disaggregated data on individual-level outcome indicators with systems-level condition indicators, we can hold organizations and institutions accountable for creating the conditions under which everyone can thrive, no matter their race, ethnicity, income, or pathway into the workforce.

Exhibit I.2. Indicator domains



The **evidence-based practices** component includes examples of E-W practices shown to move the needle on key outcomes and system conditions for individuals least well served by E-W systems, along with guidance for decision makers on how to select the evidence-based practices most appropriate for

their context. This component is intended to drive action by linking specific indicators to examples of interventions E-W system leaders can consider implementing to address disparities. Data alone are not enough to drive change. After disaggregating data on key indicators, E-W systems must act to close the observed disparities and continue monitoring the data for progress.

At the heart of the framework is a set of **data equity principles** for centering equity throughout the data life cycle. Data can empower practitioners, policymakers, and community members to make decisions grounded in evidence, but they can also reinforce deficit narratives, biases, and other long-standing structural inequities when used inappropriately. Data equity principles offer guidance for data users to ensure data are meaningful, accessible, and actionable for those communities least well served—thereby minimizing the risk of harm while maximizing the potential to promote greater equity through data use. For example, it is critical to have data safeguards in place and ensure that privacy and security considerations are built into the work from the beginning. This framework component provides guidance on seven leading data equity principles to help E-W systems use data in service of equity goals. The order in which the principles are listed is not indicative of their relative importance—all seven principles must be put into action to achieve data equity. In particular, engaging community members as data experts (Principle 7) is critical to successfully implementing all of the other principles and meeting equity goals.

> **"It's difficult to continuously advance economic mobility without system interventions.... The federal indicators we need to track are not responsive to the systemic challenges we face."**
>
> ***— Community advocate***

C. Who is the framework for?

The E-W Framework is designed for a broad group of policymakers, administrators, community organizations, and researchers who use education and workforce data to diagnose inequities; implement evidence-based decisions; and evaluate and monitor the impact of policies, programs, and investments to address those inequities. Effectively collecting, accessing, and using E-W data at scale requires significant coordination, collaboration, and investment across pre-K, K–12, postsecondary, workforce, and adjacent sectors. Given the framework's goals of encouraging greater cross-sector collaboration and alignment across data systems, a key audience of the framework consists of system leaders across sectors who seek to enhance the development and use of state longitudinal or pre-K-to-workforce data systems; for example, by collecting additional data, linking existing data across sectors, and reporting on new indicators to make the data more actionable. Although many states are building, expanding, or modernizing their state longitudinal data systems, it can be difficult to know which data to prioritize linking, collecting, and reporting. This resource can help system leaders to assess their current data systems, identify opportunities and gaps, and plan for future enhancements.

These system leaders should represent multiple sectors and may be representatives of agencies in a system coordination or funding role; representatives of early learning, education, workforce, and other service-providing agencies within the system; community advocates; or elected officials. For instance, key actors typically involved in governing the pre-K-to-workforce data system include the governor; state superintendent of schools; chancellor of the state university system; executive director of independent colleges; leadership representing community colleges, secretary of labor or workforce; leadership representing early childhood education; head of a department of children, youth, and

families; and other state policy leaders identified by the governor or legislature.[10] Additionally, community representatives and practitioners are beginning to play an increasingly central role within state longitudinal data system governance, as in California's new Cradle-to-Career Data System.[11]

D. How can the framework be used?

The E-W Framework offers a blueprint for improvements to data systems. In particular, the framework can help users do the following:

- Identify and track the most consequential indicators to measure along the E-W continuum, including indicators of student outcomes *and* system conditions
- Promote alignment around common definitions and equity practices
- Drive greater consistency in data collection and reporting practices
- Better support individuals least well served by current systems
- Establish processes to use data ethically and safely, thereby promoting access to information while protecting individuals' privacy

Applying the framework will vary based on the maturity of state and local data infrastructure and will depend on state and local policy agendas and resource levels. The 99 indicators in the framework are not meant to be exhaustive, nor is it expected that every state or community will implement every indicator, or all of them at once. Both practical considerations and local priorities will determine which indicators a community should track and report over time. On the practical front, some indicators require the collection of institutional data that may be readily available (for example, expenditures per pupil), whereas many others require individual-level data that administrative data systems are already collecting but may or may not be linked to other individual-level records from other sectors. Other indicators may not yet be collected systematically and might require administering a new assessment or survey tool. Also, for a small number of indicators, measurement is still being refined and tested in the field.

We acknowledge these varying degrees of data availability and measurement feasibility across indicators and contexts. However, to disrupt inequities and depart from the status quo, the framework promotes not just indicators for which data already are widely available, but those most meaningful, actionable, and important to measure based on existing research and the input of field experts and community partners. Even in cases where indicators are not or cannot be readily measured currently, by highlighting their value, we hope system leaders can prioritize key outcomes and system conditions to which they should pay attention and generate demand for more and better data.

E-W system leaders should begin by identifying essential questions based on their state priorities. For example, system leaders focused on improving transitions from high school into the postsecondary sector may be especially interested in understanding whether students have access to and complete rigorous and accelerated college preparatory coursework that prepares them for college, whether students are taking the necessary steps to submit college and financial aid applications with sufficient counseling support, and whether they are then matriculating to well-matched postsecondary institutions that successfully graduate their students with credentials of value. (See the section on Essential Questions for guidance on the questions every E-W data system should be able to answer.)

With an understanding of the priority questions, system leaders can use the E-W Framework to identify the indicators they need to measure to answer those questions. For instance, the framework

provides guidance on several student outcomes and milestones and related system conditions that need to be measured to understand and improve transitions from high school to college, such as whether students have access to and are completing college preparatory and early college coursework; whether they have access to college advising supports and submit college and financial applications on time; and whether they select well-matched postsecondary institutions, complete the necessary pre-matriculation tasks over the summer, and enroll the fall after graduating from high school.

After reviewing the list of indicators recommended for their essential questions, system leaders can determine whether the necessary data are already being collected, linked, and reported, or whether they must take action to ensure the data are available. If data for the recommended indicators and disaggregates are already available, thus enabling data analysis, system leaders may use the framework to determine whether evidence-based practices related to postsecondary transitions—such as accelerated postsecondary pathways and comprehensive, integrated advising—are already in place, or whether a new practice should be selected using guidance from the framework. System leaders may also consult the data equity principles to ensure any new or existing data are being collected, stored, analyzed, and reported in a manner that supports equity goals. The framework thus provides multiple entry points and use cases, depending on the state of existing data systems and local priorities.

The COVID-19 pandemic has provided an opportunity to reassess the types of data most needed to support decision making and invest in any necessary enhancements to data systems. An analysis of state legislation and state plans for using ESSER funds identified several areas where states are looking to improve data availability, including investing in early warning systems that identify whether students are on track for high school graduation; safely and securely gathering data on students' social, emotional, and mental health needs; and linking data to better understand transitions between K–12, postsecondary education, and the workforce.[12] In addition to ESSER, the Data Quality Campaign has highlighted other federal funding sources that state and local governments can use to collect and report the data they need to respond to the challenges presented by the pandemic.[13] Some states, like California, are also investing heavily in ambitious new plans for enhanced data systems, demonstrating that the status quo of E-W data can be reimagined and disrupted. (See the discussion about California's Cradle-to-Career Data System on the next page.)

California's cradle-to-career data system

California is undertaking an ambitious plan to develop a cradle-to-career data system, exemplifying an equity-centered approach to designing and developing a new E-W data system. Despite enrolling more students than any other state, California had historically lagged in creating a state longitudinal data system. However, in 2021, Governor Gavin Newsom signed a bill to build a data system that brings together data from early learning programs, schools, colleges, financial aid providers, employers, workforce training programs, and social service agencies. The new data system will inform six critical areas of inquiry identified by the California Cradle-to-Career Data System Act:

1. The effect of early education on student success and achievement throughout the education pipeline and in the workforce
2. The effect of state intervention programs and targeted resource allocations in primary education
3. How prepared high school students are to succeed in college
4. How long it takes students who transfer from community college to a four-year postsecondary institution to graduate with a B.A. degree
5. The effect of access to state financial aid on college access, completion, and other long-term outcomes
6. The effects of graduation from high school, community college, and four-year postsecondary institutions on workforce outcomes

As one of the last states to implement a longitudinal data system, California has learned from the successes and failures of its predecessors and implemented a series of best practices, including involving broad representation from agencies in and outside of education and community members in the design of the system, and developing a transparent, inclusive decision-making governance structure. For instance, members of the public (including practitioners, families, students, and workers) have decision-making authority on the governing board equal to that of agency leaders. A third of the seats on the governing board are reserved for members of the public. This structure is codified into the authorizing legislation.

Over 18 months, more than 200 individuals from 15 state agencies and several educational institutions, research and policy organizations, and community groups worked together to design the blueprint for the California Cradle-to-Career Data System. The blueprint identified 176 data points to prioritize for the new data system (including 37 of the indicators that appear in the E-W Framework). It detailed user personas and plans for how actionable data would be made available to them through user-centered dashboards and tools. For example, the California College Guidance Initiative, a college- and career-planning platform, will soon provide real-time data to students, parents, and educators to help them track students' progress in completing A–G course requirements necessary for admission to a four-year college.

The blueprint also included plans for community engagement and training to ensure the data could be used effectively by students, families, educators, researchers, and policymakers alike. This included emphasizing asset-based and student-centered approaches to displaying and interpreting information; providing resources in plain language and multiple languages; and partnering with community leaders to serve as messengers and build their capacity to conduct outreach about the data system. As the development and rollout of California's Cradle-to-Career Data System continues over the next several years, other states will now have the opportunity to learn from California.

E. How was the framework developed?

In April 2021, the Bill & Melinda Gates Foundation engaged Mathematica and its data equity partner, Mirror Group, to lead the development of the E-W Framework, with input from a range of experts connected to E-W research, advocacy, policy, and practice at the local, state, and federal levels. The E-W Framework builds on the prior P-16 Framework, which identifies a set of factors and critical milestones from pre-K to postsecondary education that matter most to priority students and their educational success; it also builds on a number of other leading frameworks in the field. The E-W framework offers an update to the P-16 framework by integrating new developments in the field, especially those related to workforce and mobility indicators and system-level indicators that drive inequities.

We began by convening two advisory groups that helped us develop the framework through regular convenings, meetings, and review periods:

1. An **external advisory board** of 15 E-W data experts and leaders, including state and district policymakers, researchers, and policy advocates
2. An **internal working group** of 10 Bill & Melinda Gates Foundation program officers who work with grantees across the country on early learning, K–12, postsecondary, pathways, economic mobility, and data initiatives

External Advisory Board members

- **Tauheedah Baker-Jones**
  Atlanta Public Schools
- **Keith Catone**
  Center for Youth & Community Leadership in Education (CYCLE) at Roger Williams University
- **Sagar Desai**
  StriveTogether
- **Afet Dundar**
  National Student Clearinghouse
- **Maria Echaveste**
  The Opportunity Institute
- **Nikki Edgecombe**
  Community College Research Center at Teachers College, Columbia University
- **Orville Jackson**
  GreatSchools
- **Carlise King**
  Child Trends
- **David Montes de Oca**
  CORE Districts
- **Ryan Reyna**
  Education Strategy Group
- **Zelphine Smith-Dixon**
  special education policymaker and school improvement expert
- **Mamie Voight**
  Institute for Higher Education Policy
- **Rachel Vilsack**
  National Skills Coalition
- **Terra Wallin**
  The Education Trust
- **Kelia Washington**
  Data Quality Campaign

Bill & Melinda Gates Foundation internal working group members

- **Jacklyn Altuna Willard**
  Early Education and Pathways
- **Leah Bradford Francis**
  Washington State Initiative
- **Julia Gray**
  Postsecondary Success
- **Kosar Jahani**
  Economic Mobility and Opportunity
- **Mariana Preciado**
  K–12 Education
- **Tafaya Ransom**
  Postsecondary Success
- **Jamey Rorison**
  Postsecondary Success
- **Brandee Tate**
  K–12 Education

We collaborated with these two advisory groups to identify a set of guiding design principles that center equity and reflect shared values to uphold. Exhibit I.3 lists "from-to" value statements that represent shifts in traditional approaches to performance measurement, along with corresponding design principles for the E-W Framework. We offer these design principles both for transparency and to guide how users approach the framework. For instance, one of the key values for the development of the framework was a shift from deficit to asset framing. This value translated into a design principle focused on offering definitions of student success inclusive of both academic and non-academic outcomes valued by priority communities, as well as valuing and reflecting multiple pathways to success.

Exhibit I.3. Values and design principles of the E-W Framework

"From-to" value statements	Design principles
Narrow notions of success ⇨ Broader notions of success	• Definitions of student success include both academic and non-academic outcomes valued by priority students and the practitioners and communities that support them. • The framework values and reflects multiple pathways to success.
Deficit framing ⇨ Asset framing	
Focus on a single assessment or milestone ⇨ Focus on a system of indicators	
Focus on the individual ⇨ Focus on the system	• The framework promotes cross-sector collaboration across pre-K-to-workforce systems. • Indicators of individual outcomes are presented alongside indicators of E-W and adjacent system conditions and evidence-based practices. • Indicators are actionable for policymakers and practitioners to identify and address equity gaps, including root causes.
Judgement oriented ⇨ Improvement oriented	
Accountability as blame and shame ⇨ Reciprocal and shared accountability	
Top-down approaches ⇨ Collaborative approaches	• The framework centers a diversity of knowledge and expertise, including from those who live the experiences being measured.
Prioritizing efficiency ⇨ Prioritizing trust and being responsive to needs	
Assuming racial and socioeconomic equity will be addressed if we look at disparities ⇨ Intentionally centering racial equity in determining what is measured, how it is measured, and implications for improvement	• The framework articulates and centers equity principles from development to application.
Proliferation of metrics and frameworks ⇨ Cohesive set of comparable yet relevant indicators that can be used to consistently measure equity gaps within and across locales (for example, states) and over time	• The framework prioritizes a finite set of indicators that reflect the best thinking in the field and can be measured comparably and feasibly at scale.

Note: This table is adapted from a draft of U.S. Program Design Principles by the Bill & Melinda Gates Foundation (June 2021).

"For me as a parent, it is important to get a full picture of the school outside of academics."

— Community advocate

Having identified these core values and design principles, we followed a similar approach to develop each component of the E-W Framework: we reviewed and synthesized existing frameworks, reports, and research, and then shared findings with the two advisory groups for input in a continuous feedback cycle. During working sessions with these groups, we solicited targeted feedback on the components and facilitated group dialogue to grapple with important questions, tensions, and trade-offs that emerged during development of the framework. Advisory group members pointed us to leading resources we should consult, highlighted advances and gaps in the field, and weighed in on indicators and other content to prioritize for inclusion in the framework, given its broad focus.

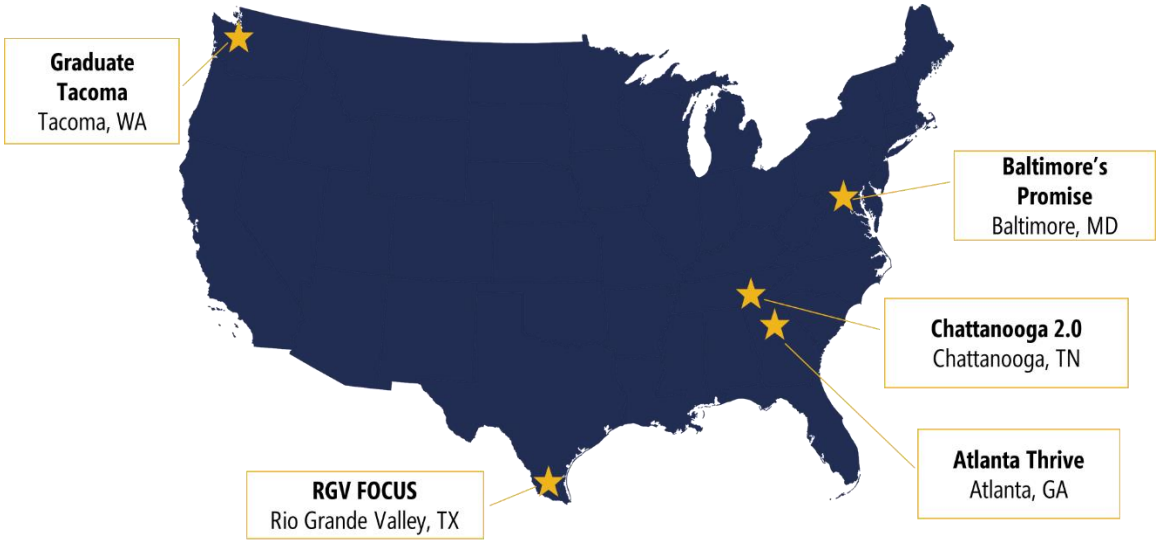
For instance, to develop the indicators component, we began by conducting a crosswalk of more than 40 existing indicator frameworks, from which we identified nearly 200 candidate indicators for initial review. To guide the review process, we identified a set of review criteria with input from the advisory boards. Review criteria included whether the indicator met the following criteria:

- Actionable for addressing inequities
- Predictive of later education or workforce success
- Meaningful to parents, students, educators, and other groups
- Feasible to measure
- Comparable across contexts
- Valid for disaggregation
- Minimizes unintended consequences (for example, unlikely to create perverse incentives)

We then presented the findings and gathered input to further refine the list of indicators, as well as their definitions and recommended metrics. The approach to developing each framework component is described in greater detail in the corresponding chapters.

In addition to engaging with the two advisory groups throughout the project, we led input sessions during the early development phase with staff and partners from five collective impact organizations across the country (Exhibit I.4) to learn about how the framework could support their work. Each of these organizations comprises parents, practitioners, community leaders, and institutional partners working together to promote systems change in their communities. These experts surfaced important gaps in current data systems and practices that too often omit contextual, system, and institutional factors that perpetuate inequities and leave out the communities most affected by decision-making processes. They also discussed other types of data they use most or wish they could use to support individuals in their communities. These sessions helped us vet and validate the framework's design principles and prioritize indicators that community leaders and advocates said were most critical to their work.

Exhibit I.4. Collective impact organizations consulted



F. Essential questions

Data systems should provide information that is useful to decision makers in advancing equity. Every state and locality should be able to ask and answer essential questions about how their students are performing and progressing throughout their education journeys from pre-K into the workforce. Easily accessible and high-quality data can make it possible to answer these questions, guide action to address equity disparities, and ensure all students are on a path toward economic mobility and security. However, current gaps in state pre-K-to-workforce data collection, system linkages, and availability make it difficult to answer critical questions about student outcomes and E-W systems. In particular, the absence of linked data across different sectors reinforces a siloed approach to policy and practice that fails to recognize and address the needs of the whole child, the whole person, or the whole community. We must take a holistic approach to inquiry and action to drive systems change.

> **"We need to ask the right questions to get the information we want to look at."**
>
> ***— Community advocate***

When deciding which indicators to prioritize for data collection and analysis, states and localities must start with a list of the essential questions about students' journeys along the pre-K-to-workforce continuum that require data to answer. In many instances, decision makers already have access to large quantities of data—though these data may not always be what are needed to answer the questions that matter most. It is quite possible to be "data rich but information poor." Along with disaggregation, approaching data through the lens of essential questions can support a culture of inquiry and continuous improvement and promote data-driven decision making.[14] In fact, research shows that when school leaders used essential questions to guide collaborative data use in their schools, staff became more engaged with the process and quickly learned how to identify and analyze different types of data to answer those questions.[15]

Below, we have compiled 20 questions we see as essential for E-W data systems to answer. Each of these questions can be mapped back to key outcome and milestone indicators, as well as the E-W and adjacent system conditions indicators that appear in the framework. (See Appendix F for a mapping of questions to indicators.) Although some of these questions may receive greater attention depending on local policy priorities, we believe all 20 questions are critical for assessing and addressing disparities along the pre-K-to-workforce continuum and guiding action to ensure all individuals can achieve economic mobility and security. To ensure these questions lead to meaningful action, data should be disaggregated by race, income, gender, and other characteristics to reveal disparities that may be masked in the aggregate.

We encourage framework users to follow an essential-questions approach to determine how the framework can best support their needs. Essential questions can help system leaders prioritize new data they need to collect and highlight opportunities to yield greater insight from existing data (for example, by linking data or creating new data dashboards or reports). In addition to tracking trends in localities over time, these questions should be used to identify which schools and institutions are serving their students well—and which are not—to better understand how to address disparities and improve student outcomes. Communities may have variations on the questions that are most important in their contexts, but we offer these 20 essential questions as a starting point for conversations around data and equity.

20 essential questions for E-W systems

The following essential questions can be answered using indicators from the E-W Framework:

1. Do students and families have access to adequate **public supports** and **neighborhood conditions** to enable them to succeed academically and in the workforce?
2. Are eligible children enrolled in **quality, full-day pre-K programs**?
3. Are children demonstrating **kindergarten readiness** across the five learning domains?
4. Do students have access to **quality, full-day kindergarten**?
5. Are students demonstrating satisfactory **academic progress, consistent attendance,** and **positive behavior** to be considered **on track in the early grades**?
6. Do students have **access to quality school environments**, including quality curricula and instruction, experienced teachers, effective leaders, and adequate funding?
7. Are there populations of students that disproportionately experience **exclusionary discipline practices** that disrupt their educational experience?
8. Are students meeting **reading and math benchmarks** in grades 3 and 8?
9. Are teachers and schools making sufficient **contributions to academic growth** for students?
10. Do students attend schools with **safe, inclusive,** and **supportive environments** that support their **social, emotional, mental,** and **physical development and well-being**?
11. Are students demonstrating satisfactory **academic progress, consistent attendance,** and **positive behavior** to be considered **on track for high school graduation**?
12. Do students have access to and complete rigorous and accelerated **college preparatory coursework**?
13. Are students taking the necessary steps to **apply to college** after high school with sufficient **counseling support**?
14. Are students **graduating from high school** on time and successfully transitioning into **further education, training, or employment**?
15. Are there **quality pathways** for students who pursue career training that lead to employment in **quality jobs**?
16. Are students **matriculating to well-matched postsecondary institutions** that successfully graduate their students with credentials of value?
17. Do students attend postsecondary institutions that provide **adequate financial aid** and are **adequately funded** to offer a quality educational experience?
18. Are students experiencing sufficient **early momentum in postsecondary education** to be on track for on-time completion?
19. Are students **completing credentials of value** after high school that set them up for success in the workforce?
20. Are students gaining access to **quality jobs** that offer **economic mobility and security** after high school or postsecondary training and education?

Introduction and approach endnotes

[1] Dorn, E., Hancock, B., Sarakatsannis, J., & Viruleg, E. (2020). *COVID-19 and learning loss—disparities grow and students need help.* McKinsey & Company. https://www.mckinsey.com/industries/public-and-social-sector/our-insights/covid-19-and-learning-loss-disparities-grow-and-students-need-help

[2] Hutchins Coe, E., & Enomoto, K. (2020). *Returning to resilience: The impact of COVID-19 on mental health and substance use.* McKinsey & Company. https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/returning-to-resilience-the-impact-of-covid-19-on-behavioral-health

[3] Office for Civil Rights. (2021). *Education in a pandemic: The disparate impacts of COVID-19 on America's students.* U.S. Department of Education. https://www2.ed.gov/about/offices/list/ocr/docs/20210608-impacts-of-covid19.pdf

[4] Bateman, N., & Ross, M. (2021). *The pandemic hurt low-wage workers the most—and so far, the recovery has helped them the least.* Brookings Institute. https://www.brookings.edu/research/the-pandemic-hurt-low-wage-workers-the-most-and-so-far-the-recovery-has-helped-them-the-least/

[5] Liu, R. (2021). Disparities in disruptions to postsecondary education plans during the COVID-19 pandemic. *AERA Open, 7.* https://doi.org/10.1177/23328584211045400

[6] Gonzalez, N., Aikens, N., & Gosciak, J. (2021). *What drives systems change? Key findings and implications from a literature review on systems change in education.* Mathematica. https://www.mathematica.org/publications/key-findings-and-implications-from-a-literature-review-on-systems-change-in-education

[7] Sirinides, P., & Coffey, M. (2021). *Using data to support systems building activities: PDG B-5*

application review and impact of COVID-19 on grant activities. SRI International. https://childcareta.acf.hhs.gov/sites/default/files/public/pdgb5ta_datasystem_applicationreview_acc.pdf

[8] Education Commission of the States. (2021). *50-state comparison: Statewide longitudinal data systems 2021.* https://reports.ecs.org/comparisons/statewide-longitudinal-data-systems-2021-03

[9] Karva, F. (2021). *Time to act 2021: Solving for disconnects across local, state, and federal priorities.* Data Quality Campaign. https://dataqualitycampaign.org/time-to-act-2021-governance-priorities-in-education-data/

[10] Shah, R., Kowalski, P., & Sonn, L. (2012). *Pivotal role of policymakers as leaders of P-20/workforce data governance.* Data Quality Campaign. https://dataqualitycampaign.org/resource/pivotal-role-policymakers-leaders-p-20workforce-data-governance/

[11] State of California Cradle-to-Career System. *Governing board members.* https://c2c.ca.gov/governing-board-members/

[12] Karva, F. (2021). *Time to act 2021: Solving for disconnects across local, state, and federal priorities.* Data Quality Campaign. https://dataqualitycampaign.org/time-to-act-2021-governance-priorities-in-education-data/

[13] Data Quality Campaign. (2021). *State and local governments can use federal funding for education data.* https://dataqualitycampaign.org/resource/federal-funding-for-eddata/

[14] Lachat, M. A., Williams, M., & Smith, S. C. (2006). Making sense of all your data. *Principal Leadership, 7*(2), 16–21. https://eric.ed.gov/?id=EJ767092

[15] Lachat, M. A., & Smith, S. C. (2005). Practices that support data use in urban high schools. *Journal of Education for Students Placed at Risk. 10*(3), 333–349. https://doi.org/10.1207/s15327671espr1003_7

II. Indicators and metrics

A. Overview

In this chapter, we describe the evidence base and measurement guidance for the 99 indicators selected for inclusion in the Education-to-Workforce Indicator Framework (E-W Framework). The indicators included in this framework were selected because research and input from our partners support their power to inform local, state, and federal policy and practice to promote equity and enable individuals to achieve economic mobility and security. As illustrated in Exhibit II.1, the indicators are organized into the following three categories:

1. **Outcomes and milestones.** Key outcomes and milestones along the E-W continuum strongly associated with individuals achieving economic mobility and security. There are 55 indicators in this category.
2. **E-W system conditions.** Key institutional or systemic environments, policies, and practices within E-W systems that support positive E-W outcomes. There are 34 indicators in this category.
3. **Adjacent system conditions.** Key experiences, situations, and circumstances outside of E-W systems that support positive E-W outcomes. There are 10 indicators in this category.

Within each category, the indicators are organized according to three interrelated domains that shape individuals' progression toward economic mobility and security: **academic progress and completion**; **physical, mental, and social well-being**; and **career readiness and economic success**.

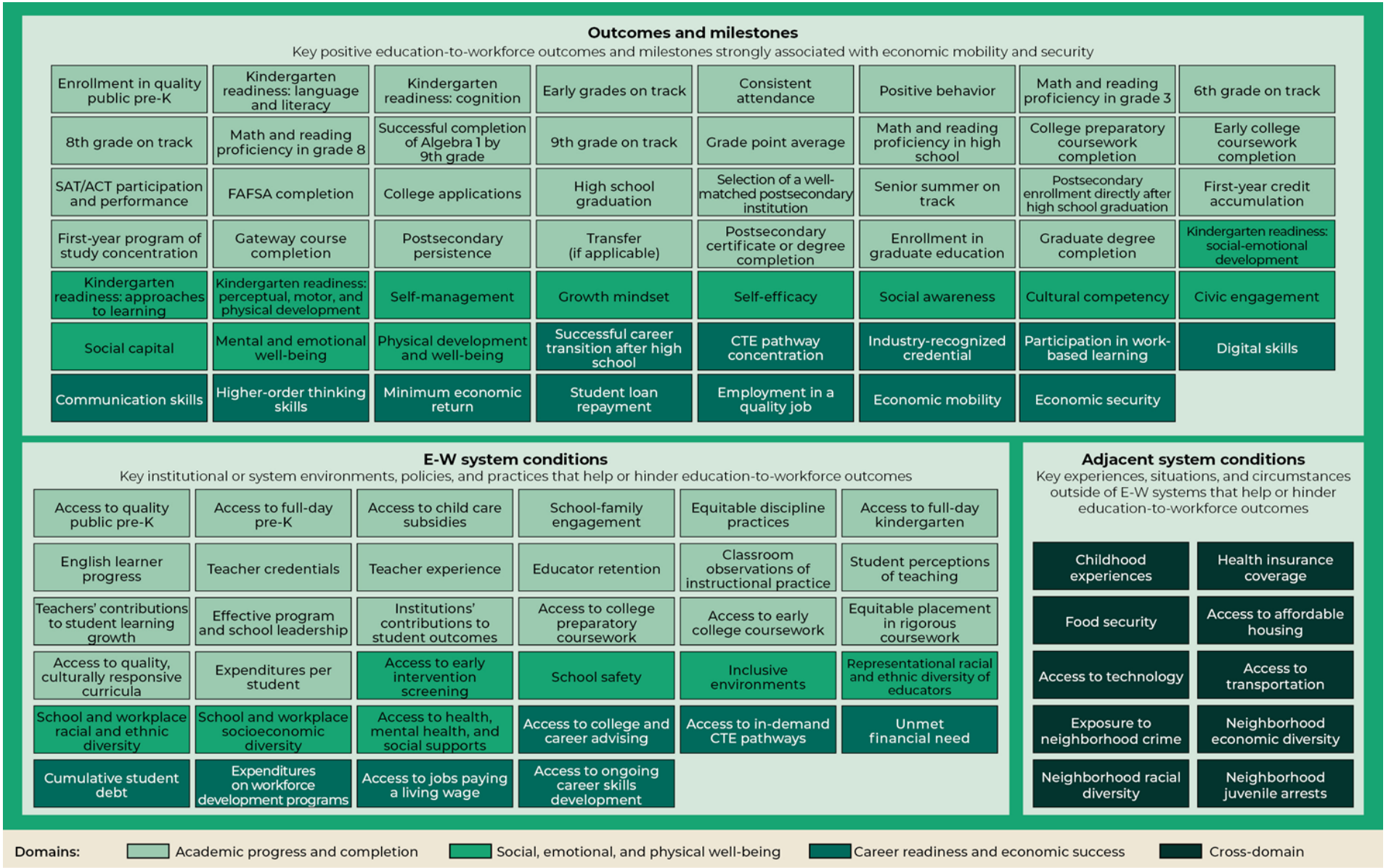
Framework users can adapt their use of indicators based on their local policy priorities and top essential questions, but we encourage them to examine all three types of indicators together because data on system conditions—both within and adjacent to E-W systems—are essential for understanding and acting on data on student outcomes and milestones. The reverse is also true: data on outcomes and milestones shed light on the performance of these systems and inform where users should intervene to better support individuals along their journeys from pre-K to the workforce. When we collect and disaggregate both types of data, we can help ensure organizations and institutions are creating the conditions in which everyone can thrive, no matter their race, ethnicity, income, or other characteristics.

For each indicator, we provide the following information:

- **Sectors.** The sectors that should prioritize measuring an indicator (pre-K, K–12, postsecondary, and workforce). Although some indicators are most relevant to just one sector, many apply to multiple sectors.
- **Definition.** A suggested definition for the indicator that can be applied across contexts.
- **Why it matters.** A summary of the evidence of an indicator's predictive value and opportunities to address known disparities among priority groups.
- **Recommended metric(s).** Recommendations for operationalizing the measurement of an indicator in each sector. For indicators requiring survey data, we suggest instruments with an evidence base, though users may consider different instruments, depending on their context.
- **Data source.** The likely source for the data needed to measure the indicator, including administrative data regularly collected as part of institutions' general operations (for example, in student information systems and employee performance management systems), and data from assessments, transcripts, and surveys (which can be loaded into data systems).

- **What to know about measurement.** Considerations about measurement of the indicator, including feasibility, comparability, and risks for unintended consequences. We also note when there is limited consensus on measurement and opportunities to advance the field.
- **Source frameworks.** The number of sources (including indicator frameworks, program reporting guidelines, and data system elements) consulted that include the indicator or a version of it. We also note frameworks that we closely followed to develop the indicator's recommended definition and metrics to leverage best practices from the field.

Exhibit II.1. Indicator overview



Indicator review process

Mathematica took a multistep approach to reviewing and prioritizing indicators for the framework. We began by conducting a crosswalk of more than 40 existing frameworks, from which we identified nearly 200 candidate indicators for initial review. To guide the review process, we identified and prioritized a set of review criteria with input from the advisory boards. Exhibit II.2 defines each criterion used to review the indicators during two rounds of review. (The complete review rubric appears in Appendix C.)

In Round 1, Mathematica subject matter experts in the areas of pre-K education, K–12 education, postsecondary education, and workforce used evidence to review, rate, and prioritize indicators based on the three top criteria that our partners prioritized: (1) actionable for addressing inequities; (2) predictive of economic mobility and security; and (3) meaningful to community groups, including parents, students, practitioners, and advocates. To make these assessments, we reviewed existing research studies (including past work summarizing parent, student, and community priorities around E-W data). We also noted which source frameworks had gathered input from community members in their development and mapped that back to the indicators under review. (Of the 41 source frameworks consulted, 11 gathered input from community members.) Finally, we spoke to members of five select collective impact initiatives to gauge the types of information most actionable and meaningful to their work.

Having identified a set of the most actionable, predictive, and meaningful indicators, our next step was to review the indicators that advanced to Round 2 with a focus on measurement. The Round 2 criteria included whether an indicator can be measured feasibly, comparably, and reliably for priority groups, allowing for disaggregation, and whether its measurement minimizes unintended consequences. To make these assessments, Mathematica subject matter experts reviewed available data sources, technical documentation, and other research that documented approaches and limitations to measuring the indicators. During and after each round of the review process, we gathered input from the advisory groups, which helped us identify potential gaps in the source frameworks and research consulted, prioritize indicators to include or exclude, and refine the measurement guidance for each indicator.

In particular, we weighed trade-offs between what researchers and communities say is most critical to measure to support equity goals and what can currently be measured feasibly, comparably, and reliably. The latter criteria reflect what is possible today, and therefore risk reinforcing the status quo. Based on input from our collaborators, we placed less weight on the Round 2 measurement criteria compared to Round 1 criteria, placing comparatively *more* emphasis on whether indicators are actionable, predictive, and meaningful. Thus, we acknowledge that some indicators are more "aspirational" in their measurement, as noted in the measurement guidance for each indicator. Some indicators are already collected regularly through administrative data systems, whereas others require safely and securely linking individual-level records from multiple sectors. Other indicators may not yet be collected systematically and might require administering a new assessment or survey tool. And for a small number of indicators, measurement is still being refined and tested in the field. However, an important goal for the framework is to recognize the innovative work happening across the country and encourage greater field coordination as we strive to measure what matters most.

Exhibit II.2. Criteria used to assess indicators

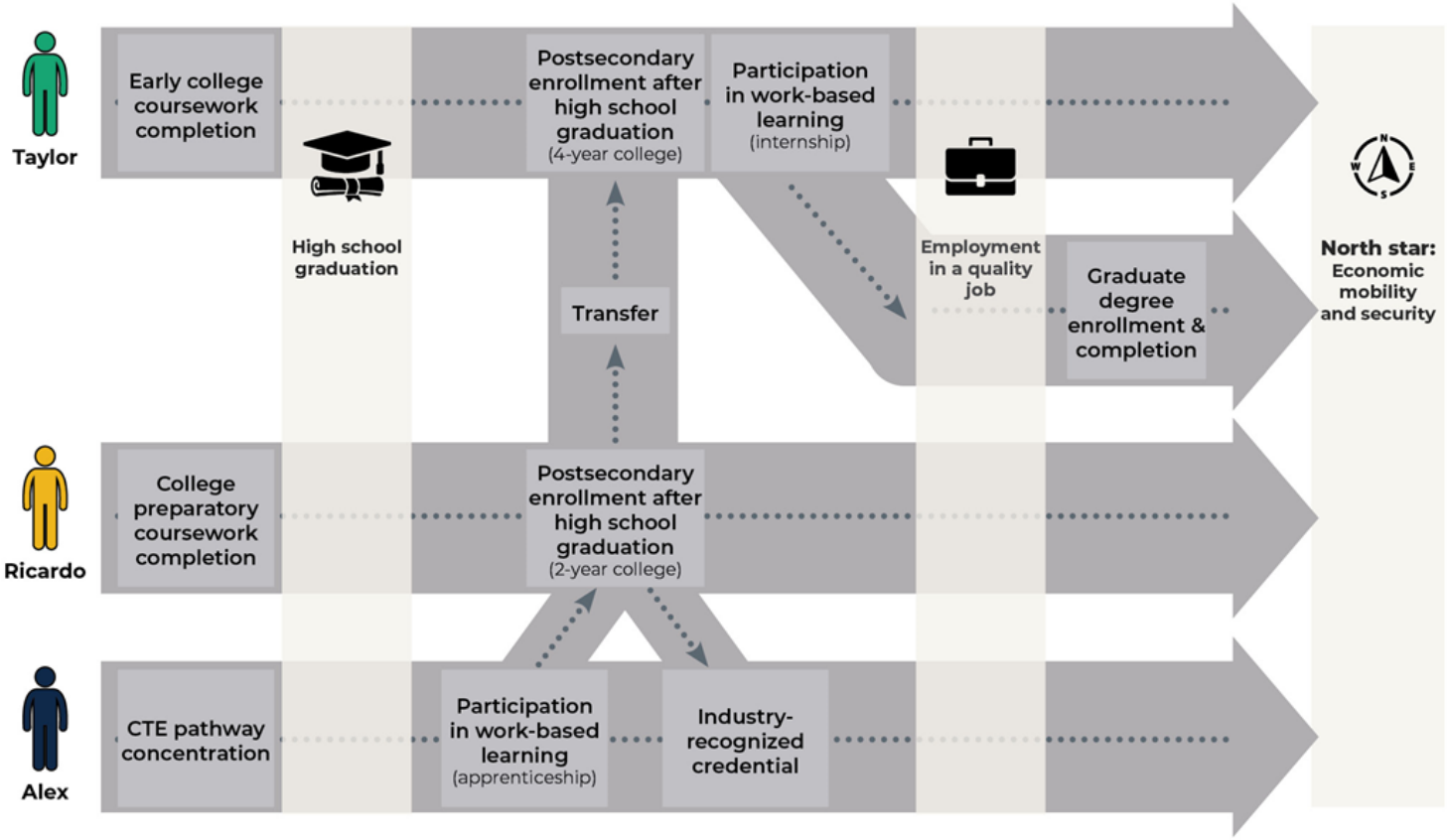
	Criterion	Definition
Round 1 review	**Actionable**	There is significant potential for improvement in addressing disparities, and data for the indicator can be available on a regular, frequent basis—at least annually.
	Predictive	Theory, research, or both suggest a strong association between the indicator and economic mobility and security (or milestones along the way) for priority groups.
	Meaningful	The indicator is considered meaningful by priority communities.
Round 2 review	**Feasible**	Data to measure the indicator are widely available or feasible to collect at reasonable cost in relation to the indicator's value for addressing inequities.
	Valid for disaggregation	There is credible evidence about the validity and reliability of data to measure the indicator for priority groups, allowing for disaggregation.
	Comparable	Data for the indicator can be measured comparably across time and place.
	Minimizes unintended consequences	The indicator is difficult to manipulate to make a district, school, university, or similar entity appear more equitable and is not likely to create perverse incentives.

Pathways to economic mobility and security

As discussed in the introductory section of this report, we are committed to ensuring the framework values and reflects *multiple* pathways to success. Our recommended indicators capture diverse experiences, reflecting the reality that—especially in high school and beyond—individuals can take varied and non-linear pathways to achieve economic mobility and security. E-W data systems must ensure they capture multiple pathways from K–12 to the workforce, such as those illustrated in Exhibit II.3, to fully understand individuals' experiences and how best to support them. Taylor, Alex, and Ricardo each take different pathways through postsecondary and career training to secure employment in a quality job. Despite the variation in their pathways and chosen professions, each of their jobs offers fair pay and benefits, opportunities for advancement, and support for ongoing career skills development—ultimately enabling each of them to achieve economic mobility and security.

Exhibit II.3. Illustrative E-W pathways

This graphic illustrates a few possible pathways to economic mobility and security. It is not necessarily representative of "ideal" pathways or all potential pathways to success. Given that there is less variation in early learning and elementary education settings, the pathways depicted here begin in high school.



Pathways are shaped by **system conditions** and are enabled by **social-emotional** and **career readiness skills**.

Taylor completes and earns college credit for Advanced Placement (AP) English and AP Statistics courses in high school. She goes on to attend a four-year college and earns a bachelor's degree in communications. During the semester after her graduation, Taylor completes a paid internship with a marketing firm, which leads to full-time employment at the same company. After a few years, Taylor decides to pursue a career change and enrolls in a master's degree program in Education. Upon obtaining her master's degree, Taylor re-enters the workforce as a high school English teacher.

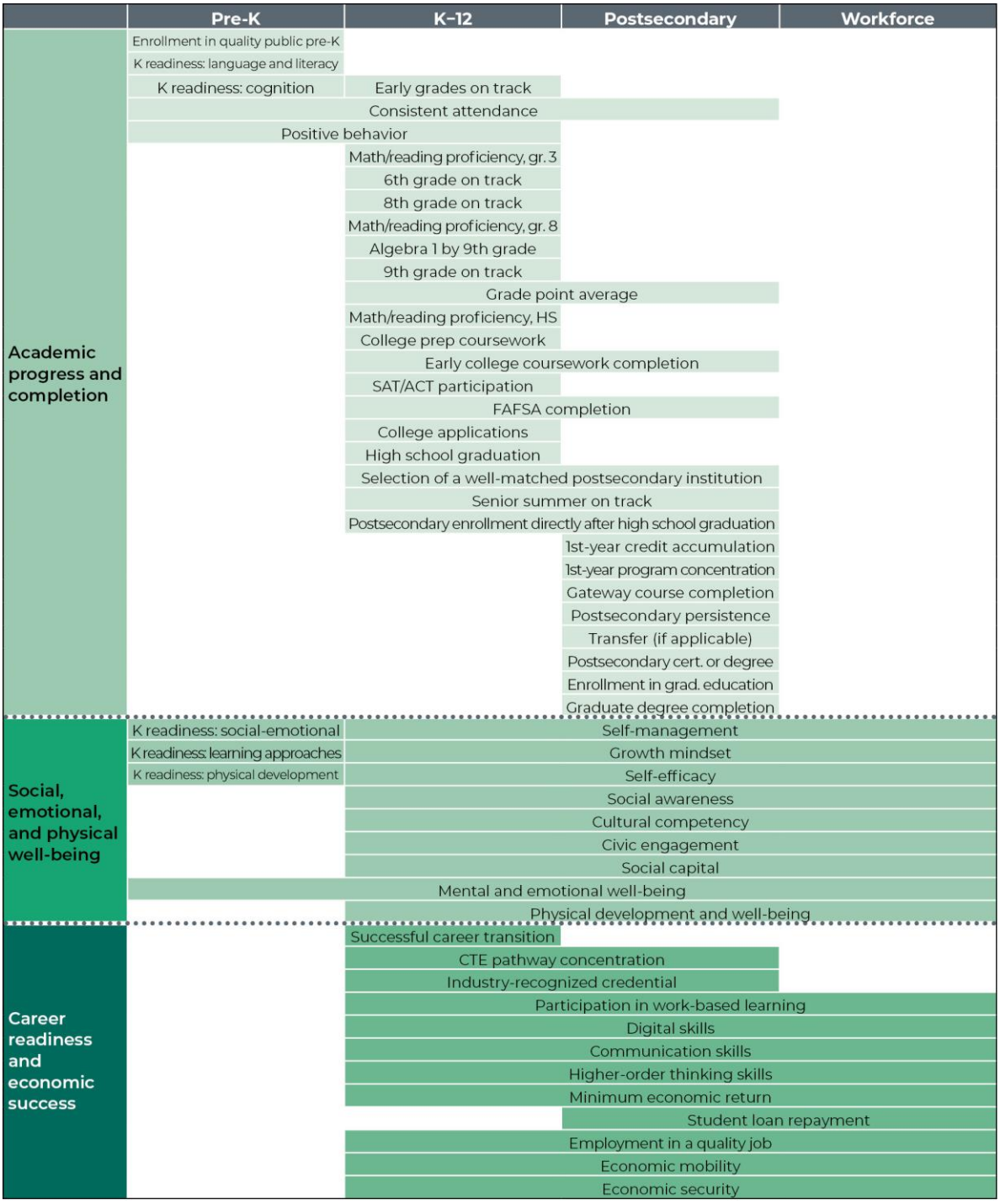
Ricardo completes general college preparatory coursework in high school and, upon graduating high school, is uncertain of what career field he is interested in pursuing. Ricardo enrolls in a two-year college, where he discovers an interest in environmental sustainability. He then transfers to a four-year university and completes a bachelor's degree in environmental engineering. Ricardo participates in an internship for credit during his last year of college, preparing him for a job as an environmental engineer.

Alex concentrates in an information technology career and technical education (CTE) program in high school. After graduating high school, they participate in a registered apprenticeship, gaining valuable hands-on experience. After completing their apprenticeship, Alex enrolls in and completes a two-year cybersecurity degree program and earns an industry-recognized cybersecurity certification. Alex's combined education and work experience make them an attractive candidate for information management and cybersecurity jobs.

B. Outcomes and milestones

Outcomes and milestones include key student outcomes and milestones along the E-W continuum that are strongly related to achieving economic mobility and security. Exhibit II.4 presents a summary view of the outcomes and milestones indicators in each domain and sector.

Exhibit II.4. Outcomes and milestones indicators



Cert. = certificate; CTE = career and technical education; gr. = grade; grad. = graduate; K = kindergarten.

DOMAIN: Academic progress and completion

Enrollment in quality public pre-K

Definition: Eligible children are enrolled in a publicly funded pre-K program, which can be administered through mixed delivery systems that include Head Start, pre-K classrooms in public schools, and licensed family-based child care programs and community-based organizations.

Why it matters: Pre-K is a first step into K–12 education and establishes an enduring base for future learning. Attending pre-K can boost children's school readiness, start them on trajectories of academic and life success, and produce a return on investment over time, particularly for children from low-income families and children of color.[16, 17, 18] Lifelong benefits of participating in high-quality early learning include higher earnings, improved health, lower participation in social services programs, and lower chances of involvement with the criminal justice system. However, pre-K enrollment patterns vary by race and ethnicity.[19, 20, 21] As of 2017, enrollment rates among Latino children were lower (30 percent) than those among Black children (34 percent) in publicly funded pre-K programs in their neighborhood.[22] In an analysis of Head Start participation, the participation rate among Latino children was 38 percent, compared with 54 percent for Black children and 43 percent for all eligible children.[23]

Recommended metric(s): Percentage of eligible 3- and 4-year-olds enrolled in public pre-K

Data source(s): Administrative data

What to know about measurement: This indicator focuses on public pre-K given that a growing proportion of children of color and those experiencing poverty attend these programs.[24] However, these populations also attend pre-K programs that are not publicly funded,[i] so systems may also consider broadening data collection efforts. State-by-state data on public pre-K enrollment are generally available and are more feasible to collect than data on other programs, because publicly funded programs are subject to regulatory standards and quality monitoring that require data tracking.

Drawing on individual-level records across state systems, aggregate data on pre-K enrollment are reported in different public sources. The National Institute of Early Education Research (NIEER) publishes an annual State of the Preschool Yearbook with statewide enrollment numbers. NIEER reports the number of children of all ages in state pre-K programs, in addition to federally funded Head Start and state-funded Head Start enrollment numbers for 3- and 4-year-old children. However, it does not report enrollment data for 3- and 4-year-old children in other publicly funded programs, such as licensed family-based child care programs and community-based organizations. The Civil Rights Data Collection (CRDC) publishes the number of pre-K students served in local education agency facilities only,[25] and the National Center for Education Statistics (NCES) annually collects school enrollment rates of all 3- to 5-year-olds.

[i] Children might also attend programs that do not receive public funds. These programs vary in their data collection, including private community-based centers that may offer scholarships (such as a local YMCA or community center), classrooms in religious institutions (such as a church preschool), or other out-of-market options that are financially accessible to families with low incomes, but are not publicly funded.

Source frameworks: Enrollment in pre-K appeared in 12 source frameworks reviewed for this report. Our recommendation to emphasize *public* pre-K aligns with recommendations put forth by the Center on Enhancing Early Learning Outcomes (CEELO) and the Council of Chief State School Officers (CCSSO).[26]

Kindergarten readiness: language and literacy

PK K12 PS WF

Definition: Children develop and demonstrate foundational language and literacy skills.

Why it matters: Children's early language and literacy skills are key areas of development underlying their later academic success.[27, 28, 29, 30] However, disparities in language and literacy skills and knowledge between White and Black children and White and Latino children appear as early as age 3.[31, 32] Compared with their White peers, Black and Latino children enter kindergarten 7 to 12 months behind in literacy and language skills, on average.[33] As noted in the E-W system conditions section of this report, there is inequitable access to quality pre-K education that promotes positive outcomes for all children.

Recommended metric(s):

- Percentage of children meeting benchmarks on a teacher-reported kindergarten readiness assessment, such as:
  - Desired Results Developmental Profile (DRDP) Language and Literacy Development domain[34]
  - Ready 4 Kindergarten Early Learning Assessment (R4K ELA) Language and Literacy domain[35]
  - Teaching Strategies GOLD (TS GOLD) Language and Literacy subscales[36]
- Or, percentage of children meeting benchmarks on direct child assessments administered by trained assessors, such as:
  - Woodcock-Johnson IV Tests of Early Cognition and Academic Development (ECAD) Letter-Word and Writing subtests[37]
  - Individual Growth and Development Indicators (IGDIs) Early Literacy assessment[38]

Data source(s): Assessments

Hamilton County's Camp K

Camp Kindergarten, or Camp K, is a free kindergarten readiness program serving children and families in Hamilton County, Tennessee. Hamilton County launched a pilot of Camp K in 2018, enrolling 211 children and using kindergarten readiness data to monitor their progress. Fifty percent of Camp K children scored "on target" on their kindergarten screening, higher than the district average of 21 percent for children from low-income communities and 42 percent overall. As of 2019, 400 kindergarten-age children across 15 schools in Hamilton County enrolled.

Camp K's curriculum focuses on foundational English and literacy skills, as well as social and emotional development. A head teacher leads a class of 15 children with assistance from a preservice teacher. Parents of children enrolled in Camp K attend weekly sessions hosted by community partners that offer resources to advocate for their child's learning and development.

Camp K was the result of a collective impact initiative around early learning between Hamilton County Schools and community partners.

What to know about measurement: Kindergarten readiness assessments, which teachers complete, are an increasingly popular option for assessing a broad range of school readiness skills, including language and literacy. An estimated 43 states have or are developing kindergarten readiness assessments.[39] These measures are mostly used as formative, not summative, assessments, and are not designed for accountability or high-stakes testing.[40] For example, the past use of these assessments for accountability in Florida faced pushback and eventually was discontinued.[41]

Teacher-reported kindergarten readiness assessments are generally more feasible to conduct at scale than standardized direct child assessments, which have greater reliability and validity[42] and thus allow for comparison across children, classrooms, and pre-K programs.[43] However, direct child assessments may be burdensome to administer or may not be completed for every child. Direct child assessments such as the ECAD or IGDIs must be administered by trained assessors.

Current research is limited on whether kindergarten readiness assessments are reliable and valid for children who speak a language other than English at home.[44] However, the DRDP has specific items for teachers to report on English language development for children who speak a non-English language at home and is a promising measure.[45] Some research indicates that the TS GOLD functions well with children whose home language is not English.[46]

Source frameworks: Kindergarten readiness appeared in 10 source frameworks reviewed for this report. Our proposed definition and measures align with the five domains of kindergarten readiness summarized in the Getting Ready framework, prepared by Rhode Island KIDS COUNT,[47] which are also included in the Head Start Early Learning Outcomes Framework.[48]

Kindergarten readiness: cognition

Definition: Children develop and demonstrate foundational math and scientific reasoning skills.

Why it matters: Children's cognition, including math and scientific reading skills, is essential for a growing number of tasks.[49] Children's early skills in this domain set the course for their later achievement, with the skills that children demonstrate at an early age being the strongest predictors of their later school achievement.[50, 51, 52, 53] For math skills in particular, disparities by race, ethnicity, and income appear early and widen during early childhood.[54, 55] Compared with White children, Black and Latino children enter kindergarten 9 to 10 months behind in math skills, on average.[56] As noted in the E-W system conditions section of this report, there is inequitable access to quality pre-K education that promotes positive outcomes for all children.

Recommended metric(s):

- Percentage of children meeting benchmarks on teacher-reported kindergarten readiness assessment, such as:
  - Desired Results Developmental Profile (DRDP) Cognition domain[57]
  - Ready 4 Kindergarten Early Learning Assessment (R4K ELA) Mathematics and Science domains[58]
  - Teaching Strategies GOLD (TS GOLD) Cognitive and Mathematics subscales[59]

- Or, percentage of children meeting benchmarks on direct child assessments, such as:
  - Woodcock-Johnson IV Tests of Early Cognition and Academic Development (ECAD) Number Sense subtest[60]
  - Individual Growth and Development Indicators (IGDIs) Early Numeracy assessment[61]
  - Research Based Early Mathematics Assessment (REMA)[62]

Data source(s): Assessments

What to know about measurement: This indicator's measurement considerations are similar to those noted above under the *kindergarten readiness: language and literacy* indicator. Children's cognition skills can be measured through direct child assessments, but kindergarten readiness assessments, which ask teachers to report and rate children's skill development, are increasingly common and less burdensome to implement at scale. For example, the DRDP has one subscale that measures cognition, including math and science skills. These items ask teachers to rate children's development of number sense, measurement, patterning, shape recognition, cause and effect, inquiry through observation and investigation, and understanding of objects and their characteristics. As noted in the *kindergarten readiness: language and literacy* indicator discussion, these assessments should only be used for formative purposes.

Source frameworks: Kindergarten readiness appeared in 10 source frameworks reviewed for this report. Our proposed definition and measures align with the five domains of kindergarten readiness summarized in the Getting Ready framework, prepared by Rhode Island KIDS COUNT,[63] which are also included in the Head Start Early Learning Outcomes Framework.[64]

Early grades on track

Definition: Students in grades 1 and 2 are on track to achieve academic proficiency in grade 3.

Why it matters: An on-track measure before grade 3 can help schools target additional support to students at risk of not meeting grade-level proficiency standards in grade 3, which is a strong predictor of later outcomes. For example, a study in three diverse urban districts found that math and reading benchmark performance and growth and chronic absenteeism in grades K–2 were important and consistent predictors for reading success in grade 3.[65] Early on-track measures are relatively newer than those used in middle and high school, but have been implemented in some contexts, such as Montgomery County Public Schools,[66] to identify students who need support as early as grade 1. Disparities in children's early-grade outcomes along income and race are evident, pointing to the need for early intervention.[67, 68] For instance, a study of nationally representative data found that at the start of grade 1, Black children's reading proficiency was three months behind that of White children, and math proficiency was almost five months behind; these disparities were only slightly smaller for Latino children.

Recommended metric(s): Percentage of students in grades 1 and 2 meeting grade-level math and reading benchmarks, with an attendance rate of 90 percent or higher, and no in- or out-of-school suspensions or expulsions

Data source(s): Assessments; administrative data

What to know about measurement: Each on-track indicator in the E-W Framework is supported by research conducted in specific district contexts; therefore, the specific criteria used to define whether a student is on track might not predict long-run outcomes equally well in all settings. To define this indicator, we drew on research in Montgomery County Public Schools,[69] which found that grade 1 students well below grade level in reading, math, or both; absent nine or more days; or suspended one or more times were significantly more likely to drop out of high school. If possible, research based on local data should be conducted to validate this measure of students' on-track status in other settings.

Although attendance and suspension data are generally available to measure this indicator, benchmark tests in early grades are not universally administered and can vary across states and districts. Math and reading proficiency are measured in kindergarten through grade 2 in 37 states (as well as the District of Columbia). Assessments range from screeners and diagnostic assessments to formative and summative assessments.[70] Thus, this indicator might not be fully comparable across contexts and might not be feasible in districts that do not currently give early-grades assessments. Emerging multilingual students should be tested in their home language, though not all assessments make this possible. Additional considerations for attendance and discipline data are discussed in the next two indicators (*consistent attendance* and *positive behavior*).

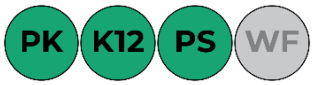
Montgomery County's early warning sign system

Montgomery County Public Schools, located in a Maryland suburb of Washington, DC, developed an early warning data system to measure whether students are on track to graduate high school and intervene early to better support their future learning. The system uses attendance, behavior, and coursework indicators to assess a student's likelihood of future school dropout. For students in grade 1, key predictors of dropping out of high school included receiving grades equivalent to a grade point average below 1.2, not meeting grade-level math and reading benchmarks, being absent more than nine days, and receiving at least one suspension. Based on the results of a longitudinal analysis, other predictors and thresholds were used to identify students at risk of falling behind in other grades.

Teachers use the early warning data system to create personalized learning plans to address each student's needs. These learning plans also account for circumstances outside of the classroom that may affect a student's ability to stay on track, such as experiences related to poverty or complex family dynamics. The Montgomery County superintendent, Joshua P. Starr, acknowledges that early on-track indicators can be misused to stigmatize or label students early on as high school dropouts. Instead, he encourages districts to use the tool and measures as a pulse check for educators and district leaders to adjust their supports based on individual students' needs and circumstances.

Source frameworks: Although general "academic proficiency" or "academic progress" in K–12 appeared in four source frameworks reviewed for this report, none of the source frameworks specifically included an early grades on track indicator. As discussed above, our proposed definition and measure draw on research in Montgomery County Public Schools.[71]

Consistent attendance



Definition: Students are present for more than 90 percent of enrolled days.

Why it matters: Students must be consistently present to learn and succeed in school. Consistent attendance (attending 90 percent or more of school days) is a positive reframing of chronic absenteeism (missing 10 percent or more of school days), a metric which is widely used in the field and is negatively correlated with other measures of school performance. Research shows that absenteeism is related to reduced math and reading achievement outcomes, reduced educational engagement, and reduced social engagement.[72, 73, 74, 75] Chronic absenteeism in middle school and high school is also related to lower rates of on-time graduation.[76] As one specific example, Allensworth and Easton[77] found that course attendance was eight times more predictive of failing a 9th-grade course than were 8th-grade test scores, and that attendance was the strongest predictor of overall grades. At the postsecondary level, attendance has a strong positive relationship with course grades and college grade point average (GPA).[78] Attendance is also commonly used in college early warning systems to help identify students at risk of falling behind and improve retention and graduation rates.[79, 80]

Despite issues with tracking attendance during the COVID-19 pandemic, the available data show significant increases in chronic absenteeism during this period.[81, 82] For instance, in Connecticut—one state that required regular attendance taking during the pandemic and standardized attendance tracking across learning modes—rates of absenteeism increased from 12 to 20 percent from 2020 to 2021; however, students from low-income households and Black and Latino students were two to three times more likely to be chronically absent than students from higher-income households and of other races and ethnicities.[83]

Recommended metric(s): Percentage of students who are present for more than 90 percent of their enrolled days, excluding students enrolled for fewer than 90 days

Data source: Administrative data

What to know about measurement: Pre-K and K–12 schools regularly collect attendance data as part of their normal operations. However, the COVID-19 pandemic has raised the importance of establishing a common definition of what constitutes a full day of attendance across all modes of instruction, including in-person, remote, asynchronous, and hybrid. At the postsecondary level, colleges with early warning systems often track student attendance,[84] though the extent to which they track attendance and methods for doing so vary widely across institutions, making this indicator more challenging to measure at scale in postsecondary contexts.[85, 86]

We selected an attendance rate of 90 percent as a minimum recommendation to align with the most commonly reported measure of chronic absenteeism, used by Attendance Works and the Civil Rights Data Collection (CRDC). However, data users might conduct further analyses of attendance data. For example, Attendance Works recommends examining satisfactory attendance (missing less than 5 percent of school days), at-risk attendance (missing 6 to 10 percent of school days), moderate chronic absence (missing 10 to 19 percent of school days), and severe chronic absence (missing 20 percent or more of school days).[87] Although these thresholds are commonly used to determine whether students are chronically absent across grade levels, we encourage framework users to examine attendance by

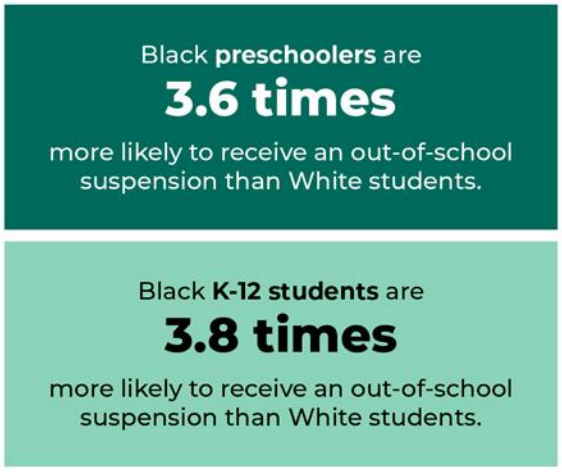
grade level, as students in later grades tend to have lower attendance rates, on average, than students in early grades.[88]

Source frameworks: This indicator appeared in 12 source frameworks reviewed for this report. As discussed above, our proposed measure aligns with the commonly accepted definition of chronic absenteeism put forth by the P-16 Framework,[89] Center on Enhancing Early Learning Outcomes (CEELO) and the Council of Chief State School Officers (CCSSO) Birth to Grade 3 Framework,[90] and the CORE Districts' Improvement Measures.[91]

Positive behavior

PK K12 PS WF

Definition: Students are not suspended or expelled from school and do not experience other types of exclusionary discipline, such as restraint and seclusion.



Source: U.S. Department of Education, Office of Civil Rights (2016).

Why it matters: Being subjected to disciplinary action in school is negatively related to a host of academic outcomes that are key to student success, including attendance, course passing, standardized test achievement, high school graduation, and college enrollment.[92, 93, 94] Because it is a strong predictor of later outcomes, student behavior—as measured by disciplinary actions—is a component of many early warning indicators, along with attendance and course grades (these three primary predictors are known as the ABCs of early warning).[95] However, disciplinary actions are a flawed measure of student behavior as they also reflect bias in disciplinary practices. Black and Latino students, students experiencing poverty, and students with disabilities experience suspensions at disproportionate rates.[96] For instance, Black students are nearly four times as likely to receive an out-of-school suspension than White students. Black and Latino students are also more likely than White students to be expelled for similar behavior.[97] There is evidence that racial disparities in suspension rates are larger in counties with higher racial bias, as measured by data on implicit and explicit bias from 1.6 million respondents across the country.[98] Racial disparities in exposure to exclusionary discipline start early on: Black preschoolers are 3.6 times as likely to receive one or more suspensions as White preschoolers.[99]

Recommended metric(s): Percentage of children who do not experience any of the following: in-school suspensions, out-of-school suspensions, disciplinary use of restraint and seclusion, or expulsions

Data source: Administrative data

What to know about measurement: Although the absence of exclusionary discipline is not a perfect measure of positive behavior, we recommend using the proposed metric as the most feasible proxy given the widespread availability of discipline data and their value in predicting future academic outcomes. As a system condition, we also recommend monitoring disproportionality in suspensions

and other disciplinary actions (see the indicator on *equitable discipline practices* in the E-W system conditions section) to address bias.

Schools regularly collect discipline data as part of their normal operations. Although suspensions and expulsions are generally defined and tracked comparably, there are opportunities for states to apply more consistent definitions in determining what counts as physical restraint and seclusion. They can do so by adopting the revised federal definitions proposed by the Office of Civil Rights (see Arundel[100] for a discussion of the challenges in defining and reporting restraint and seclusion in schools).

Source frameworks: This indicator appeared in eight source frameworks reviewed for this report. Several frameworks mention "disciplinary action," including the P-16 Framework,[101] the Center on Enhancing Early Learning Outcomes (CEELO) and the Council of Chief State School Officers (CCSSO) Birth to Grade 3 framework,[102] and the National Education Association's (NEA) Great Public Schools Indicators Framework.[103] Research by CORE Districts,[104] Council of the Great City Schools,[105] and the Urban Institute[106] also include measures of suspension and/or expulsion rates.

Math and reading proficiency in grade 3

Definition: Students demonstrate proficiency in math and reading/English language arts according to high-quality state standards.

Why it matters: Math and reading proficiency are highly predictive of later outcomes, including high school graduation and college enrollment.[107, 108, 109] This indicator focuses on grade 3 (rather than grades 4 or 5), reflecting the consensus that a strong early start and early intervention are crucial for success.[110, 111] Reflecting disparities in access to strong systems and supports for learning, there are large and persistent gaps between the test scores of students who are Black, Latino, and from low-income households and their White, Asian, and more economically advantaged counterparts.[112, 113, 114] For example, among 4th graders, 45 percent of White students were proficient on the National Assessment of Educational Progress (NAEP) in 2019, compared to 18 percent of Black students and 23 percent of Latino students.[115]

Recommended metric(s): Percentage of students in grade 3 who meet grade-level standards in reading/English language arts and math as measured by state standardized tests

Data source: Assessments

What to know about measurement: Under the Every Student Succeeds Act (ESSA), schools must collect and report test scores for students in grades 3–8, making data for this indicator broadly available. However, states use different assessments that vary in both content and proficiency standards, as shown by analyses that map proficiency cut scores on state tests to NAEP-equivalent scores.[116] As a result, proficiency rates should not be compared across states, except when using NAEP data, which are available for grades 4, 8, and 12.

This indicator may also measure students' writing proficiency in states where a writing component is included within the English language arts assessment. As of 2019, one-third of states use either the Partnership for Assessment of Readiness for College and Careers (PARCC)[117] or Smarter Balanced[118] tests, both of which include a writing component.[119]

We acknowledge limitations of test-based measures of proficiency, such as the potential for unintended consequences when used for accountability purposes (for example, teaching to the test, incentives for cheating) and limited accessibility of non-English testing for emerging multilingual students.[120, 121, 122] Evidence also shows that when students are encouraged to perform better on standardized tests through a financial reward, their performance improves, sometimes substantially, suggesting that test scores may not fully capture students' true academic proficiency.[123, 124] Despite these concerns, we recommend these indicators because of the demonstrated predictive value of measures of math and reading proficiency, and their potential to be used for intervention purposes.

Source frameworks: A total of 15 source frameworks reviewed for this report included math or reading proficiency in grade 3, grade 4, or both. Our definition aligns with the CORE Districts' definition of academic performance in grades 3–8.[125]

6th grade on track

Definition: Grade 6 students are on track to graduate high school on time.

Why it matters: Research on early warning indicators shows that measures of academics, behavior, and course performance in middle school can predict whether students are on track to graduate from high school, and schools can use this information to provide individualized support to students at risk of falling behind.[126, 127] For example, a study of 6th graders in Philadelphia found that 60 percent of the students demonstrating any of the following warning signs eventually left school: attendance below 80 percent, one or more out-of-school suspensions, and failing either math or English.[128] Research also points to the importance of a successful transition from elementary school to middle school for later academic and social-emotional outcomes,[129, 130, 131] perhaps especially so for Black boys.[132]

Recommended metric(s): Percentage of students in grade 6 with passing grades in English language arts and math, attendance of 90 percent or higher, and no in- or out-of-school suspensions or expulsions

Data source: Administrative data; student transcripts

What to know about measurement: Each on-track indicator in the E-W Framework is supported by research conducted in specific district contexts; therefore, the specific criteria used to define whether a student is on track may not predict long-run outcomes equally well in all settings. To define this indicator, we drew on research in the School District of Philadelphia by Balfanz et al. to identify students at risk of not graduating high school.[133] The metrics and thresholds may be different if predicting other outcomes, such as success in college. For example, in addition to the metrics listed here, grantees in the Bill & Melinda Gates Foundation's Network for School Improvement are also measuring whether students have a grade point average (GPA) of 3.0 or higher to determine whether they are on track to graduate high school *and* be academically prepared for college. Research on middle school on-track indicators is ongoing,[134] and multiple approaches exist to identifying students' on-track status.[135] If possible, research based on local data could help validate this measure of students' on-track status in other settings. Three states currently include a middle school on-track indicator as part of their school accountability plan under the Every Student Succeeds Act (ESSA).[136]

Schools record student course grades, attendance, and suspensions data as part of their regular operations, making this indicator feasible to measure. However, reporting of these administrative data to higher levels (district, state, federal) varies, and the underlying data are not necessarily comparable across localities. Because teachers subjectively determine students' grades, a teacher in another school or district might grade a student's performance differently and may be subject to grader bias. An analysis of 20 research studies found consistent evidence of grader bias by students' race, ethnicity, and past poor performance,[137] from elementary school through college. However, grades are consistently very strong predictors of later outcomes across contexts.[138] We note additional considerations about attendance and discipline data under the indicators for *consistent attendance* and *positive behavior*.

Source frameworks: This indicator appeared in recommended K–12 student outcomes and indicators from the Bill & Melinda Gates Foundation as "middle school on track."[139] To define this indicator, we drew on research in the School District of Philadelphia by Balfanz et al.[140]

8th grade on track

Definition: Grade 8 students are prepared to transition to high school and are on track to graduate on time.

Why it matters: The transition from middle to high school is one of the most difficult turning points on students' K–12 pathways, especially for Black boys,[141] who experience the greatest drops in grade point average (GPA) from grades 8 to 9. According to research by the UChicago Consortium on School Research,[142] students' attendance, GPA, and course failures in the middle grades are the most accurate indicators of how they will perform in their high school classes, compared to other potential indicators, such as test scores. To provide early targeted support as students enter high school, some local education agencies, such as the CORE Districts, have developed 8th-grade on-track early warning indicators to measure students' high school readiness. Across all states and districts, the most common components of early warning indicators are attendance, behavior, and course grades (the ABCs). (See Balfanz and Byrnes[143] for a state-of-the-field summary of early warning indicators.) Early analyses of the CORE Districts' indicator found that it correctly predicts high school graduation for 9 out of 10 students.[144]

Recommended metric(s): Percentage of students in grade 8 with a GPA of 2.5 or higher, no Ds or Fs in English language arts or math, attendance of 96 percent or higher, and no in- or out-of-school suspensions or expulsions.

Data source: Administrative data; student transcripts

What to know about measurement: Each on-track indicator in the E-W Framework is supported by research conducted in specific district contexts; therefore, the specific criteria used to define whether a student is on track may not predict long-run outcomes equally well in all settings. To define this indicator, we drew on research in California's CORE Districts to identify students at risk of not graduating high school. However, as noted previously, research on middle school on-track indicators is ongoing,[145] and other approaches exist to identifying students' on-track status.[146, 147] As one example, grantees in the Bill & Melinda Gates Foundation's Network for School Improvement use a higher GPA

threshold of 3.0 to determine whether students are on track to graduate high school *and* be academically prepared for college. Research based on local data could help validate this measure of students' on-track status in other settings. Three states currently include a middle school on-track indicator as part of their school accountability plan under the Every Student Succeeds Act (ESSA).

Schools record student GPA, course grades, attendance, and suspensions data as part of their regular operations, making this indicator feasible to measure. However, reporting of these administrative data to higher levels (district, state, federal) varies, and the underlying data are not necessarily comparable across localities. As noted in the discussion of a *6th grade on track* indicator, a teacher in another school or district might grade a student's performance differently and might be subject to grader bias, which can affect the comparability of data on course failures. GPA, which aggregates course grades into a single value, can be more reliable than a single course grade,[148] though GPA calculations (for instance, how courses are weighted) can also differ across contexts. Nevertheless, course grades are highly predictive of later academic success. We note additional considerations about attendance and discipline data under the indicators for *consistent attendance* and *positive behavior*.

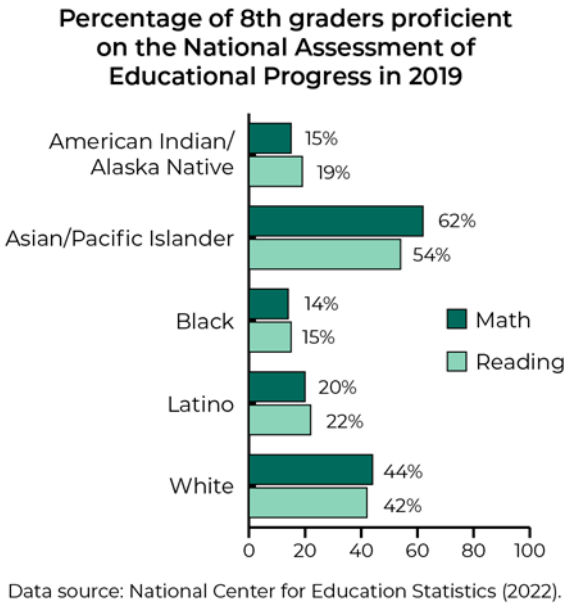
Source frameworks: This indicator appeared in two source frameworks reviewed for this report. Our proposed measure aligns with the CORE Districts' indicator of high school readiness.[149]

Math and reading proficiency in grade 8

PK **K12** PS WF

Definition: Students demonstrate proficiency in math and reading/English language arts according to high-quality state standards.

Why it matters: Math and reading proficiency are highly predictive of later outcomes, including high school graduation and college enrollment.[150, 151, 152] Reflecting disparities in certain populations' access to strong systems and supports for learning, there are large and persistent gaps between the test scores of students who are Black, Latino, and from low-income households and their White, Asian, and more economically advantaged counterparts.[153, 154, 155] For example, among 8th graders, 44 percent of White students were proficient on the National Assessment of Educational Progress (NAEP) in 2019, compared to 14 percent of Black students and 20 percent of Latino students.[156]



Data source: National Center for Education Statistics (2022).

Recommended metric(s): Percentage of students in grade 8 who meet grade-level standards in reading/English language arts and math as measured by state standardized tests

Data source: Assessments

What to know about measurement: Under the Every Student Succeeds Act (ESSA), schools must collect and report test scores for students in grades 3–8,

making data for this indicator broadly available. However, states use different assessments that vary in both content and proficiency standards, as shown by analyses that map proficiency cut scores on state tests to NAEP-equivalent scores.[157] As a result, proficiency rates should not be compared across states, except when using NAEP data, which are available for grades 4, 8, and 12.

This indicator may also measure students' writing proficiency in states where a writing component is included within the English language arts assessment. As of 2019, one-third of states use either the Partnership for Assessment of Readiness for College and Careers (PARCC)[158] or Smarter Balanced[159] tests, both of which include a writing component.[160]

We acknowledge limitations of test-based measures of proficiency, such as the potential for unintended consequences when used for accountability purposes (for example, teaching to the test, incentives for cheating) and limited accessibility of non-English testing for emerging multilingual students.[161, 162, 163] Evidence also shows that when students are encouraged to perform better on standardized tests through a financial reward, their performance improves, sometimes substantially, suggesting that test scores may not fully capture students' true academic proficiency.[164, 165] Despite these concerns, we recommend these indicators because of the demonstrated predictive value of measures of math and reading proficiency, and their potential to be used for intervention purposes.

Source frameworks: This indicator appeared in 12 source frameworks reviewed for this report. For example, our definition aligns with the CORE Districts' definition of academic performance in grades 3–8.[166]

Successful completion of Algebra I by 9th grade

Definition: Students successfully complete Algebra I or an equivalent course before or during grade 9.

Why it matters: Completion of Algebra I by grade 9 is highly predictive of later outcomes, including high school graduation and success in college, and proficiency in algebra is linked to job readiness and higher earnings once students enter the workforce.[167] In addition, Algebra I can act as a "gatekeeper" for access to upper-level math courses that are drivers of college readiness and college completion.[168] White students are more likely than Black and Latino students to take Algebra I earlier and pass the course.[169] Of students who took Algebra I in grade 8, for example, 64 percent of Black students and 72 percent of Latino students received a passing grade, compared to 85 percent of White students. Preparing students for rigorous math coursework in middle school and early high school has been shown to help close racial, ethnic, and socioeconomic achievement gaps.[170]

Recommended metric(s): Percentage of first-time grade 9 students who complete Algebra I or an equivalent course by the end of their 9th-grade year

Data source: Student transcripts

What to know about measurement: Schools record student grade data as part of their regular operations, making this indicator feasible to measure. Calculating this rate would require data from both middle school and high school transcripts, as almost a quarter of students take Algebra I in 7th or 8th grade.[171] We recommend measuring this indicator among first-time 9th-grade students (and not students who repeat 9th grade) to capture whether students are completing Algebra I on time.

Source frameworks: This indicator appeared in five source frameworks reviewed for this report. For example, Algebra I completion by grade 9 appears in the Council of the Great City Schools' Academic Key Performance Indicators.[172]

9th grade on track

Definition: Grade 9 students are on track to graduate high school in four years, enroll in postsecondary education, and succeed in their first year of postsecondary education.

Why it matters: Grade 9 is a foundational year on students' paths to on-time high school graduation and postsecondary education. For example, grade point average (GPA) in grade 9 predicts GPA in grade 11, which plays a role in college admissions and predicts students' postsecondary enrollment and first-year postsecondary retention.[173] Research demonstrates the predictive value of other measures of 9th-grade performance as well and the additional benefit of considering multiple measures in grade 9—rather than a single one—to identify whether students are on track to graduate high school on time.[174] Research on 9th-grade on-track indicators shows they can highlight disparate needs for support for students from different racial, gender, and economic backgrounds.[175] For instance, Black and Latino 9th graders tend to have lower GPAs than their peers.[176] Moreover, 9th-grade on-track indicators can play a critical role in dropout prevention efforts, as highlighted by their use in settings like Chicago Public Schools.[177]

Recommended metric(s): Percentage of students in grade 9 with a GPA of 3.0 or higher, no Ds or Fs in English language arts or math, attendance of 96 percent or higher, and no in- or out-of-school suspensions or expulsions

Data source: Administrative data; student transcripts

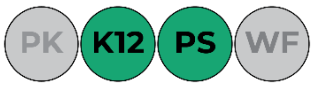
What to know about measurement: Each on-track indicator in the E-W Framework is supported by research conducted in specific district contexts; therefore, the specific criteria used to define whether a student is on track may not predict long-run outcomes equally well in all settings. To define this indicator, we drew on recommendations from the Bill & Melinda Gates Foundation and work by the UChicago Consortium on School Research, CORE Districts, and Balfanz and Byrnes.[178] Relative to the early and middle grades, research and measurement of on-track indicators in grade 9 have been more common, though the field has largely focused on dropout prevention rather than college readiness. For example, the metrics and thresholds recommended by Balfanz and Byrnes (such as attendance of 90 percent or higher and no more than one suspension) predict whether students are likely to graduate high school. We suggest raising these thresholds to emphasize readiness to enroll and succeed in postsecondary education. However, research based on local data should validate the criteria used to measure students' on-track status for college.

Schools record student course grades, attendance, and suspensions data as part of their regular operations, making this indicator theoretically feasible to measure. However, reporting of these administrative data to higher levels (district, state, federal) varies, and the underlying data are not necessarily comparable across localities. Currently, 14 states include 9th-grade on-track measures in their Every Student Succeeds Act (ESSA) accountability plans or publicly report this information, but the metrics used vary. For instance, some states focus only on credit accumulation, whereas others

consider course performance in particular core subject areas.[179, 180] We note that relative to data on course grades, which are updated after every marking period, data on credits earned are updated at most twice a year, which make course grades more actionable information for intervention purposes (though both course grades and credits are predictive of later academic outcomes).

Source frameworks: This indicator appeared in two source frameworks reviewed for this report by the Council of the Great City Schools[181] and the Bill & Melinda Gates Foundation.[182]

Grade point average



Definition: Middle school students earn course grades that demonstrate high school readiness; high school students earn course grades necessary to gain admission to college; and college students earn grades high enough to graduate and obtain jobs.

Why it matters: Students' course performance is highly predictive of later outcomes. For example, high school grade point average (GPA) predicts success in college, even more so than test scores.[183] College GPA is also associated with a greater likelihood of graduating. One study found that college students with a one-point higher GPA are 24 percentage points more likely to graduate.[184] College GPA also affects students' eligibility for financial aid and their employment prospects. According to the Job Outlook 2019 survey, 73 percent of employers used college GPA as a screening tool, with a GPA of 3.0 used as the most common threshold.[185]

A national analysis of high school students' GPAs revealed disparities by race and ethnicity, with Asian and Pacific Islander students earning a 3.1 GPA and White students earning a 2.9 GPA, on average, compared to 2.6 for Latino students and 2.5 for Black students.[186] Disparities persist in college, where Black students nationwide are nearly three times as likely as White students to graduate with a GPA below 2.5.[187] Course grades reflect a student's effort and skills[188] as well as grader bias—an analysis of 20 research studies found consistent evidence of grader bias by students' race, ethnicity, and past poor performance, from elementary school through college.[189]

Recommended metric(s):

- Percentage of students in grades 6–8 with a GPA of 3.0 or higher
- Percentage of students in grades 9–12 with a GPA of 3.0 or higher
- Percentage of college students with a GPA of 3.0 or higher

Data source: Student transcripts

What to know about measurement: Schools and colleges record student GPAs as part of their regular operations, making this indicator feasible to measure, although reporting of student transcript data to higher levels (district, state, federal) varies. In addition to the risk of grading subjectivity and bias noted earlier, there is evidence of different grading criteria across postsecondary institution types[190] and of grade inflation at the postsecondary level.[191] GPA, which aggregates course grades into a single value, can be more reliable than a single course grade,[192] though GPA calculations can differ across localities. In addition, a student's GPA may be related to their *relative* performance among other students at their

school or college, a phenomenon sometimes called "the frog pond effect." Therefore, although GPA is a highly predictive measure, care should be taken in comparing GPA values across contexts.

Source frameworks: This indicator appeared in 10 source frameworks reviewed for this report. The suggested thresholds draw on studies by the UChicago Consortium on School Research showing that a high school GPA of 3.0 is the threshold above which students' probability of graduating college becomes greater than 50 percent.[193, 194] The suggested thresholds also draw on survey research by the National Association of Colleges and Employers[195] revealing that employers most commonly use a 3.0 threshold as a screening tool for job applicants.

Math and reading proficiency in high school

Definition: Students demonstrate proficiency in math and reading/English language arts according to high-quality state standards.

Why it matters: Math and reading proficiency are highly predictive of later outcomes.[196, 197, 198, 199] In high school, measures of students' academic proficiency can be used to identify high-achieving students from marginalized backgrounds for the purposes of college access and outreach initiatives.[200, 201] Researchers have also identified a possible role for test scores as part of on-track indicator systems.[202] Reflecting disparities in access to strong systems and supports for learning, there are large and persistent gaps between the test scores of Black, Latino, and low-income students, and the scores of their White, Asian, and economically advantaged counterparts.[203]

Recommended metric(s): Percentage of tested students who meet grade-level standards in reading/English language arts and math, as measured by state standardized tests

Data source: Assessments

What to know about measurement: Under the Every Student Succeeds Act (ESSA), schools are required to collect and report test scores for students in one grade level in high school. However, testing for a specific high school grade level is not required, so tested grade levels vary widely in practice, as do the types of assessments used across states (including state proficiency tests, end-of-course tests, and college readiness tests such as the Preliminary SAT [PSAT], ACT, and SAT). This variation severely limits the comparability of this indicator. Proficiency rates should not be compared across states except when using National Assessment of Educational Progress (NAEP) data, which are available for grades 4, 8, and 12. Despite this and other concerns, including those discussed under the indicators of proficiency in grades 3 and 8, we recommend measuring high school math and reading proficiency because of the predictive value of this information and its potential to be used for intervention purposes. We encourage the field to converge on tested grades and approaches to assessment that best support high school students' learning.

Source frameworks: This indicator appeared in seven source frameworks reviewed for this report, including the Urban Institute's Robust and Equitable Measures to Identify Quality Schools (REMIQS) framework,[204] CORE Districts Improvement Measures, [205] and the National Academies Framework for Monitoring Educational Equity.[206]

College preparatory coursework completion

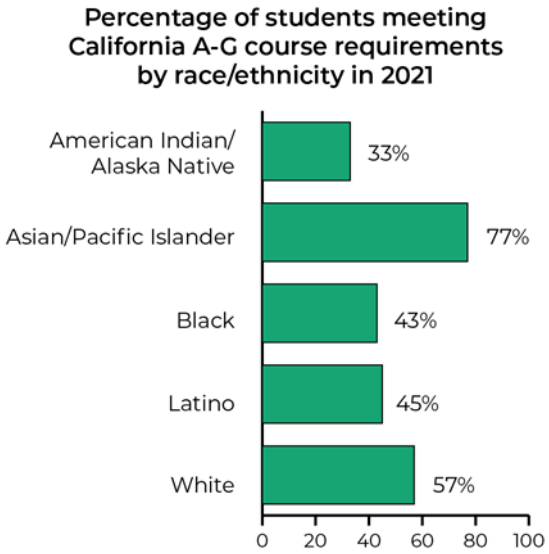
PK **K12** PS WF

Definition: High school students meet typical coursework requirements for admission to a four-year college.

Why it matters: A high school education should ensure that students are eligible to pursue their chosen pathway after graduation. In many states, however, the requirements for a high school diploma fall short of the admissions criteria at many four-year colleges and universities.[207] Thus, completing a full set of college preparatory coursework is a key milestone on students' pathways to higher education. Moreover, when students enter postsecondary education without first completing the necessary courses, they may be placed in remedial or developmental courses, and thus spend time and financial resources without advancing toward a degree.[208] Many high school graduates do not meet the eligibility requirements for four-year colleges. For example, 52 percent of all California high school graduates in 2020–2021 met course requirements for admission into the University of California and California State University systems (that is, passed college preparatory courses, known as A-G courses, with a grade C or higher).[209] These rates differed by race, ethnicity, and household income. Seventy-seven percent of Asian students and 57 percent of White students met the California A-G course requirements, compared to 45 percent of Latino students, 43 percent of Black students, and 33 percent of American Indian and Alaska Native students.

Recommended metric(s):

- Percentage of high school graduates who successfully complete the coursework required for admission to a four-year college or university, which includes:
  - Four years of English classes
  - Four years of math classes (including at least four of the following: pre-algebra, algebra, geometry, Algebra II or trigonometry, precalculus, calculus, statistics, quantitative reasoning, and data science)
  - Three years of laboratory science (including biology, chemistry, and physics)
  - Two years of social sciences
  - Two years of foreign language
  - One year of visual or performing arts



Data source: California Department of Education (2021).

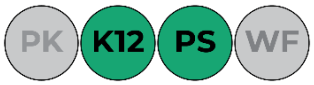
Data source(s): Student transcripts

What to know about measurement: As part of their operations, schools regularly record student course enrollment and grade data, making this indicator feasible to measure if courses that meet these requirements are consistently defined and identified in data systems. Although reporting of student transcript data to higher levels (district, state, federal) varies, as do course names and definitions,

reporting data on whether students are meeting course requirements would be feasible at different levels. Our recommended metric follows recommendations by the National Association for College Admission and Counseling (NACAC).[210] Some of these recommendations are also aligned to states' high school graduation requirements—for example, 45 states require four years of English.[211] High school graduation requirements in other subjects, however, often fall short, particularly in math where the requirements in nearly one in five states are misaligned to the admissions criteria at their respective flagship university.[212]

Source frameworks: Several frameworks reviewed for this report discussed the importance of academic rigor in high school; however, only two source frameworks, the Urban Institute's Robust and Equitable Measures to Identify Quality Schools (REMIQS)[213] and the National Education Association's (NEA) Great Public Schools Indicators Framework,[214] specifically referenced completion of college preparatory courses. As discussed above, our recommended metric draws on recommendations by the NACAC.

Early college coursework completion



Definition: High school students successfully complete early college coursework (Advanced Placement [AP], International Baccalaureate [IB], or dual credit).

Why it matters: There is growing evidence that participation in accelerated postsecondary pathways (such as early college high schools and dual enrollment) has a positive impact on students' high school graduation and postsecondary enrollment and completion.[215, 216, 217, 218] For example, Texas high school graduates who took more than one AP/IB course were more likely to enroll in a four-year college.[219] Engaging in early college coursework has been shown to predict future success in college,[220, 221] and earning early college credit by passing an AP exam also has a positive impact on college admissions scores and on-time postsecondary degree completion.[222, 223] According to an analysis of national data, even in schools that offer similar availability to AP courses, Black, Latino, and Indigenous students are less likely to be enrolled and earn college credit if they do enroll compared to other student groups.[224] For instance, for every 1,000 Asian students in public high schools, 375 take an AP course and 215 pass an AP test, whereas for every 1,000 Black students, 105 take an AP course and 21 pass an AP test. There is also evidence of inequitable participation in dual enrollment courses.[225]

Recommended metric(s):

- Percentage of high school students who enroll in and pass at least one early college course (AP, IB, or dual credit)
- Percentage of students enrolled in early college coursework who earn credit-bearing scores on end-of-course tests (for example, a score of 3 or higher on AP tests or 5 or higher on IB tests) or earn postsecondary credit within their dual enrollment courses

Data source(s): Student transcripts; assessments

What to know about measurement: As part of their regular operations, schools record student course enrollment and grade data, from which course completion can be determined. Schools also receive data on students' AP and IB exam scores. In the case of dual enrollment, however, K–12 districts must have

formal agreements with nearby participating colleges where students enroll to ensure data are being shared (and that course offerings allow students to earn transferrable college credit). Although reporting of student transcript data and exam scores to higher levels (district, state, federal) varies, it would be feasible to report course completion and exam-passing data at different levels.

Although course participation and AP/IB scores are comparable across contexts, not all students have equal access to these courses or exams, which affects interpretation of our suggested metrics, particularly when comparing them across localities. For instance, exam pass rates may be higher in districts where fewer students are given the opportunity to take the exams. Therefore, we provide additional information on measuring access under the E-W system indicator on *access to early college coursework*. Twenty-five states require districts to offer AP, IB, dual enrollment, or other similarly rigorous courses,[226] and many also mention the following early college coursework options for meeting college and career readiness requirements in their Every Student Succeeds Act (ESSA) plans: AP (22 states), dual credit/dual enrollment (18 states), advanced courses or accelerated learning (15 states), and IB (12 states).[227, 228]

Source frameworks: Ten source frameworks reviewed for this report discussed the importance of early college course completion, AP, IB, and dual enrollment, or both. For example, our choice to include both enrollment in and completion of AP, IB, or dual enrollment courses aligns with the recommendations of the National Academies' Educational Equity Indicator Systems.[229]

SAT and ACT participation and performance

Definition: High school students take and earn a "college-ready" score on the ACT or SAT before graduating high school.

Why it matters: Although test-optional and test-blind college application policies are on the rise, college entrance tests like the ACT and SAT have long played a gatekeeping role in students' college prospects and may still play a role in determining college course placement. According to the National Association for College Admission Counseling (NACAC), 55 percent of all four-year colleges and universities nationwide (nearly 1,600 institutions) waived standardized testing requirements for 2020–2021,[230] a trend that continued in 2021–2022, when more than 1,800 four-year institutions were test optional.[231] Nevertheless, evidence suggests that such tests can be a useful and cost-effective approach for identifying high-achieving students from marginalized backgrounds for the purposes of college access and outreach initiatives.[232] There is also evidence that universal testing mandates requiring all students to take the ACT or SAT raise college enrollment rates among students from low-income households.[233] However, there are persistent disparities in the test scores of Black, Latino, and students from low-income households, and their White, Asian, and economically advantaged counterparts.[234, 235, 236] In addition, the disparity between White and Black students' SAT scores remains virtually unchanged at .92 standard deviations over the past 15 years, which is a considered a large magnitude of difference.[237]

Recommended metric(s):

- Percentage of grade 11–12 students who take the SAT/ACT

- Percentage of grade 11–12 students who earn a "college-ready" score, based on the benchmarks set by the SAT and ACT

Data source(s): Assessments

What to know about measurement: Amidst ongoing changes in college admissions policies[238] and concerns about the fairness of admissions tests,[239, 240] framework users should be aware of evolving considerations when implementing this indicator. Although differences in educational opportunities can account for some of the disparities in scores among groups of students, and these tests have been validated[241] for use with diverse populations, there is also some evidence of racial and cultural biases within the test questions themselves.[242, 243] Research also shows that test scores are manipulable through test prep; thus, the tests may conflate students' college-ready skills and knowledge with their access to test prep resources.[244] Disparities in test scores may also be attributable to stereotype threat.[245] Due at least in part to these concerns, some university systems have eliminated their use in admissions policies.[246, ii] On the other hand, expanding access to college admissions tests has been shown to help low-income students who otherwise might not take the tests enroll in college at higher rates,[247] leading to questions about the extent to which these measures bar or promote equitable access to higher education.[248]

Although many colleges and universities have recently adopted test-optional admissions policies, a trend which the COVID-19 pandemic has accelerated,[249] we recommend that educational entities continue to track the rate at which students both take and earn college-ready scores on the SAT and ACT, given the gatekeeping role these tests have historically played in access to higher education. Our first recommended metric—participation rate—can shed light on whether students have access to college admissions tests. As of 2018, 25 states required high school students to take the ACT or SAT (which the state paid for).[250] Our second metric uses benchmarks set by the ACT and SAT for the minimum scores associated with "a high probability of success in credit-bearing first-year college courses."[251] In 2022, the SAT benchmarks were 480 for evidence-based reading and writing and 530 for math. For the ACT, the benchmarks were 18 for English, 22 for math and reading, and 23 for science. As of 2018, at least 11 states included the ACT/SAT college-ready benchmarks as an option for students to meet college and career readiness requirements in their Every Student Succeeds Act (ESSA) plans.[252] We encourage framework users to stay abreast of further changes in policies and evidence regarding use of the ACT and SAT.

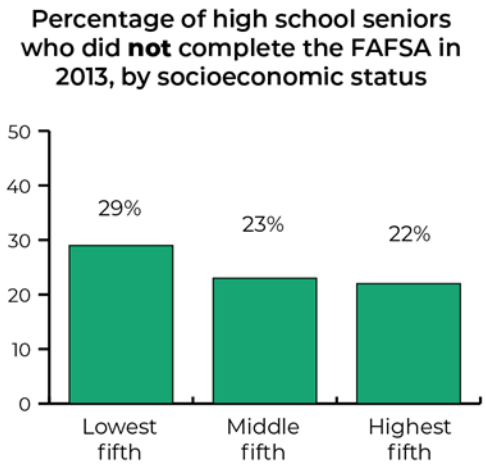
Source frameworks: SAT participation and/or performance was included in six sources reviewed for this report. For example, the College Readiness Indicator Systems (CRIS)[253] menu of college readiness indicators includes both SAT/ACT score and SAT/ACT participation.

[ii] For example, following a 2019 lawsuit filed on behalf of the Compton Unified School District, the University of California Board of Regents voted unanimously in May 2020 to stop requiring the ACT and SAT as part of admissions applications. The state plans to introduce a new assessment in their place.

FAFSA completion

PK K12 PS WF

Definition: Grade 12 students eligible for federal financial aid complete the Free Application for Federal Student Aid (FAFSA) by June 30.



Data source: National Center for Education Statistics (2018).

Why it matters: Students who report completing a FAFSA are more likely to enroll in college, enroll in a four-year rather than a two-year college, and enroll full time rather than part time compared to students who do not complete an application.[254, 255, 256] For example, students from low-income households who complete a FAFSA are 127 percent more likely to enroll in college in the fall after graduating high school than their peers who do not.[257] One study found that, among students who applied and were admitted to college, there was a 29 percent difference in enrollment—84 percent of students who were admitted and completed the FAFSA enrolled in a four-year college, compared with 55 percent enrollment by students who were admitted but did not complete the FAFSA.[258] Among the high school class of 2015, students from low-income households were less likely to submit the FAFSA (71 percent) compared to students from middle-income households (77 percent), despite having greater financial need. In addition, Latino students were less likely to complete the FAFSA (75 percent) compared to Black students (81 percent) or Asian students (84 percent).[259] Being flagged for FAFSA verification increases the likelihood that a college-intending student will delay enrollment, and students of color are more likely to be flagged for FAFSA verification than White students.[260]

Students who are eligible for financial aid but do not apply forgo a total of $24 billion in aid, adding to their student debt.[261] Recognizing the importance of FAFSA completion, at least six states have made it a requirement for high school graduation; several more are considering following suit.[262]

Recommended metric(s): Percentage of grade 12 students who complete the FAFSA by June 30

Data source(s): Administrative data

What to know about measurement: Records of FAFSA completion are federally collected and reported at aggregate levels by high school and district by the office of Federal Student Aid (FSA).[iii] At least 49 states have access to student-level data from FSA through the Student Aid Internet Gateway agreement, but only 38 states have established a data-sharing process for making student-level FAFSA completion data available to schools, as summarized by the National College Attainment Network.[263]

The FAFSA does not currently collect information on applicants' race/ethnicity; therefore, it is not currently possible to disaggregate federal FAFSA completion data (current research on differences in completion rates by subgroup typically includes survey data). The FAFSA Simplification Act contains several provisions that will modify current application and eligibility determination processes beginning in the 2023–2024 school year, including a provision that will require race/ethnicity data to be collected.[264]

To be eligible to submit a FAFSA, students must be U.S. citizens or eligible noncitizens, so care should be taken in interpreting completion rates in schools with immigrant populations. Undocumented students are eligible for state financial aid in at least seven states,[265] and E-W systems should also track whether students are completing state aid applications in addition to FAFSA.

Source frameworks: This indicator appeared in five source frameworks reviewed for this report. Our proposed measure aligns with work by the Education Strategy Group on the From Tails to Heads framework.[266]

Access to student-level FAFSA completion data in Iowa

As of 2019, all public high schools in Iowa receive student-level FAFSA completion data. An ambitious effort to overhaul the process of student-level data sharing was accomplished by Iowa College Aid in coordination with the Area Education Agencies' Postsecondary Readiness and Equity Partnership (AEA PREP). All schools now receive weekly FAFSA reports from their regional AEA PREP, which has data-sharing agreements with local schools. These reports are stored in a Google Drive folder where the school's local access manager, usually a school counselor, can access the data via the Iowa College Aid Processing System (ICAPS). Reports include information such as whether each student has completed the FAFSA, is missing signatures, or has been selected for verification.

In the past, high schools relied on students' self-reports to estimate their FAFSA completion rates in a timely way. Thanks to the Student Aid Internet Gateway (SAIG), hosted by the office of Federal Student Aid (FSA), states now have access to student-level data. However, although states can now access FAFSA data, some still face challenges getting the data from FSA into the hands of districts, schools, and community-based organizations, underscoring the importance of learning from states like Iowa. According to the National College Attainment Network, other states with exemplary FAFSA data-sharing procedures include California, Arizona, and Rhode Island.

[iii] To report the number of students who submitted the FAFSA by high school, the office of FSA uses an automated process to aggregate counts based on the school names students enter on their applications. Because these names are not standardized, FSA cautions that the reported data "may not represent an exact count." This limitation and others of the aggregate FAFSA completion data reported by FSA are summarized here.

College applications

Definition: Grade 12 students submit a well-balanced portfolio of at least three college applications.

Why it matters: Before students can attend college, they must first apply. Research shows that students who apply to at least two colleges are more than 40 percent more likely to enroll in a four-year college than those who apply to only one.[267] There are disparities by race, ethnicity, and income in the rates at which students apply to college. One study found, for instance, that students from low-income households were less likely to apply to college and less likely to apply to multiple colleges than their peers.[268] As another example, among Chicago Public School (CPS) students who aimed to achieve a four-year degree, Black and Latino students were least likely to apply to and enroll in college.[269]

Recommended metric(s): Percentage of grade 12 students who submitted at least three college applications

Data source(s): Administrative data or surveys

What to know about measurement: For schools that do not already systematically record if or where students apply to college, this metric will require a new system for tracking the number of applications each grade 12 student submits or linking to existing data. Currently, about 40 percent of high schools use Naviance, an online tool that allows schools to track and manage students' college application and admission processes.[270] In 2020, almost one million students submitted college applications through the Common App, which serves more than 900 colleges and universities.[271] Linking to existing administrative data sources such as Naviance and Common App is likely to result in more accurate data and be less burdensome to school staff than collecting data through student self-reported surveys.

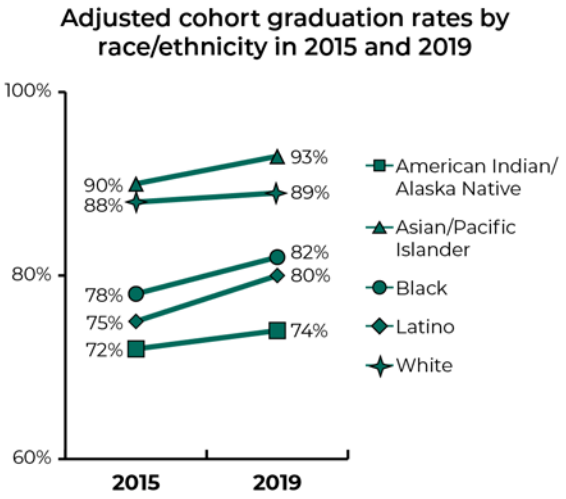
To define this indicator, we drew on recommendations from the Bill & Melinda Gates Foundation. We see submitting three applications to a well-balanced portfolio of postsecondary institutions as a foundational goal and encourage schools and districts to consider setting more ambitious goals. In particular, we note examples such as OneGoal, a nonprofit organization that encourages students to apply to at least seven colleges or similar postsecondary programs, and the Knowledge Is Power Program's (KIPP) College Match Framework,[272] which tracks the percentage of students who apply to at least six "likely/target/reach" colleges and nine total colleges, but allows regions to set different targets for students with a grade point average (GPA) below 2.0 or ACT score below 16. A well-balanced portfolio includes postsecondary institutions of varying selectivity levels, where students face different likelihoods of admission based on their academic profile, and should also reflect students' needs, interests, and aspirations.

Source frameworks: This indicator appeared in four source frameworks reviewed for this report, including Education Strategy Group's From Tails to Heads framework.[273] Our proposed measure draws on work by the Bill & Melinda Gates Foundation.[274]

High school graduation

PK **K12** PS WF

Definition: Students graduate from high school with a regular diploma within four, five, and six years of entering high school.



Data source: National Center for Education Statistics (2016, 2021).

Why it matters: High school graduation is a critical milestone along the pathway to a multitude of better life outcomes, including the likelihood of attending college.[275, 276, 277, 278, 279] In contrast, individuals who leave school before earning a high school diploma face bleak economic, social, and health prospects.[280,281, 282] There are narrowing but persistent gaps in graduation rates for students from low-income households; Black, Latino, and Indigenous students; and emerging multilingual students.[283] For example, in 2019, 93 percent of Asian/Pacific Islander students and 89 percent of White students graduated on time, compared to 82 percent of Latino students, 80 percent of Black students, and 74 percent of Indigenous students.[284]

Recommended metric(s): Adjusted cohort graduation rate (the percentage of first-time 9th graders who graduate with a regular diploma within four, five, and six years of entering high school, regardless of whether they transferred schools)

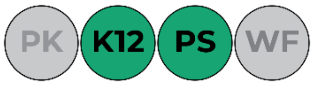
Data source(s): Administrative data

What to know about measurement: High school completion is regularly reported in administrative data systems, and the metric definition (adjusted cohort graduation rate) has been adopted across the country. However, states (and in some cases, districts) have leeway to set graduation requirements. For example, 17 states specify non-course requirements in addition to course requirements, which also vary.[285] Given significant increases in graduation rates over time and their use for school accountability, there has been some concern that localities are incentivized to "lower the bar" or "game" the calculation of the adjusted cohort rates (for example, by removing certain students from the cohort count). Although some instances of problematic practices have been documented, research suggests standards for graduations have not been lowered and the observed improvements in the data are largely substantiated.[286, 287]

On-time graduation in four years is most commonly reported, as it is the time to graduation that most students should aim to achieve. As such, it is important to ensure equitable outcomes in four-year rates. However, examining four-year graduation rates only can mask the achievements of students who may need more time to graduate (for example, special education students), so we recommend measuring five- and six-year graduation rates as well. Data systems should also collect information on whether students complete a high school equivalency credential.

Source frameworks: This indicator appeared in 13 source frameworks reviewed for this report. Our proposed measure aligns with the CORE Districts' Improvement Measures, which include four-, five-, and six-year cohort graduation rates.[288]

Selection of a well-matched postsecondary institution



Definition: High school graduates select the best "match" college among the institutions to which they were admitted, based on the institutional graduation rate of similar students.[iv]

Why it matters: Nationwide, 50 percent of students from low-income families attend a less selective college than those to which they have access, even though attending a more selective college can lead to higher graduation rates and future income.[289, 290] For Black and Latino students and students whose parents have lower education levels, the economic returns of attending more selective colleges are large.[291] However, most high-achieving students from low-income households do not apply to any selective postsecondary institutions.[292]

Recommended metric(s): Percentage of high school seniors who select a college within 10 percentage points of the best matched postsecondary institution to which they were admitted, based on the institution's graduation rate for similar students by race, ethnicity, or income status (as measured by Pell Grant receipt).

Data source(s): Administrative data

What to know about measurement: This indicator requires linking K–12 and postsecondary records to determine where a student enrolled in college. Individual-level data on high school students' postsecondary enrollment can be obtained through state longitudinal data systems and the National Student Clearinghouse (NSC). The NSC receives

KIPP's College Match Strategies Framework

Each fall, Knowledge Is Power Program (KIPP) counselors work with high school seniors to create a college "wish list" based on their academic achievement, financial needs, and personal interests. Students and families are given access to a match tool that provides personalized information about "likely," "match," and "reach" colleges for that student, based on grade point average (GPA) and ACT/SAT scores, along with data on the graduation rate and net price of each college. Counselors offer guidance on how to select a good mix of schools to which to apply, develop strong applications, request application waivers from colleges, and apply for financial aid.

Using a centralized data system, counselors track students' wish lists—and later, their applications, admissions, and enrollment—which they use to follow up with students at key points in their senior year. Supporting this process is a set of key performance indicators that KIPP monitors; they include the share of seniors who apply to at least nine colleges by December, submit financial aid applications by February, and enroll in college by the following October. KIPP then determines which students did not enroll or enrolled in a college with a much lower underrepresented minority (URM) graduation rate (10 percentage points or lower) than the college with the highest URM graduation rate to which they were admitted. Each year, staff analyze the data to measure progress over time in helping students attend not just any college but one that is a good match.

[iv] As an alternate definition, we define "undermatch" as enrolling at an institution with a lower level of success for underrepresented minority (URM) students than those to which the student had access.

student-level postsecondary enrollment records from participating institutions on a regular basis and links high school and postsecondary records for districts or states that participate in its High School Tracker service.[293] In 2020, 14 percent of all high schools in the U.S., representing about 24 percent of high school graduates, participated in the High School Tracker service.[294] Postsecondary institutions reporting to the NSC capture approximately 97 percent of all postsecondary enrollment in Title IV degree-granting institutions; however, some types of institutions are less likely to report to the NSC, especially private two-year colleges and for-profit institutions.[295, v] State higher education departments may have direct access to enrollment records for in-state colleges and may supplement these data with records from the NSC to capture out-of-state enrollment. Currently, 33 states link K–12 and postsecondary records as part of their state longitudinal data systems.[296]

To determine whether the institution where a student enrolled is a "match," we recommend using institutional-level graduation rates reported in the Integrated Postsecondary Education Data System (IPEDS) for all Title IV degree-granting institutions. These data can be used to compare the graduation rates of the institution where the student enrolled to the graduation rates of the other institutions where the student was admitted. Because several factors should inform whether a college is a good "match" for a student—not just the institution's graduation rate—we recommend allowing for a 10-percentage-point difference between the graduation rate of the institution where the student enrolled and the highest graduation rate among the institutions where the student was admitted. This threshold is used by Knowledge Is Power Program (KIPP) schools (see the callout box above for more information on the KIPP approach).

We recommend basing match on institutional graduation rates for students with background characteristics similar to the student in question (for example, students of color or those from low-income households). IPEDS reports institutional graduation rates by gender, race and ethnicity, and Pell Grant receipt. However, it is worth noting that graduation rates in IPEDS are based on full-time, first-time, degree- or certificate-seeking students, and therefore do not include part-time and transfer students. Although the NSC collects individual-level completion records, it does not report institutional-level graduation rates publicly, so IPEDS is still the best source of graduation rates for all postsecondary institutions in the country.[vi] Schools and states should use the more accurate rates from their state longitudinal data system if available.

We acknowledge that there are several emerging definitions of "college match" in the field that have varying benefits and limitations. Our recommended definition and measure leverage those used by KIPP, which are not based on students' academic qualifications, but rely instead on the colleges where the student was admitted. Another approach that is not based on students' academic qualifications, used by the Vela Institute, determines students' choice set based on nearby colleges with similar selectivity levels as the college where the student enrolled. An advantage of our recommended metric is that it is relatively straightforward to operationalize compared to definitions researchers have used, which require statistical or geospatial analysis. A disadvantage is that it can be applied only at the enrollment stage, whereas more complex calculations allow match to be assessed at the earlier application and admission stages, when it is also possible for students to undermatch. However,

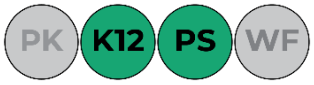
[v] For additional caveats about NSC data, see Dynarski, S. M., Hemelt, S. W., & Hyman, J. M. (2015). The missing manual: Using national student clearinghouse data to track postsecondary outcomes. *Educational Evaluation and Policy Analysis, 37*(1S), 53S-79S. https://doi.org/10.3102/0162373715576078

[vi] Some K–12 districts calculate institutional graduation rates based only on their students. For example, the District of Columbia Public Schools (DCPS) calculates a district-specific rate for postsecondary institutions that have had at least 20 DCPS high school graduates attend across two cohorts.

research with KIPP Northern California found that high rates of undermatch in enrollment can occur among students from low-income households and students of color even when there is limited undermatch in their applications and admissions—namely, although 97 percent of recent graduates applied to at least one well-matched postsecondary institution and 94 percent were admitted to least one well-matched postsecondary institution, only 60 percent eventually enrolled in a well-matched postsecondary institution.[297]

Source frameworks: This indicator appeared in four source frameworks reviewed for this report. As discussed above, our proposed measure aligns with the KIPP College Match Strategies framework.

Senior summer on track



Definition: High school graduates intending to enroll in postsecondary education in the fall after high school graduation complete the registration, financial, and logistic deadlines over the summer necessary to successfully enroll in the fall.

Why it matters: Disparities in college enrollment are compounded by the period of transition from high school to college: between 10 and 40 percent of graduating high school seniors who intend to attend college do not matriculate in the fall, with rates of "summer melt" especially high among college-intending students from low-income households.[298, 299] For example, an analysis of Chicago Public Schools graduates found that 20 percent of students who planned to attend a four-year college in the fall and had been accepted into one did not enroll in the fall.[300] One reason for the summer melt phenomenon is the number and complexity of tasks students must complete before they can successfully enroll in college. For students from low-income or first-generation households in particular, these tasks create an additional barrier during the time when they are out of high school, but not yet in college and therefore may have limited access to supports. Studies show that text messaging interventions that remind students about pre-matriculation tasks and connect them to support from counselors or peers can reduce summer melt and raise enrollment among low-income students.[301, 302, 303]

Recommended metric(s): Percentage of high school graduates reporting intentions to enroll in postsecondary education in the fall who successfully enroll in a postsecondary institution by October 31 following their high school graduation

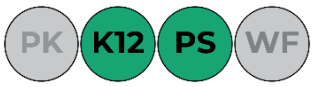
Data source(s): Administrative data; surveys

What to know about measurement: This indicator can and should be measured by both K–12 and postsecondary institutions. In its summer melt handbook, the Strategic Data Project at Harvard University's Center for Education Policy Research recommends (1) determining which students intend to enroll in college in the fall after high school graduation (for example, through an exit survey fielded in the last month of high school or through administrative records), (2) determining which students actually enroll in college in the fall, and (3) determining the rate of summer melt using the information gathered in Steps 1 and 2.[304] The handbook includes other guidance on measurement and intervention. For example, as part of Step 1, it recommends asking students to provide updated contact information, including their cell phone number and email address, to allow schools to conduct outreach during the summer. For Step 2, institutions may use enrollment data from the National Student Clearinghouse

(NSC) and/or state longitudinal data systems. Postsecondary institutions reporting to the NSC capture approximately 97 percent of all postsecondary enrollment in Title IV degree-granting institutions; however, some types of institutions are less likely to report to the NSC, especially private two-year colleges and for-profit institutions.[305]

Source frameworks: The Bill & Melinda Gates Foundation K–12 Student Outcomes and Indicators include a measure of senior summer on track, which aligns with this indicator.

Postsecondary enrollment directly after high school graduation



Definition: High school graduates enroll in a postsecondary institution by October 31 following their high school graduation.

Why it matters: College attainment is consistently associated with higher lifetime earnings, and greater benefits accrue with each additional year of education completed.[306, 307, 308, 309] However, there are persistent disparities in postsecondary enrollment for students from low-income households and students of color.[310] Among the high school class of 2019, 66 percent of students enrolled in college in October. Rates of immediate enrollment after high school were lower among Black students (57 percent) and Latino students (64 percent) than White students (69 percent) and Asian students (82 percent).[311] Postsecondary enrollment has continued to fall for each year of the COVID-19 pandemic, dropping 6.5 percent from fall 2019 to fall 2021, with larger decreases among Black, Indigenous, and White students compared to other racial and ethnic groups.

Disparities in rates of college enrollment are primarily driven by enrollment in four-year colleges. For example, in Chicago Public Schools (CPS), Black, White, and Asian high school graduates enrolled in two-year colleges at similar rates, whereas Latino students enrolled in two-year colleges at higher rates than all other groups; conversely, Latino students had the lowest rates of four-year college enrollment, followed by Black students.[312] Thirty-three percent of Latino male students and 40 percent of Black male students enrolled in a four-year college, compared to 57 percent of White male students and 59 percent of Asian male students. Although female students were more likely to enroll in a four-year college than male students, the disparities across race and ethnicity were similar among female students.

Recommended metric(s): Percentage of high school graduates who enroll in a postsecondary institution by October 31 following their high school graduation[vii]

Data source(s): Administrative data

What to know about measurement: This indicator requires linking K–12 and postsecondary records. The National Student Clearinghouse (NSC) receives student-level postsecondary enrollment records from participating institutions on a regular basis and links high school and postsecondary records for districts or states that participate in its High School Tracker service.[313] In 2020, 14 percent of all high schools in the U.S. (representing about 24 percent of high school graduates) participated in the High

[vii] This indicator captures enrollment in all for-credit postsecondary education, including credit-bearing career and technical education (CTE) courses. Enrollment in non-credit CTE coursework is captured in the *successful career transition after high school* indicator.

School Tracker service.[314] It is critical to understand not only whether students enroll in postsecondary education directly after high school, but also the type of institution where they first enroll. Postsecondary institutions reporting to the NSC capture approximately 97 percent of all postsecondary enrollment in Title IV degree-granting institutions; however, some types of institutions are less likely to report to the NSC, especially private two-year colleges and for-profit institutions.[315, viii] State higher education departments may have direct access to enrollment records for in-state colleges and may supplement these data with records from the NSC to capture out-of-state enrollment. Currently, 33 states link K–12 and postsecondary records as part of their state longitudinal data systems.[316]

Source frameworks: This indicator appeared in 17 source frameworks reviewed for this report. Our proposed measure aligns with work by Education Strategy Group on the From Tails to Heads framework.[317]

First-year credit accumulation

Definition: Students attempt and complete sufficient credits during their first undergraduate year to be on track for on-time degree completion.

Why it matters: On-track credit accumulation is positively associated with degree completion.[318, 319, 320] One study found that students who complete more than 20 credits in their first year are nearly three times as likely to complete a degree, certificate, or transfer than students who earn less than 20 credits in their first year.[321] Research also suggests disparities in credit accumulation, with students from low-income households, first-generation students, Black students, and Latino students accumulating credits less quickly relative to others.[322, 323, 324]

Recommended metric(s): Percentage of students attempting and completing sufficient credits toward on-time completion in their first year: 30 credits for full-time and 15 credits for part-time students

Data source(s): Administrative data; student transcripts

What to know about measurement: Data on first-year credit accumulation currently are not widely available to the public because they are not included in the Integrated Postsecondary Education Data System (IPEDS). However, colleges collect these measures, and the National Student Clearinghouse (NSC) offers the Postsecondary Data Partnership service to help them track and analyze these data, including benchmarking against other institutions. Credit accumulation is generally comparable across institutions, though there may be some institution-specific differences in how credits are assigned to classes.

Source frameworks: This indicator appeared in five source frameworks reviewed for this report. Our proposed measure aligns with work by the Institute for Higher Education Policy.[325]

[viii] For additional caveats about NSC data, see Dynarski, S. M., Hemelt, S. W., & Hyman, J. M. (2015). The missing manual: Using national student clearinghouse data to track postsecondary outcomes. *Educational Evaluation and Policy Analysis*, 37(1S), 53S-79S. https://doi.org/10.3102/0162373715576078

First-year program of study concentration

Definition: Postsecondary students demonstrate selection of a program of study by completing nine credits or three courses in a meta-major[ix] during their first year.

Why it matters: Community college students are often presented with a "menu" of course-taking options and receive little guidance on which courses to take, and in which order.[326, 327] Students who do not concentrate in a program of study within their first year at a community college are less likely to earn a credential (with "concentrate" defined as accumulating nine credits within a meta-major). Jenkins and Cho showed that 40 to 50 percent of students who concentrated in a program area had earned a certificate or associate's degree, transferred to a four-year institution, or earned a bachelor's degree within five years, compared to less than 15 percent of students who did not concentrate within their first year.[328]

Recommended metric(s): Percentage of students completing at least nine credits (or three courses) within a meta-major during their first year in postsecondary education

Data source(s): Administrative data; student transcripts

What to know about measurement: Course-taking patterns of first-year students can be measured using student transcript data tracked in postsecondary institutions' data systems, but these data typically are not publicly available and reported. Nguyen et al.[329] provide guidance for using course data and degree requirements to consistently classify meta-majors, and the National Student Clearinghouse (NSC) Postsecondary Data Partnership tracks this measure. Jenkins and Cho[330] note that whether students declare a major in their first year does not adequately capture the program of study selection, given that declaring a major does not necessarily mean students have completed multiple courses in that meta-major. Therefore, we recommend using course data rather than information on student major for this indicator.

Source frameworks: This indicator appeared in four source frameworks reviewed for this report. Our proposed measure aligns with work by the Institute for Higher Education Policy.[331]

Gateway course completion

Definition: Completion of college-level introductory math and English courses, as defined by each postsecondary institution, during the first year of college.

Why it matters: Early completion of college-level math and English is positively associated with degree completion. Students who complete college-level math within their first two years of enrollment are nearly three times as likely to complete a certificate, degree, or transfer as students who did not, and

[ix] Meta-majors included in IHEP's Postsecondary Metrics framework: education; arts and humanities; social and behavioral sciences and human services; science, technology, engineering, and math; business and communications; health; trades.

those who complete college-level English are more than twice as likely to complete a certificate, degree, or transfer as those who do not.[332] These courses are known as "gateway" courses because they are often a graduation requirement and can serve as a leading indicator of postsecondary success, yet some students do not pass these classes on their first try. Black students are 5 percentage points less likely to complete gateway courses than Latino or White students also enrolled in four-year institutions, and 10 percentage points less likely than Latino or White students also enrolled at two-year institutions.[333]

Recommended metric(s): Percentage of first-year college students who complete college-level introductory math and English courses within their first year

Data source(s): Administrative data; student transcripts

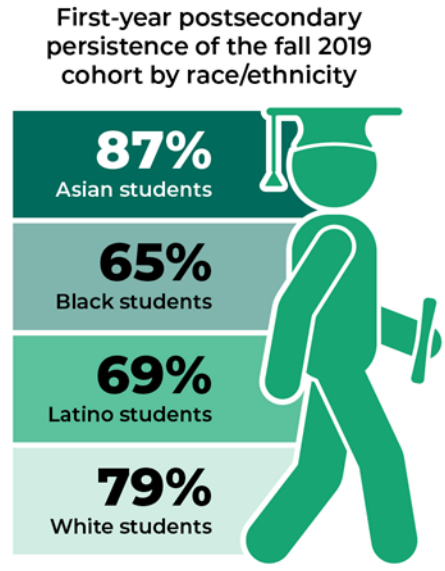
What to know about measurement: Course taking and performance patterns of first-year students can be measured using student transcript data tracked in postsecondary institutions' data systems, but these data typically are not publicly available and reported. Furthermore, no standard definition of a "gateway course" exists, leaving institutions to define which ones are considered gateway courses. They generally include "nonremedial entry-level or introductory courses in the subject area."[334] The National Student Clearinghouse's (NSC) Postsecondary Data Partnership is contributing to standardization in this area by helping colleges track gateway course data and benchmarking their performance against other institutions.

Source frameworks: This indicator appeared in nine source frameworks reviewed for this report. Our proposed measure aligns with work by the Institute for Higher Education Policy.[335]

Postsecondary persistence

PK K12 **PS** WF

Definition: Students continue enrolling in college in subsequent years, including transfers to other colleges.



Data source: National Student Clearinghouse (2021).

Why it matters: Continued enrollment in college is a prerequisite for degree completion. However, first-year persistence rates of Black and Latino students (approximately 65 and 69 percent, respectively) are lower than those of White and Asian students (approximately 79 and 87 percent, respectively). Overall persistence rates dropped by approximately 2 percentage points from 2019 to 2020 after remaining fairly steady for several years, which may be attributable to the disruptive impact of the COVID-19 pandemic. During this time, persistence rates declined more significantly in community colleges (-3.5 percentage points) than any other type of institution.[336]

Recommended metric(s): Percentage of students who continue enrolling in college (including transfers to other colleges) or complete a credential the following year,

captured for up to 150 percent of program length. Other time frames, such as 100 and 200 percent of program length, should also be reported for this measure.

Data source(s): Administrative data

What to know about measurement: Though institutions can measure their annual retention of students, measuring persistence in any college requires linking student records to data from other institutions. National Student Clearinghouse (NSC) data can be used to calculate both retention and persistence rates, though the NSC does not report this information publicly at the institution level (it does report aggregate analyses in its annual Persistence and Retention report series, and institutions that participate in their Student Tracker for Colleges and Universities or the Postsecondary Data Partnership service can access these data). The Integrated Postsecondary Education Data System (IPEDS) publicly reports data on retention at individual institutions but does not report a persistence measure that accounts for transfers to other institutions.

We suggest measuring both retention at the initial institution as well as persistence in any institution because the former helps institutions understand which students may be leaving and why, whereas the latter offers a systemwide view that captures transfers to other institutions.

Source frameworks: This indicator appeared in nine source frameworks reviewed for this report. Our proposed measure aligns with work by the Institute for Higher Education Policy.[337]

NSC Postsecondary Data Partnership

National Student Clearinghouse (NSC) launched the Postsecondary Data Partnership to improve institutional decision making by equipping postsecondary institutions with more timely access to effective data. Using the current data infrastructure, obtaining actionable data on postsecondary student outcomes can be costly, delayed, and incomplete. For example, publicly available data through Integrated Postsecondary Education Data System (IPEDS) do not allow for effective disaggregation on all outcomes, such as by race and ethnicity, first-generation status, and Pell Grant status. Without this information, policy and program change often falls short of addressing the structural cause of disparities in outcomes. Through joining the Postsecondary Data Partnership, system leaders commit to improving and sharing data to identify and advance strategies that ensure every student can achieve a college degree or credential of value. The Postsecondary Data Partnership tracks data on all students, including transfer and part-time students, students who transferred out, and those who enrolled in a four-year institution from a two-year program. Leading Postsecondary Data Partnership metrics include enrollment, credit accumulation, gateway course completion, two-year retention, term-to-term retention, transfer rates, and transfer completions, and credential completion rates. Participating states and institutions also have access to a collaborative dynamic set of dashboards, enabling timely analysis, cross-institution comparison, and state-level comparison. These tools provide institution and system leaders with the information they need to make informed decisions to improve student outcomes.

Transfer (if applicable)

Definition: Postsecondary students transfer to a longer program (from certificate to associate's degree, or from associate's to bachelor's degree).

Why it matters: Transferring to a four-year college is a necessary step for community college students to earn bachelor's degrees. Students who transfer after earning associate's degrees are 12 percentage points more likely to graduate with bachelor's degrees than students who transfer before earning an associate's degree (53 versus 41 percent).[338, 339] There is also evidence that students with a bachelor's degree earn nearly 40 percent more annually than those with an associate's degree only, and are also less likely to face unemployment.[340] However, transfer rates tend to be lower for Black and Latino students,[341, 342] as well as for students from low-income households, than their peers.[343]

Recommended metric(s): Percentage of students in a certificate or associate's degree program who transfer to a longer degree program within 150 percent of the original program's intended length. Other time frames, such as 100 percent and 200 percent of program length, are also useful to track.

Data source(s): Administrative data

What to know about measurement: Students may transfer to longer degree programs both within their current institutions and by enrolling in a different institution, so this indicator requires linking student data from multiple institutions. National Student Clearinghouse (NSC) enrollment records can be used to calculate transfers from two-year to four-year institutions, though the NSC does not report this information publicly at the institution level. (It does report aggregate analyses in its annual Tracking Transfer report series, and institutions that participate in their Student Tracker for Colleges and Universities or Postsecondary Data Partnership service can access data on transfer rates and transfer completions.) Detailed transfer rates for two-year institutions (whether public, private, or for-profit) currently are not publicly available. Though Integrated Postsecondary Education Data System (IPEDS) reports overall transfer outs, it does not track where students subsequently enroll nor whether students who complete a certificate or associate's degree subsequently enroll in a longer degree program. It is also important to measure the extent to which students' credits are transferring between institutions, with credit loss negatively impacting affordability and completion.[344]

Source frameworks: This indicator appeared in eight source frameworks reviewed for this report. Our proposed measure aligns with work by the Institute for Higher Education Policy.[345]

Postsecondary certificate or degree completion

Definition: Students complete a certificate, associate's, or bachelor's degree within a specified time frame after entering college.

Why it matters: A large body of research consistently demonstrates that students receive substantial economic returns on certificate completion,[346, 347, 348] associate's degree completion,[349, 350] and bachelor's

degree completion.[351, 352, 353, 354] In 2020, for example, workers with an associate's degree earned 20 percent higher wages than those with a high school diploma only.[355] However, there are persistent disparities in degree completion by race/ethnicity and income.[356, 357] For instance, among students who enrolled in a four-year college in 2010, 74 percent of Asian students and 64 percent of White students graduated within six years, compared to 54 percent of Latino students and 40 percent of Black students.[358]

Recommended metric(s): Percentage of students completing a certificate, associate's, or bachelor's degree within 150 percent of the program's intended length. Other time frames, such as 100 percent and 200 percent of program length, should also be reported for this measure.

Data source(s): Administrative data

What to know about measurement: Institutions regularly track and report certificate and degree completion for their students and can disaggregate this information by field of study, which can reveal disparities in access to certain fields like science, technology, engineering, or mathematics (STEM). State longitudinal data systems that include postsecondary data contain individual-level completion data from in-state institutions, making it possible to measure completion more broadly, but can obtain completion data from out-of-state institutions only through the National Student Clearinghouse (NSC), which collects individual records provided by participating institutions.[x] Although NSC collects and reports data on program of study (such as Psychology) and degree title (such as Bachelor of Arts), completion records sometimes omit these data due to issues with data coverage or underreporting.[359, 360, 361] Improved standardization of data collection and sharing in this area could help data users gain important insights into matriculation patterns and degree attainment.

At the institutional level, aggregate completion data are available annually through Integrated Postsecondary Education Data System (IPEDS) for all Title IV-eligible universities, colleges, and technical and vocational education providers. Based on aggregate data reported by institutions, IPEDS publishes three related but distinct measures of degree completion, which are measured at different time points and cover different student populations:

1. The IPEDS graduation rate assesses whether students complete their intended degree within 100, 150, or 200 percent of the normal time for that degree type. The graduation measure is calculated only for full-time, first-time degree-seeking students.
2. The IPEDS Outcome Measures survey tracks whether students complete a certificate, associate's, or bachelor's degree four, six, and eight years after entering the institution. This measure captures degree completion outcomes for more students than the graduation rate measure because it is calculated separately for part-time and non-first-time degree-seeking students in addition to full-time, first-time degree-seeking students. However, the Outcome Measures survey does not track the type of program in which students are enrolled, and so does not provide a measure of the timing of degree completion relative to normal program length.
3. IPEDS also separately tracks the total number and type of degrees awarded at each institution, as well as the number of students completing a degree each year. However, these completion

[x] For additional technical details regarding institutions' reporting of completion data to NSC, see Causey, J., Pevitz, A., Ryu, M., Scheetz, A., & Shapiro, D. (2022). *Completing college: National and state report on six-year completion rates for fall 2015 beginning cohort.* National Student Clearinghouse Research Center. https://nscresearchcenter.org/completing-college/#:~:text=Highlights,colleges%20starters%20(%2B1.5%20pp)

measures are not tied to specific cohorts of students and do not capture how long it took for the degrees to be completed.

Source frameworks: This indicator appeared in 15 source frameworks reviewed for this report. Our proposed measure aligns with work by the Institute for Higher Education Policy.[362]

Enrollment in graduate education

Definition: Students enroll in a graduate education program after completing an undergraduate degree.

Why it matters: Graduate education represents one of many pathways to economic mobility and success along the pre-K-to-workforce continuum. Graduate degree holders earn substantially more during their lifetimes than people who hold only a bachelor's or high school degree,[363, 364] and enrollment in a graduate program is a necessary first step before degree completion. However, Black and Latino students are underrepresented in graduate school relative to students from other racial and ethnic backgrounds,[365] though research indicates that these disparities disappear when comparing only students with a bachelor's degree.[366, 367] This finding suggests that higher education indicators measured *before* graduate school enrollment are critical for addressing inequities in educational attainment.

Among students who hold a bachelor's degree and pursue graduate school, disparities by race, ethnicity, and income emerge along institution type and field of study. For example, 24 percent of Black graduate students and 12 percent of Latino graduate students enroll in for-profit institutions, compared with 8 percent of White graduate students and 7 percent of Asian graduate students.[368] Among students who enroll in doctoral programs, Black students (14 percent) and Latino students (18 percent) were less likely to pursue a science, technology, engineering, or mathematics (STEM) degree than White students (27 percent) and Asian students (29 percent). These results underscore the importance of examining enrollment patterns by institutional sector and field.

Recommended metric(s): Percentage of bachelor's degree recipients enrolling in post-baccalaureate or graduate programs within one to five years of completion. Other time frames, such as within 10 years of completion, should also be reported for this measure.

Data source(s): Administrative data

What to know about measurement: Because students can pursue graduation education in a different institution than where they completed an undergraduate degree, this indicator requires linking student data from multiple institutions. Currently, 35 state longitudinal data systems include data from postsecondary institutions. As noted earlier, state longitudinal data systems sometimes draw on enrollment records from National Student Clearinghouse (NSC) to track enrollment in institutions outside of the state. NSC enrollment data coverage is highest (almost 98 percent) for students in four-year colleges but varies by type of institution: for instance, NSC covers only 80 percent of students in four-year for-profit institutions,[369] where students of color are more likely to enroll. In addition, 12 percent of enrollment records reported to NSC do not include information on whether the student is

enrolled at the undergraduate, master's, or doctoral level.[370] This area is also one in which data collection and sharing can be improved, both with the NSC and within states.

Aggregate data on graduate enrollment are collected regularly and reported via the Integrated Postsecondary Education Data Systems (IPEDS), though these data report only the number of students enrolled in graduate education and cannot be used to measure the share of college graduates from a given cohort who go on to enroll in graduate education.

Source frameworks: This indicator appeared in three source frameworks reviewed for this report. Our proposed measure aligns with work by the Institute for Higher Education Policy.[371]

Graduate degree completion

Definition: Students complete a graduate degree (master's degree or higher) within a specified time frame after entering graduate school.

Why it matters: A graduate degree represents one of many pathways to economic mobility and success along the pre-K-to-workforce continuum. Graduate degree holders earn substantially more during their lifetimes than people who hold only bachelor's or high school degrees.[372, 373] For instance, in 2020, workers with a master's degree earned 18 percent more than those with a bachelor's degree only, whereas those with a professional degree earned 45 percent more, on average. About 14 percent of adults in the United States age 25 and older have completed a master's degree or higher, though only 11 percent of Black adults and 6 percent of Latino adults hold a graduate degree.[374] Disparities in graduate degree completion are particularly large in certain fields of study, with Black and Latino students less likely to complete a graduate degree in a science, technology, engineering, or mathematics (STEM) field compared to students of other racial and ethnic backgrounds.[375]

Recommended metric(s): Percentage of graduate students completing a graduate degree within 150 percent of their current program's length. Other time frames, such as 100 percent and 200 percent of program length, should also be reported for this measure.

Data source(s): Administrative data

What to know about measurement: Institutions regularly track and report certificate and degree completion for their students. State longitudinal data systems that incorporate the postsecondary sector include individual-level completion data from in-state institutions (making it possible to measure completion more broadly), but can only obtain completion data from other institutions through National Student Clearinghouse (NSC), which collects individual records provided by participating institutions. However, as noted earlier, NSC's completion records are sometimes missing information on the type of degree earned, and 12 percent of enrollment records reported to NSC do not include information on whether the student was enrolled at the undergraduate, master's, or doctoral level.[376]

Aggregate data on graduate degree completion are collected regularly and reported via the Integrated Postsecondary Education Data Systems (IPEDS), though these data report only the number of students earning a degree. They do not track cohorts of students and cannot be used to calculate graduation rates.

Source frameworks: This indicator appeared in two source frameworks reviewed for this report. The Institute for Higher Education Policy's metrics framework does not explicitly measure graduate degree completion, though the data are captured in its general graduation rate metric.[377]

DOMAIN: Social, emotional, and physical well-being

Kindergarten readiness: social-emotional development

Definition: Children develop and demonstrate the skills to form positive relationships with adults and peers, emotional functioning, and a sense of identity and belonging.

Why it matters: Children with positive social and emotional development tend to be happier, show greater motivation to learn, have a more positive attitude toward school, more eagerly participate in class activities, and demonstrate higher academic performance than peers with social and emotional behavior issues.[378, 379] Positive social and emotional development is also related to completing a college degree, likelihood of being employed, and less likelihood of involvement with the justice system at age 25.[380] However, children from low-income households and children of color are more likely to experience behavioral issues that affect their educational experiences and outcomes.[381, 382] For example, children in the bottom three income quintiles score between 0.15 and 0.23 standard deviations higher on behavior problems compared with children in the top two income quintiles at kindergarten entry, which are considered small- to medium-sized differences.[383] As noted under E-W system conditions, there is inequitable access to quality pre-K education that promotes positive outcomes for all children.

Recommended metric(s):

- Percentage of students meeting benchmarks on teacher-reported kindergarten readiness assessment, such as the following:
  - The Desired Results Developmental Profile (DRDP) Social and Emotional Development domain[384]

Elevating social-emotional learning in CORE Districts

The CORE Districts—a collaborative of eight school districts in California serving more than 1 million students in total—serve as an exemplar for education agencies seeking to elevate the importance of social-emotional learning (SEL). In 2013, the CORE Districts were granted a No Child Left Behind waiver, permitting them to use a rigorous accountability system developed by the districts themselves rather than adhere to the state of California's requirements. "Non-academic indicators," including social-emotional indicators, comprise 40 percent of the index used to assess school quality in the CORE Districts accountability system. CORE Districts engaged school administrators, educators, and data leads, as well as SEL experts from outside the CORE Districts, to help determine what social-emotional competencies should be included in the index. Competencies were also evaluated against the research base to determine whether they were meaningful, measurable, and malleable (that is, could be influenced by school systems). The districts developed student surveys for the four selected competencies—growth mindset, self-efficacy, self-management, and social awareness—which have been tested for validity and reliability and are currently administered annually to students in grades 5–12.

  - Ready 4 Kindergarten (R4K) English language arts (ELA) Social Foundations domain[385]
  - Teaching Strategies (TS) GOLD Social-Emotional subscale[386]
- Or, percentage of students meeting benchmarks on teacher reports, such as the following:
  - The Child Behavior Rating Scale (CBRS)[387]
  - Devereaux Early Childhood Assessment Preschool Program (DECA-P2)[388]

Data source(s): Assessments

What to know about measurement: Measurement of social-emotional development typically relies on teacher or parent reports. However, children's skills in this domain likely vary by context, so teachers and parents might rate children's social and emotional development differently based on their experiences and perspectives. Additionally, the evidence is not clear as to whether many of the commonly used measures of social and emotional development are culturally and linguistically appropriate for young children. Specifically, there is the potential for bias in these assessments for children of color and those who speak a language other than English at home.[389, 390, 391] Therefore, it may be useful to gather data on children's social-emotional development from multiple sources and to use the information with caution to avoid bias.

Source frameworks: Kindergarten readiness appeared in seven source frameworks reviewed for this report. Our proposed definition and measures align with the five domains of kindergarten readiness summarized in the Getting Ready framework, prepared by Rhode Island KIDS COUNT;[392] they are also included in the Head Start Early Learning Outcomes Framework.[393]

Kindergarten readiness: approaches to learning

Definition: Children develop and demonstrate emotional and behavioral self-regulation, cognitive self-regulation (executive functioning), initiative and curiosity, and creativity.

Why it matters: Children with positive approaches to learning have higher school readiness and achievement outcomes than those with less developed approaches to learning.[394, 395, 396] Studies have also consistently found positive associations between measures of children's ability to control and sustain attention, and academic gains in the preschool and early elementary school years.[397, 398, 399] However, studies have documented disparities related to income, race, and ethnicity in children's approaches to learning in preschool.[400, 401] At kindergarten entry, children in the bottom fifth of the income distribution score 0.40 standard deviations lower on approaches to learning relative to the top fifth of the income distribution, and Black children are rated 0.20 standard deviations lower compared with White children.[402] As noted in the E-W system conditions section of this report, there is inequitable access to quality pre-K education that promotes positive outcomes for all children.

Recommended metric(s):

- Percentage of students meeting benchmarks on teacher-reported kindergarten readiness assessment, such as the following:
  - The Desired Results Developmental Profile (DRDP) Approaches to Learning – Self-Regulation domain[403]
  - Teaching Strategies (TS) GOLD Cognitive subscale[404]
- Or, percentage of students meeting benchmarks on teacher reports of children's executive function, such as the Child Behavior Rating Scale (CBRS)[405]
- Or, percentage of students meeting benchmarks on a direct child assessment, such as the following:
  - The Heads Toes Knees Shoulders (HTKS) task, administered by teachers[406]
  - The Minnesota Executive Function Scale (MEFS), self-administered on a tablet[407]

Data source(s): Assessments

What to know about measurement: Individual instruments for this indicator do not comprehensively capture children's approaches to learning. It is recommended that this indicator be measured with multiple assessments to capture different components of children's approaches to learning. For example, children's initiative, curiosity, and creativity typically are measured through teacher reports, whereas executive functioning is typically measured using direct child assessments, teacher reports, or sometimes both.[408] Collecting data through these multiple approaches may prove to be a significant effort. Measuring children's approaches to learning is also commonly done through standardized kindergarten readiness assessments that have been adopted by 13 states as of 2017.[409] For example, California and Illinois use the DRDP as their kindergarten readiness assessment, which has a subscale focused on children's approaches to learning and self-regulation skills.

Source frameworks: Kindergarten readiness appeared in eight source frameworks reviewed for this report. Our proposed definition and measures align with the five domains of kindergarten readiness summarized in the Getting Ready framework, prepared by Rhode Island KIDS COUNT;[410] they also are included in the Head Start Early Learning Outcomes Framework.[411]

Kindergarten readiness: perceptual, motor, and physical development

Definition: Children develop and demonstrate gross and fine motor skills, and an understanding of health, safety, and nutrition.

Why it matters: Gross motor skills predict children's social competencies and physical well-being,[412, 413, 414] and are a gateway to engagement in learning and social activities, including sports and games, throughout the school years.[415, 416] Fine motor skills are associated more robustly with academic achievement.[417, 418] Preschool children from families with low incomes score significantly lower on direct assessments of visual and motor skills compared with children from families with higher incomes.[419, 420, 421] As noted in the E-W system conditions section of this report, there is inequitable access to quality pre-K education that promotes positive outcomes for all children.

Recommended metric(s):

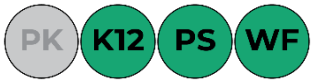
- Percentage of children meeting benchmarks on teacher-reported kindergarten readiness assessment, such as the following:
  - The Desired Results Developmental Profile (DRDP) Physical Development – Health domain[422]
  - Ready 4 Kindergarten (R4K) English language arts (ELA) Physical Well-Being and Motor Development domain[423]
  - Teaching Strategies (TS) GOLD Physical subscale[424]
- Or, percentage of students meeting benchmarks on direct child assessment administered by teachers, healthcare professionals, or other qualified adults, such as the Peabody Developmental Motor Scale[425]

Data source(s): Assessments

What to know about measurement: Children's perceptual, motor, and physical development can be measured with direct child assessments. However, they may be burdensome to assess for all children. For example, the Peabody Developmental Motor Scale comprehensively assesses these interrelated motor abilities, but is composed of six subtests that measure reflexes, ability to control one's body, ability to move from one place to another, ability to manipulate objects such as balls (for example, catching, throwing, kicking), ability to use one's hands, and visual-motor integration. An increasingly common option to measure this indicator is through kindergarten readiness assessments that teachers can complete. These teacher-reported assessments, which include domains such as Physical Development – Health on the DRDP, ask teachers to rate children's awareness of their own physical effort, body awareness, spatial awareness, and directional awareness.

Source frameworks: Kindergarten readiness appeared in five source frameworks reviewed for this report. Our proposed definition and measures align with the five domains of kindergarten readiness summarized in the Getting Ready framework, prepared by Rhode Island KIDS COUNT;[426] they also are included in the Head Start Early Learning Outcomes Framework.[427]

Self-management



Definition: Students are able to regulate their emotions, thoughts, and behaviors effectively in different situations.

Why it matters: Stronger self-management skills[xi] during childhood are predictive of numerous positive outcomes, including high school graduation, better physical health, more stable personal finances, decreased substance dependence, and lower chances of criminal offenses in adulthood, even after accounting for personal and family characteristics.[428] Compared to other social-emotional learning (SEL) competencies (including self-efficacy and social awareness), self-management is most strongly related to multiple later academic outcomes, even after accounting for previous achievement. Studies from multiple large school districts find that Black and Latino students self-report lower self-

[xi] These skills are commonly referred to as executive functioning and/or self-regulation skills in the early childhood sector and are discussed under the *kindergarten readiness: approaches to learning* indicator.

management skills than White students.[429, 430] Research has also identified a negative correlation between self-management scores and the following student characteristics: families experiencing poverty, emerging multilingual learners, and students receiving special education services.[431] However, studies show that students of all ages and backgrounds can be taught self-management skills.[432]

Recommended metric(s):

- Pre-K: See *kindergarten readiness: approaches to learning* indicator
- K–12: Percentage of students reporting a high level of self-management on surveys such as the CORE Districts SEL Survey self-management scale (grades 5–12)[433] or Shift and Persist scale for children[434]
- Postsecondary and workforce: Percentage of individuals reporting a high level of self-management on surveys such as the Shift and Persist scale for teens and adults[435]

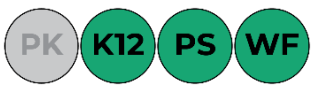
Data source(s): Surveys

What to know about measurement: Several survey tools exist to measure this indicator and related constructs. We have identified and suggested some tools with an evidence base; however, other instruments may also be appropriate to measure this indicator. We acknowledge there is limited consensus on measuring social-emotional skills, given its relatively recent emergence in the field, and that the use of different instruments across contexts would reduce the comparability of this indicator. Institutions that do not already collect survey data may need to develop a new data management infrastructure.

Competencies like self-management can be measured in different ways, including individual self-reports, teacher or parent reports, and performance tasks, that can be more or less predictive of future outcomes, depending on the particular instruments used and skills being measured. Here we recommend approaches relying on validated self-reported surveys, which are more feasible to collect at scale. Although teacher reports of students' social-emotional skills were found to be more predictive of student performance than student self-reports, CORE Districts made teacher reports optional, due in part to concerns about burden.[436, 437] Teacher reports of students' social-emotional skills can also be more predictive of student outcomes than performance tasks, which are not always any more predictive than student self-reports.[438] On the other hand, teacher reports may not be appropriate if the data are used for school accountability and, like grading practices, are subject to the rater's implicit or explicit bias.

Source frameworks: This indicator appeared in five source frameworks reviewed for this report. Our proposed definition and measure align with the CORE Districts definition of self-management. Broadly, we have opted to align with—and build on—their SEL indicators, given the evidence base for their predictive power and instrumentation.[439]

Growth mindset



Definition: Students believe that their abilities can grow with effort.

Why it matters: A growth mindset has been linked to better attendance, behavior, and math and English language arts test scores.[440] In particular, the belief that math ability is fixed or innate is especially common, and may limit learning in math.[441] Research shows that traditionally underserved students—including students experiencing poverty, emerging multilingual learners, and Latino and Black students—are less likely to hold a growth mindset than their peers.[442] Some interventions with K–12 and college students that foster a growth mindset have been shown to improve students' grade point averages (GPAs), reduce course failures, and support academic effort.[443, 444, 445, 446, 447] However, a recent meta-analysis of 29 mindset interventions found that, on average, they had limited effects on student outcomes.[448] Growth mindset interventions may help narrow differences in academic achievement between students of color and White students;[449, 450] however, research findings are inconsistent—for example, one study found that growth mindset interventions significantly improved the academic performance of Latino students, but not Black students,[451] and other studies have not been able to replicate positive impacts among diverse populations of students.[452]

Recommended metric(s):

- K–12: Percentage of students reporting a high level of growth mindset on surveys such as the CORE Districts SEL Survey Growth Mindset Scale (grades 5–12)[453] or the Growth Mindset Scale developed by Carol Dweck,[454] which may be used with children, teens, and adults
- Postsecondary and workforce: Percentage of students reporting a high level of growth mindset on surveys such as the Growth Mindset Scale developed by Carol Dweck[455]

Data source(s): Surveys

What to know about measurement: As indicated above, several survey tools exist to measure this indicator and related constructs. We have identified and suggested tools with an evidence base; however, other instruments may also be appropriate to measure this indicator, though the use of different instruments across contexts would reduce comparability of this indicator. Please see information on the *self-management* indicator for additional considerations regarding the measurement of social-emotional skills.

Source frameworks: This indicator appeared in three source frameworks reviewed for this report. Our proposed definition and measure align with the CORE Districts definition of growth mindset. Broadly, we have opted to align with—and build on—CORE Districts SEL indicators,[456] given the evidence base for their predictive power and instrumentation.

Self-efficacy

Definition: Students believe in their ability to achieve an outcome or reach a goal.

Why it matters: Self-efficacy is a strong predictor of college grade point average (GPA) and persistence, with additional predictive power beyond socioeconomic status and prior achievement.[457] Students who report higher self-efficacy earn higher GPAs and score higher on math and English language arts tests.[458, 459] Higher levels of self-efficacy in math—students' belief in their capacity to successfully execute math-related tasks—have also been linked to the likelihood of attending college and choosing a science, technology, engineering, or mathematics (STEM) field.[460, 461] Self-efficacy tends to decline over

time for students of all racial and socioeconomic backgrounds, but economically disadvantaged students consistently report lower rates of self-efficacy than more economically advantaged students, as do students of color compared to White students.[462] Like other social-emotional skills, self-efficacy can be fostered in classrooms and through interventions.

Recommended metric(s):

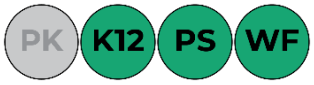
- K–12: Percentage of students reporting a high level of self-efficacy on surveys such as the CORE Districts Social-Emotional Learning (SEL) Survey self-efficacy scale[463]
- Postsecondary and workforce: Percentage of individuals reporting a high level of self-efficacy on surveys such as the New General Self-Efficacy Scale[464] or Ascend survey's Self-Efficacy Scale[465]

Data source(s): Surveys

What to know about measurement: As indicated above, several survey tools exist to measure this indicator and related constructs. We have identified and suggested tools with an evidence base; however, other instruments may also be appropriate to measure this indicator, though the use of different instruments across contexts would reduce comparability of this indicator. Please see information on the *self-management* indicator for additional considerations regarding the measurement of social-emotional skills.

Source frameworks: This indicator appeared in five source frameworks reviewed for this report. Our proposed definition and measure align with the CORE Districts definition of self-efficacy. Broadly, we have opted to align with—and build on—CORE Districts SEL indicators,[466] given the evidence base for their predictive power and instrumentation.

Social awareness



Definition: Students are able understand others' perspectives; understand social and ethical norms for behavior; and recognize family, school, and community resources and supports.

Why it matters: Some research has found that higher social awareness in early grades is correlated with a greater likelihood of graduating from high school and college, and more stable employment at age 25, controlling for family socioeconomic status (SES) and prior achievement.[467] Other evidence, however, shows that social awareness has limited predictive power for later academic outcomes after accounting for other social emotional learning (SEL) skills, such as self-management and self-efficacy.[468] Research from the CORE Districts shows that White students consistently rate themselves more favorably than other racial groups regarding social awareness.[469] Research on soft skills required for workplace success shows that social skills—including whether individuals respect differences and use appropriate behavior and conflict-resolution methods—are predictive of employment, job performance, income, and entrepreneurial success.[470]

Recommended metric(s):

- K–12: Percentage of students reporting a high level of social awareness on surveys such as the CORE Districts SEL Survey[471] social awareness scale, or percentage of students meeting

benchmarks on teacher ratings of social skills drawn from Elliott and Gresham's Social Skills Rating Scale[472]

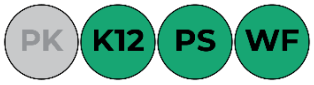
- Postsecondary and workforce: Percentage of individuals demonstrating social proficiency on a performance assessment, such as the National Work Readiness Credential Essential Soft Skills assessment[473]

Data source(s): Surveys or assessments

What to know about measurement: As indicated above, several survey tools exist to measure this indicator and related constructs. We have identified and suggested tools with an evidence base; however, other instruments may also be appropriate to measure this indicator, though the use of different instruments across contexts would reduce comparability of this indicator. Please see information on the *self-management* indicator for additional considerations regarding the measurement of social-emotional skills.

Source frameworks: This indicator appeared in five source frameworks reviewed for this report. Our proposed definition and measure are adapted from the CORE Districts definition of social awareness. Broadly, we have opted to align with—and build on—CORE Districts SEL indicators,[474] given the evidence base for their predictive power and instrumentation.

Cultural competency



Cultural competency: Individuals are able to understand the perspectives of and empathize with others from diverse backgrounds and cultures.

Why it matters: Projections by the National Skills Coalition[475] show that, by 2040, people of color will comprise more than half of the working-age population in the United States. Increased racial and socioeconomic diversity in schools and workplaces is associated with improved outcomes for individuals and businesses (see the E-W System Conditions section of this report for more on the benefits of diverse institutions). For students and employees to succeed in an increasingly diverse, globalized economy, it is important that they demonstrate an ability to empathize with and work effectively with others of diverse backgrounds. As discussed above, social skills—including whether individuals respect differences and use appropriate behavior and conflict-resolution methods—are predictive of employment, job performance, income, and entrepreneurial success.[476] At the same time, polling shows that racial divides persist regarding both lived experience and perceptions of discrimination in the workplace. About half of Black individuals and a third of Asian and Latino individuals report having been treated unfairly in hiring, pay, or promotion. Poll data show that just over half of White adults perceive race relations in the United States as "generally bad," compared to 71 percent of Black adults.[477]

Recommended metric(s):

- K–12: Reflecting the lack of developed tools in the field, we are unable to recommend a specific measurement tool. In some contexts, it might be possible to adapt an existing measure for adults for use with youth. For examples, we refer to the tools recommended for postsecondary and workforce contexts.

- Postsecondary: Percentage of students demonstrating proficiency on an assessment of cultural competency, such as the HEIghten Outcomes Assessment for Intercultural Competency & Diversity[478] or The Intercultural Development Inventory®[479]
- Workforce: Percentage of individuals demonstrating proficiency on an assessment of cultural competency, such as The Intercultural Development Inventory®[480]

Data source(s): Surveys or assessments

What to know about measurement: Intercultural knowledge and competence is deemed an "essential learning outcome" by the American Association of Colleges and Universities, which has published a rubric for evaluating students' cultural competence based on a work sample.[481] However, given that scoring students' work is subjective and difficult to compare across contexts, we propose using performance assessments (or survey-based measures, although such measures could be subject to social desirability bias), which could more feasibly be administered at scale.

Source frameworks: This indicator appeared in four source frameworks reviewed for this report. Our proposed definition and measure are adapted from the CORE Districts definition of social awareness. However, although the CORE Districts *definition* of social awareness includes cultural awareness, the CORE Districts Social-Emotional Learning (SEL) Survey instrument does not sufficiently capture intercultural competency.[482] Other source frameworks, including the National Research Council's Key National Education Indicators[483] framework and the Urban Institute's Robust and Equitable Measures to Identify Quality Schools (REMIQS),[484] include sets of "learning outcomes" or "deeper learning skills," which include social and intercultural skills.

Civic engagement

Definition: Individuals exhibit the knowledge, skills, values, motivation, and activities that promote quality of life within a community and society at large through political and nonpolitical processes.

Why it matters: Participating in civic work can help develop transferrable career skills, such as coalition-building, communication, project development and implementation, meeting facilitation, and problem solving. Community engagement activities, including volunteerism and participation in community decision making, are associated with improved well-being among both youth and adults.[485, 486, 487] Acknowledging its importance, the American Association of Colleges and Universities deems civic engagement an "essential learning outcome," and at least two states require community service as part of their high school graduation requirements.

A study of civic participation by the Center for Information & Research on Civic Learning & Engagement (CIRCLE)[488] shows that White survey respondents tend to be civically engaged at higher rates than Black, Latino, and Asian respondents, regardless of socioeconomic status (SES). However, it acknowledges two important limitations of the analysis: (1) potential bias in what survey-based measures capture (that is, they often do not capture informal civic activity), and (2) potential barriers to participation in civic activities for communities of color.

Recommended metric(s):

- K–12: Percentage of students reporting a high level of civic engagement on surveys such as the Youth Civic and Character Measures Toolkit Survey[489] and Youth Civic Engagement Indicators Project Survey[490]
- Postsecondary and workforce: Percentage of individuals reporting a high level of civic engagement on surveys such as the Index of Civic and Political Engagement[491]

Data source(s): Surveys

What to know about measurement: We propose using a survey-based measure of civic engagement. Several survey tools exist to measure this indicator and related constructs, though the use of different instruments across contexts would reduce comparability of this indicator. We have identified and suggested survey tools with an evidence base; however, other instruments may also be appropriate or are under development. For example, the Postsecondary Value Commission[492] describes ongoing work by the Next Generation Undergraduate Student Success Measurement Project to measure civic engagement, which it defines as "community participation that facilitates the development of democratic skills, media literacy that supports political knowledge, and values that promote equity, diversity, and justice."[493]

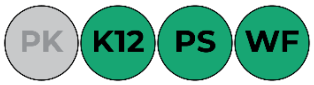
Next Generation Undergraduate Success Measurement Project at UC Irvine

In collaboration with the Postsecondary Value Commission and the Andrew W. Mellon Foundation, in 2018 the University of California Irvine (UCI) launched the Next Generation Undergraduate Success Measurement Project, which aims to identify key benefits of postsecondary education while driving systematic improvement across universities to ensure these benefits are equitably distributed to all students. Using performance assessments, administrative records, and learning management system data for a cohort of 1,200 UCI students, the project tracks six dimensions of student outcomes: cognitive ability and intellectual dispositions, life-course agency, self-regulation skills, social capital, civic engagement, and psychological flourishing and mental health. The initiative also aims to promote evidence-based models for institutions to advance life-course outcomes, including postgraduate education; employment; and health, social, and psychological outcomes (for example, social connectedness, improved well-being), and civic outcomes (for example, participation in elections and political processes, involvement in community organizations).

Voter registration rates and voting rates offer a more comparable and less burdensome alternative to survey-based measures because individual records can be linked to administrative voter data and are often used as proxies for civic engagement among adults. However, voter registration and participation are impacted by voter disenfranchisement policies, and noncitizens cannot vote in elections. If feasible, a survey-based, multidimensional measure provides a more inclusive view of civic engagement.

Source frameworks: This indicator appeared in nine source frameworks reviewed for this report. Many source frameworks, including the Urban Institute's Metrics for Boosting Economic Mobility[494] and Race Count's Education and Economic Opportunity indicators,[495] focus on participation in political processes (for example, voting). Our definition draws from this work as well as the National Research Council's Key National Education Indicators[496] which includes cognitive skills, as well as activities such as volunteerism and community engagement in its definition for civic engagement.

Social capital



Definition: Individuals have access to and are able to mobilize relationships that help them further their goals.

Why it matters: Social network connections are important for accessing social, educational, and employment-related opportunities. Studies looking at employment outcomes have noted that social contacts are important for providing job referrals, and evidence suggests that candidates who have been referred to jobs are more likely to be hired and retained in their positions.[497] One study demonstrates that social cohesion (defined as "trusting neighbors, talking to and helping neighbors, and socializing with family and friends") is correlated with lower unemployment: states with high social cohesion had approximately 2 percent lower unemployment than those with lower social cohesion, controlling for other demographic and economic factors.[498] Some studies have indicated that Black Americans and Latinos have less access to social capital, controlling for other demographic factors.[499, 500] Schools and nonprofit organizations can help cultivate social capital among young people through educational and non-educational programming; therefore, we suggest measuring social capital starting in K–12, using a survey instrument that has been developed for use with youth and young adults.

Recommended metric(s):

- K–12 and postsecondary: Percentage of students or individuals reporting a high level of social capital on surveys such as the Social Capital Assessment + Learning for Equity (SCALE) Social Capital, Network Diversity, and Network Strength scales[501]
- Workforce: Percentage of individuals reporting a high level of social capital on surveys such as the Social Capital Community Benchmark Survey[502]

Data source(s): Surveys

What to know about measurement: Several survey tools and approaches exist to measure this indicator and related constructs. We have identified and suggested examples of tools with an evidence base; however, other instruments may also be appropriate, and the measurement field continues to evolve. Framework users should also consult guidance by the Christensen Institute that describes emerging practices for measuring students' social capital using a four-dimensional framework based on quantity of relationships, quality of relationships, structure of networks, and ability to mobilize relationships.[503]

Most measures of social capital at the individual level can be organized into two types. Most studies use a measurement of cognitive social capital, which focuses on the perception of interpersonal connections. In contrast, other studies have focused on structural social capital by measuring the density of social networks. Operationalizing structural social capital is methodologically more difficult, as it requires sophisticated network analysis techniques.

An alternative to measuring social capital at the individual level is measuring it at the systems level by measuring the concentration of social capital in an area. Chetty et al.[504] found that the concentration of social capital in a neighborhood has a strong positive correlation with upward mobility. Social capital

can be influenced by social and economic factors, and therefore can be unevenly distributed or concentrated across local, regional, or institutional contexts. To measure concentration of social capital, users could consider an index (adapted from Rupasingha and Goetz),[505] including the following:

- The number of all associations per 10,000 population, including religious organizations, civic and social associations, political organizations, professional organizations, labor organizations, bowling centers, physical fitness facilities, public golf courses, and sports clubs. The measure also includes commercial and nonprofit associations drawn from Census Bureau County Business Patterns data.
- The percentage of voters who participated in a presidential, state, or county election.
- The county-level census response rate in the person's county.
- The number of charitable, nonprofit organizations with an office in the county.

Source frameworks: This indicator appeared in three source frameworks reviewed for this report. Our proposed definition most closely draws from the Key National Education Indicators.[506]

Mental and emotional well-being

PK K12 PS WF

Definition: Individuals possess mental and emotional well-being.

Why it matters: In 2019, just before the COVID-19 pandemic, roughly one in five U.S. adults—nearly 50 million people—experienced a mental illness.[507] Rates are even higher for youth and young adults who experienced record levels of depression and anxiety, alongside multiple forms of trauma.[508, 509] In today's political, economic, social, and health contexts, students of color and students from lower-income backgrounds face even greater mental and emotional well-being concerns because they are bearing burdens of family bereavement, economic uncertainty, housing instability, racial injustices, and trauma. Identifying individuals in need of mental and emotional health care is critical. Research shows that childhood depression, for instance, is more likely to persist into adulthood if left untreated, but only half of children with pediatric major depression are diagnosed before adulthood.[510] This indicator thus aims to increase the identification of individuals experiencing mental and emotional well-being concerns.

The California Healthy Kids Survey

Since 2003, every school district in California has been required to administer the California Healthy Kids Survey (CHKS) at least once every two years and make the results publicly available. CHKS is an anonymous, confidential survey for students in grades 5 and above designed to help school communities identify students' needs. It is based on a strengths-based framework drawn from resilience and youth development research. CHKS covers several dimensions of school climate and student well-being, including physical and mental well-being and safety. Although there is a core survey that must be administered, school districts can select supplementary modules for more in-depth questions on different topics or add a custom module to measure other topics relevant to their community. For example, the Oakland Unified School District has administered additional questions on topics such as access to health care, exposure to community violence, and social-emotional learning (SEL). Members of the community can explore the data through query tools and dashboards, which allow users to disaggregate data and compare trends over time. In 2021, prompted in part by the strains the pandemic has placed on children's emotional and mental well-being, the California state legislature passed a bill to place CHKS data alongside data on academic proficiency on the state's School Dashboard.

Recommended metric(s):

- Pre-K: Percentage of children with identified health or developmental concerns as identified by a developmental screening tool. For a list of screening tools that may be appropriate for children younger than age 5, see the following guide from the Head Start Early Childhood Learning and Knowledge Center: "Birth to 5: Watch Me Thrive! A Compendium of Screening Measures for Young Children."[511]
- K–12: Percentage of youth with mental or emotional health needs as identified by a universal screening tool. For a list of mental health screening tools that may be appropriate for school-based use, see the following guide from the National Center on Safe Supportive Learning Environments: "Mental Health Screening Tools for Grades K–12."[512]
- Postsecondary and workforce: Psychological well-being scale[513]

Data source(s): Surveys

What to know about measurement: In its guidance to schools for selecting a universal screening tool, the National Center on Safe Supportive Learning Environments states the following:

> "Prior to using a screening tool, it is essential that schools have (a) properly trained staff who can safely and effectively screen children and adolescents (i.e., at a minimum, staff who have been trained on how to administer a given screening tool and interpret the results); (b) a system for referral and follow-up when screening identifies a problem that requires further attention; and (c) access to school-based and community resources to adequately address the student's mental health needs. If schools lack these capacities, then the utility of screening will be questionable. Many experts consider it unethical, for example, to screen students if appropriate referral, diagnostic or treatment resources are not available".[514]

We also note that this information should be voluntary and confidential.

Several survey tools exist to measure this indicator and related constructs through self-reports, as recommended for postsecondary and workforce populations. We have identified and suggested tools with an evidence base; however, other instruments may also be appropriate to measure this indicator.

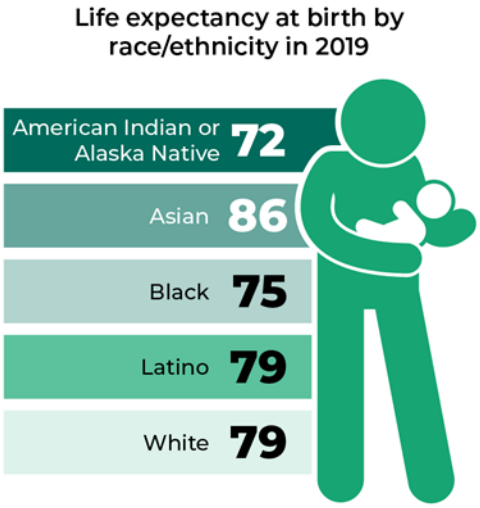
Source frameworks: This indicator appeared in three source frameworks reviewed for this report. Our proposed metric most closely aligns with StriveTogether's[515] proposed measure for health care access and utilization, neonatal/maternal health, and mental health indicator.

Physical development and well-being

Definition: Individuals exhibit positive physical development and health.

Why it matters: Physical development and well-being is both an outcome in itself and an important contributor to economic mobility and security. Research links healthy behaviors like physical activity to higher academic achievement.[516] At the same time, education affects health outcomes: in the United States, individuals with college degrees have longer life expectancies than those with lower levels of education (for example, one study shows that men with a graduate degree have a life expectancy

approximately 16 years longer than those with less than a high school degree).[517] Racial disparities in health outcomes among both children and adults are well documented. For example, Black Americans have a lower life expectancy at birth than White Americans by approximately six years.[518] Data also suggest that racial disparities in life expectancy have been exacerbated by the COVID-19 pandemic, with communities of color experiencing higher rates of hospitalization and death.[519]



Data source: National Center for Health Statistics (2022).

Recommended metric(s):

- Pre-K: See *kindergarten readiness: perceptual, motor, and physical development* indicator
- K–12: Percentage of students meeting benchmarks on self-rated surveys of physical health, such as the California Healthy Kids Survey Physical Health & Nutrition module[520]
- Postsecondary and workforce: Percentage of adults who rate their own health as good, very good, or excellent on the Self-Rated Health scale,[521] or percentage of individuals meeting benchmarks on the Health-Related Quality of Life Scale[522]

Data source(s): Surveys

What to know about measurement: We recommend measuring physical development and well-being using self-reports on surveys. Although physical fitness tests and activity trackers are viable alternatives to self-reports,[523] survey data may be more feasible to collect at scale while mitigating potential concerns about shaming and privacy. As one example, California administers both a survey and a physical fitness test to K–12 students. However, it recently eliminated the Body Composition component of the test amid concerns about its value and risk for unintended consequences and is reassessing whether to continue with the test at all.[524]

Source frameworks: This indicator appeared in seven source frameworks reviewed for this report. Our proposed approach to measuring well-being using self-reports aligns with recommendations by the Urban Institute for how to measure "overall health."[525]

DOMAIN: Career readiness and economic success

Successful career transition after high school

PK **K12** PS WF

Definition: High school graduates transition to training, military service, or employment in the fall after graduating high school (if they do not matriculate to credit-bearing postsecondary education programs).

Why it matters: Students can follow multiple pathways after high school on a course to economic and social mobility, including apprenticeships or job training, military service, or employment. To present a

complete picture of where students transition after high school, this indicator tracks data on alternatives to immediate enrollment in postsecondary education—an approach increasingly being adopted. For example, students in Chicago Public Schools are now required to have a "postsecondary plan" that can include college admission, acceptance into an apprenticeship or job training program, military enlistment, or employment. Of the 98 percent of seniors who submitted a plan in 2020, 17 percent were pursuing pathways outside of college.[526] As noted earlier, Black and Latino students and those from low-income households are less likely to enroll in college immediately following high school.

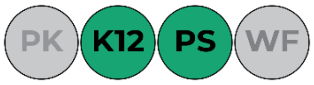
Recommended metric(s): Percentage of high school graduates enlisted in the military, enrolled in an apprenticeship program, enrolled in noncredit career and technical education (CTE) courses, or employed and earning at least the median annual full-time earnings for high school graduates ($35,000 per year) before October 31 following graduation

Data source(s): Administrative data or surveys

What to know about measurement: Measuring this indicator would require either collecting self-reported data from students following their high school graduation or linking individual-level data across multiple systems, including K–12 graduation records, noncredit CTE enrollment records from postsecondary and vocational institutions, employment and earnings records and records of participation in state apprenticeship programs from labor and workforce development departments, and national military enlistment records from the Defense Manpower Data Center.[527] Currently, 24 state longitudinal data systems link records from the K–12, postsecondary, and workforce sectors, and at least one state (Pennsylvania) has signed a memorandum of understanding with the U.S. Department of Defense to receive enlistment data for its students. Without these linkages, schools may have to rely on students' self-reports, which may be burdensome to collect and less accurate than data from administrative records.

Source frameworks: This indicator appeared in eight source frameworks reviewed for this report. Our proposed measure draws on work by Education Strategy Group on the From Tails to Heads framework.[528]

CTE pathway concentration



Definition: Students participating in career and technical education (CTE) concentrate in a single chosen pathway or program of study.

Why it matters: Students who complete CTE concentrations in pathways aligned to top occupations—particularly those from low-income households and male students—are more likely to graduate from high school, attend a two- or four-year postsecondary institution, be employed, and receive higher compensation after high school.[529, 530, 531] The benefits of CTE enrollment are driven entirely by upper-level coursework, particularly in highly technical fields or those aligned with occupations in demand by employers.[532] Exposure to CTE coursework differs slightly by race, disability status, income, and gender. For instance, White students are more likely to "concentrate" (complete three or more courses in a formal, coordinated program of study at the high school level, or 12 or more credits at the postsecondary level) than Black and Latino students,[533] even though the benefits of CTE accrue to those who concentrate in a given field.

Recommended metric(s):

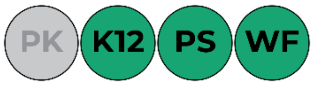
- K–12: Percentage of 12th-grade students enrolled in CTE who complete two or more CTE courses in a single pathway
- Postsecondary: Percentage of CTE students who earn at least 12 credits within a CTE program, or complete such a program if it encompasses fewer than 12 credits in total

Data source(s): Student transcripts

What to know about measurement: Schools regularly record student-level course completion, including CTE courses, as part of their regular operations. However, students can enroll in CTE courses either at their local high school or regional high school vocational school, or through postsecondary programs (credit or non-credit), including community colleges and vocational schools. Therefore, student records need to be linked across sectors. Our recommended metrics are aligned with federal guidance on defining "CTE concentrator" in K–12 and postsecondary contexts under the Perkins Career and Technical Education Act of 2006 (Perkins IV).[534] However, in practice, states vary somewhat in their definitions of "CTE concentrators."[535] An alternative metric would be to calculate the percentage of CTE students who meet their state's criteria for CTE pathway concentration, which could include completion of a non-credit CTE program. For example, at the postsecondary level, Maryland also considers students to be CTE concentrators if they complete a state-approved non-credit program that includes a sequence of two or more CTE non-credit courses leading to a postsecondary credential.[536]

Source frameworks: This indicator appeared in five source frameworks reviewed for this report. Our proposed definition and metric align with work done by the Urban Institute[537] and the Education Strategy Group.[538]

Industry-recognized credential



Definition: Individuals complete at least one industry-recognized credential, as defined by each state.

Why it matters: About 30 million "good jobs" in the United States are held by workers with less than a four-year degree and more than a high school diploma.[539, xii] In response to industry demand for qualified "middle skill" workers, at least 26 states have included industry-recognized credentials as part of their Every Students Succeeds Act (ESSA) accountability or reporting plans.[540] (A similar number also include career and technical education [CTE] concentration, and about half of these states include work-based learning.) An industry-recognized credential is typically defined as being exam-based, administered by third parties, supplemental to traditional postsecondary credentials, and sought or accepted by employers in an industry. Examples of industry-recognized credentials include Certified Information Systems Security Professional, Certified Welder, Certified Medical Laboratory Assistant, and Certified Foodservice Management Professional. Individuals can receive these nationally recognized verifications of skill independent of being enrolled in a degree-granting institution. Research suggests that earning an industry-recognized credential can increase the earnings of low-

[xii] This analysis, conducted by the Georgetown University Center on Education and the Workforce in 2017, defined a "good job" as one paying at least $35,000 per year for workers under age 45 and at least $45,000 per year for workers age 45 and older.

income job seekers by more than $10,000 over the first two years after enrollment in a training program.[541] However, it is worth noting that credentials can vary widely in value.[542] For example, an analysis of credentials earned by K–12 students found that only 19 percent of those credentials were in demand by employers.[543]

Recommended metric(s):

- K–12: Percentage of 12th-grade students enrolled in CTE who earn at least one industry-recognized credential
- Postsecondary: Percentage of students enrolled in a credit or non-credit CTE program who earn at least one industry-recognized credential
- Workforce: Percentage of program participants who have completed at least one industry-recognized credential

Data source(s): Administrative data

What to know about measurement: Just over half of states collect data on industry credential attainment, and most rely on self-reported data,[544] given the larger number of credentialing bodies that exist outside of state purview. Furthermore, secondary, postsecondary, and workforce systems in the same state often use inconsistent data collection processes and fail to link individual-level credential attainment data across systems. Recognizing these challenges, a 2018 report by Education Strategy Group, Advance CTE, and Council of Chief State School Officers (CCSSO) provides detailed recommendations for creating more standardized reporting systems to track high-value industry credential attainment and points to promising developments.[545] For example, the National Manufacturing Institute and National Student Clearinghouse (NSC) have partnered to pilot a process for collecting industry credential attainment data for postsecondary students by matching individual-level records from community colleges and third-party credentialing bodies.

With more than 4,000 credentialing bodies offering thousands of different credentials across sectors, credentialing requirements can differ widely and, in many cases, state education agencies count exams and credentials not valued by employers.[546] Some states are working to apply standard definitions. In Texas, for example, recent legislation requires the Texas Workforce Commission, the Texas Higher Education Coordinating Board, and the Texas Education Agency to jointly develop a validated list of industry-recognized credentials.[547] Care should be taken in comparing rates across localities.

The Credential Engine data initiative

The Credential Engine initiative is building a public Credential Registry of credentials across the country in a linked, standardized, open-data format that allows users to search and compare information about different credentials, including requirements, costs, quality, and value. This information is being published in an interactive tool called Credential Finder. So far, the tool includes information on more than 30,000 credentials (spanning degrees, certificates, licenses, certifications, apprenticeships, badges, and more). In 2017, Indiana became the first state in the nation to begin working with Credential Engine. To date, the state has added data on more than 3,000 credentials, including all certificates and degree programs offered by public postsecondary institutions, Next Level Jobs certificates and their connected certifications, apprenticeship programs, and programs that recognize credit for military training. It is now working to add data on secondary school credentials to understand how they are linked to other education and training opportunities, and has other planned enhancements, including adding data on median wages and employment rates associated with each credential. The data infrastructure generated by the Credential Registry can also help states standardize their collection of individual-level credential attainment data.

Source frameworks: This indicator appeared in two source frameworks reviewed for this report. Our definition and suggested metrics draw from the Workforce Innovation and Opportunity Act (WIOA) Performance Indicators and Measures[548] which includes secondary students enrolled in CTE, as well as postsecondary credential earners, in its definition of industry-recognized credential.

Participation in work-based learning

Definition: Credential seekers participate in an internship, work study, cooperative education, apprenticeship program, or other work-based learning opportunities.

Why it matters: Work-based learning opportunities are a key component of effective career pathways, offering individuals practical experiences to develop the skills they need to be successful in the workplace.[549] Internship and cooperative education programs have been identified as a high-impact practice for bolstering college students' success.[550] In addition, work-based learning programs that provide occupational skills training aligned to industry demands can lead to improved employment and earnings outcomes for individuals from low-income households.[551] For example, a 2012 study of the Registered Apprenticeship program, which offers structured on-the-job training combined with technical instruction tailored to meet industry needs, found significant positive impacts on lifetime earnings.[552] For participants who completed the program, average career earnings were estimated to be $240,037 higher than for similar nonparticipants.

There are disparities in who benefits from work-based learning programs. Black and Latino workers are proportionally represented in Registered Apprenticeship programs, but Black workers typically make significantly less than other groups upon completing the program (approximately $14 per hour compared to $26 for White workers and $31 for Latino and Asian workers).[553] Among college students, Black, Latino, and first-generation students, and those from low-income households, are less likely to participate in internships; if participating, they also are less likely to be paid relative to their peers.[554] The 2021 National Survey of College Internships found that 16 percent of first-generation college students participated in an internship, compared to 23 percent of other college students. Among those who participated, 54 percent of first-generation college students received compensation, compared to 62 percent of their peers.

Recommended metric(s):

- K–12: Percentage of students who participate in a work-based learning opportunity before graduation
- Postsecondary: Percentage of students who participate in a work-based learning opportunity before graduation
- Workforce: Percentage of workforce training program participants who participate in a work-based learning opportunity before program completion

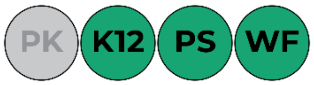
Data source(s): Administrative data; student transcripts; surveys

What to know about measurement: Federal data on participation in registered apprenticeships is gathered and reported annually by the U.S. Department of Labor. Federal Student Aid also records data

on participation in the federal work-study program. Data on unregistered apprenticeships, internships, and other work-based learning opportunities are not currently reported systematically, making measurement at scale more challenging. Some K–12 schools and postsecondary institutions may track participation in for-credit work-based learning in their administrative and course data systems, whereas others may rely on self-reported student surveys to track participation in work-based learning more broadly.

Source frameworks: This indicator appeared in four source frameworks reviewed for this report. Our proposed definition draws from work from the Center for Postsecondary and Economic Success' Framework for Measuring Career Pathways Innovation[555] and the Bill & Melinda Gates Foundation.[556]

Digital skills



Definition: Students and workers can use digital technology tools effectively to access, manage, evaluate, and communicate information.[xiii]

Why it matters: Digital skills and online literacy are increasingly critical for academic and workforce success, as well as for informed participation in civic life. One state (Delaware) now requires students to demonstrate performance-based competency in technology as part of its high school graduation requirements. A meta-analysis of more than two decades of research shows a positive relationship between information and communication technology skills and academic achievement.[557] Although some research points to disparities in digital literacy across socioeconomic and race and ethnicity groups,[558] further research is needed to develop the field's understanding of disparities in digital skills and media use.[559] Digital skills are closely linked with access to technology, which is inequitable by race, ethnicity, and income, and is discussed in the Adjacent Systems Conditions section of this report.

Recommended metric(s):

- K–12: Reflecting the lack of developed tools in the field, we are unable to recommend a specific measurement tool for K–12 students. Two validated instruments discussed in previous literature—the Instant Digital Competence Assessment (iDCA),[560] and the Student Tool for Technology Literacy (ST^2L)[561]—do not appear to be available at this time.
- Postsecondary and workforce: Percentage of individuals demonstrating proficiency on a performance assessment that measures digital skills required for workforce success, such as the Problem Solving in Technology-Rich Environments assessment within the Education & Skills Online assessment suite, which can be used by researchers and institutions to gather individual-level results based on Organisation for Economic Co-operation and Development (OECD) Survey of Adult Skills (Programme for the International Assessment of Adult Competencies [PIAAC]) domains.[562]

Data source(s): Assessments

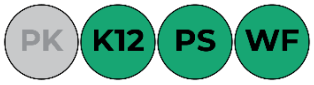
[xiii] Adapted from Katz, I. R., & Smith Macklin, A. (2007). Information and communication technology (ICT) literacy: Integration and assessment in higher education. *Systemics, Cybernetics, and Informative*, 5(4), 50-55.

What to know about measurement: The field currently lacks consensus around a definition of "digital skills" (alternatively referred to as digital literacy, Internet skills, computer literacy, and so on, each with slight nuance). However, the *quality* of engagement with technology is paramount in building digital literacy that supports academic achievement,[563] and users should be careful not to conflate use of technology alone with digital skills. Research suggests that higher levels of media use among youth can be associated with lower academic achievement and lower feelings of personal contentment.[564, 565, 566]

There is not a "best-in-class" tool that is widely used to measure this concept. We see this recommendation as an area where the suggested indicator is aspirational, guiding the field toward a more widely validated and used measure. Users should seek to measure high-quality, productive engagement with technology to cultivate skills that benefit students in school, and eventually in the workforce.

Source frameworks: The P-16 Framework[567] includes an indicator of Use of Digital Tools and Resources. Additionally, information and technology resourcefulness is included in the Urban Institute's Robust and Equitable Measures to Identify Quality Schools (REMIQS)[568] definition of "deeper learning skills."

Communication skills



Definition: Individuals have the oral, written, nonverbal, and listening skills required for success in school and at work.

Why it matters: Effective written and verbal communication skills can lay the foundation for other valuable workplace and life skills, such as collaboration and negotiation. Employers consistently rank communication skills among the most important—if not the most important—skills to support strong workplace performance across industries,[569, 570, 571] and research suggests communication skills are predictive of employment and workplace performance.[572] In a comprehensive review of soft skills literature, researchers found that communication skills are predictive of workforce outcomes for youth ages 15–29, as well as for the general adult population.[573] Reflecting the importance of communication skills, four states include communication skills among their high school graduation requirements,[574] and the American Association of Colleges and Universities (AAC&U) includes written communication and oral communication among 16 "essential learning outcomes."[575]

Recommended metric(s):

- K–12: Percentage of students demonstrating proficiency on assessments such as the College and Career Readiness Assessment (CCRA+),[576] an assessment for grades 6–12 that measures critical thinking, problem solving, and written communications
- Postsecondary: Percentage of students demonstrating proficiency on assessments such as the following:
  - The Collegiate Learning Assessment (CLA+)[577] or Success Skills Assessment (SSA+)[578] for postsecondary students that measure critical thinking, problem solving, and written communications

  - The HEIghten Outcomes Assessment for Written Communication[579]
- Workforce: Percentage of individuals demonstrating proficiency on a performance assessment, such as the National Work Readiness Credential Essential Soft Skills assessment[580]

Data source(s): Assessments

What to know about measurement: Although there is broad consensus on the importance of communication skills, communication performance assessments are not currently administered and reported at scale. We propose using a performance-based test rather than a self-reported or instructor- or employer-reported measure to mitigate the risk of bias; however, the performance tests described above only measure *written* communication skills, not verbal communication skills. As alternatives to the performance test measures suggested above, the AAC&U has published scoring rubrics for both written communication and oral communication that could be used to assess students' skills in postsecondary contexts, though they have not been validated and should be used only for formative purposes.[581] We suggest communication skills could be measured starting in middle or high school and have suggested potential performance-based measures that can be used with youth.

We acknowledge that measuring "soft skills," including communication skills, carries with it a risk of perpetuating White, Eurocentric communication norms as the standard. There is evidence of linguistic discrimination against nonnative and Black workers based on their speech—for instance, one national study found that Black workers who were perceived to "sound Black" earned 12 percent less than otherwise similar Black workers who were perceived to "sound White."[582] Data users should examine potential unintended consequences of soft skills assessments and proactively mitigate risks related to bias (see the Data Equity Principles section of this report for further guidance).

Source frameworks: This indicator appeared in the Urban Institute's Robust and Equitable Measures to Identify Quality Schools (REMIQS) framework as part of the definition of "deeper learning skills." A report on student learning outcomes by the Postsecondary Value Commission[583] references both the CLA+ instrument and the HEIghten Outcomes Assessment recommended here. Our proposed definition is adapted from a report by Child Trends, which describes key soft skills required for workforce success.[584]

Higher-order thinking skills

Definition: Individuals have the problem solving, critical thinking, and decision-making skills needed in the workplace.

Why it matters: Higher-order thinking (also referred to as critical thinking, problem solving, or decision making) is consistently ranked as one of the most in-demand workforce readiness competencies by employers across industries.[585, 586] According to a survey by the National Association of Colleges and Employers (NACE), nearly all employers consider critical thinking to be very or extremely important for workforce success—however, only 56 percent rate recent graduates as very or extremely proficient.[587] Research suggests that higher-order thinking skills are predictive of employment and workplace performance.[588, 589] Recognizing their importance, three states mention higher-order thinking skills in their high school graduation requirements,[590] and American Association

of Colleges and Universities (AAC&U) includes creative thinking, critical thinking, ethical reasoning, problem solving, and inquiry and analysis among 16 "essential learning outcomes."[591] In a comprehensive review of soft skills literature, researchers found that higher-order thinking skills are predictive of workforce outcomes for youth ages 15–29, as well as for the general adult population.[592]

Recommended metric(s):

- K–12: Percentage of students demonstrating proficiency on assessments such as the College and Career Readiness Assessment (CLA+),[593] an assessment for grades 6–12 that measures critical thinking, problem solving, and written communications
- Postsecondary: Percentage of students demonstrating proficiency on assessments such as the following:
  - The CLA+ or Success Skills Assessment (SSA+),[594] assessments for postsecondary students that measure critical thinking, problem solving, and written communications
  - The HEIghten Outcomes Assessment for Critical Thinking[595]
- Workforce: Percentage of individuals demonstrating proficiency on assessments such as the Watson Glaser Critical Thinking Appraisal,[596] a scenario-based assessment used by employers to evaluate candidates or identify areas of opportunity for growth

Data source(s): Assessments

What to know about measurement: Although there is broad consensus on the importance of critical thinking skills, currently there are not any critical thinking assessments that are administered and reported at scale. The Postsecondary Value Commission describes a variety of ways in which "cognitive ability and intellectual dispositions," a family of skills that includes critical thinking, could be measured.[597] The HEIghten assessment, suggested above as a potential instrument for measuring critical thinking skills in postsecondary contexts, has not been validated in large-scale evaluations, but is currently being evaluated in the Next Generation Undergraduate Success Measurement Project, a rigorous study of various methods to measure undergraduate experiences and outcomes.[598] Given the research evidence, we suggest higher-order thinking skills could be measured starting in middle or high school and have suggested potential performance-based measures that can be used with youth. We propose using a performance-based test to mitigate the risk of bias in self-reported or instructor- or employer-reported measures.

As noted above, we acknowledge that measuring soft skills, including critical thinking and problem-solving skills, carries with it a risk of cultural and racial bias, depending on how they are measured. Data users should examine potential unintended consequences of soft skills assessments and proactively mitigate risks related to bias (see the Data Equity Principles section of this report for further guidance).

Source frameworks: This indicator appeared in six source frameworks reviewed for this report. A report on student learning outcomes by the Postsecondary Value Commission[599] references both the CLA+ instrument and the HEIghten Outcomes Assessment recommended in this report. Our proposed definition is adapted from a report by Child Trends that describes key soft skills required for workforce success.[600]

Minimum economic return

PK K12 PS WF

Definition: Individuals earn enough after completing their education to recover the costs of their investment.

Why it matters: Although postsecondary education represents an important pathway to economic mobility, it requires a significant financial investment. If institutions fail to deliver a minimum economic return to students, individuals are at higher risk for defaulting on loans, which has meaningful consequences and creates barriers to wealth building that are difficult to overcome.[601] Analyses by the Postsecondary Value Commission show that a number of institutions do *not* equitably deliver economic value.[602] For example, private for-profit institutions, which disproportionately serve students from low-income households, are less likely to deliver a minimum economic return than their public and private nonprofit counterparts. Furthermore, institutions with higher shares of White students are more likely to deliver a minimum economic return, whereas the opposite is true for institutions with higher shares of Black and Indigenous students and Pell Grant recipients. However, disaggregated thresholds should be used when assessing these populations' earnings to account for labor market discrimination.[603]

Postsecondary Value Commission Exploring Equitable Value Data Tool

The Equitable Value Explorer is an interactive data dashboard that allows users to analyze institution-level data against the Postsecondary Value Commission framework. The tool is meant to inform institutional improvement efforts around the Postsecondary Value Commission's metrics, including minimum economic return and economic mobility. The Equitable Value Explorer leverages publicly available data from the College Scorecard, the Integrated Postsecondary Education Data System, and the Census Bureau's American Community Survey. The data can be filtered to customize the dashboard view. Users can click on specific institution profiles to view how an institution's data compare to the earnings thresholds established by the Postsecondary Value Commission. This approach allows institutional leaders and students to better assess how their colleges and universities add value to all students, regardless of their background.

Recommended metric(s): Percentage of individuals that earn at least as much as the median high school graduate in their state plus enough to recoup their total net price plus interest within 10 years of completing their highest degree or leaving education (high school, postsecondary education, or workforce training)

Data source(s): Administrative data

What to know about measurement: This metric can be estimated at the institutional level for postsecondary institutions using College Scorecard data. Both secondary and postsecondary institutions can measure it at the individual level if they collect or can link necessary earnings data for their graduates. For example, the University of Texas system publishes median loan debt and median earnings at 1, 5, and 10 years after graduation by degree level, linking student records to earnings data from the Texas Workforce Commission. Measuring this indicator at the individual level requires linking data from the K–12, postsecondary, and workforce sectors, which states can do through their

longitudinal data systems. We recommend this indicator be measured among high school graduates and workforce training completers as well because not all individuals pursue or complete postsecondary education. Further, this indicator should be measured among non-completers, as some students may enroll in a training or postsecondary program but not graduate and still carry student debt with them.

Source frameworks: This indicator appeared in two source frameworks reviewed for this report. Our proposed measure draws on work by the Postsecondary Value Commission.[604] In the Postsecondary Value Framework, this measure is described as "Threshold 0," indicating the minimum economic return individuals should obtain from their postsecondary education to enable future economic mobility and security.

Student loan repayment

PK K12 **PS** **WF**

Definition: Individuals pay student loans on time and make progress toward paying down their debt.

Why it matters: Student loan default has serious negative consequences, including restricted access to other loans, increased repayment amounts due to collection costs, and damaged credit.[605] Compared to other racial and ethnic groups, Black college students are the most likely to borrow to pay for college: 50 percent of Black college students have student loans, compared to 26 percent of Asian students, 29 percent of Latino students, and 38 percent of White students.[606] In addition, Black borrowers are the most likely to struggle financially due to student loan debt, with almost a third having payments of $350 or more per month.[607] Among borrowers, loan delinquency and default disproportionately impact Black and Latino students.[608, 609] Within six years of starting college, 32 percent of Black borrowers who had begun repayment defaulted on their loans, compared to 20 percent of Latino borrowers and 13 percent of White borrowers. First-generation college students are also more than twice as likely to experience delinquency than students with at least one parent who has earned a bachelor's degree.[610]

Source: U.S. Federal Reserve (2015).

Recommended metric(s): Percentage of student borrowers in the following repayment categories, as defined on the College Scorecard[611]—making progress, paid in full, and deferment—1, 2, 3, 5, and 10 years into the repayment phase of the loans

"Making progress" refers to making regular payments such that the total of outstanding loan balances is less than the total of the original loan balances. "Paid in full" means the outstanding loan balance is $0 and the loan has not been discharged through bankruptcy or other means. "Deferment" refers to a postponement of the loan obligations, which is common for students re-enrolling in school. Borrowers who do not meet these milestones may fall in other categories, such as delinquency, default, and not making progress, that indicate they are unable to make timely progress toward their student debt.

Data source(s): Administrative data

What to know about measurement: The College Scorecard publicly reports student loan repayment data at the institutional level two years after students enter the repayment phase of their loans.[612] These data are based on individual records from the National Student Loan Data System (NSLDS), the U.S. Department of Education's central database for federal student aid loans and grants. College administrators have access to individual-level NSLDS records; students have access to their own information.

Source frameworks: This indicator appeared in the Institute for Higher Education Policy's Postsecondary Metrics Framework.[613] Our definition and proposed metric more closely draw from the categories defined by the College Scorecard,[614] as noted above.

Employment in a quality job

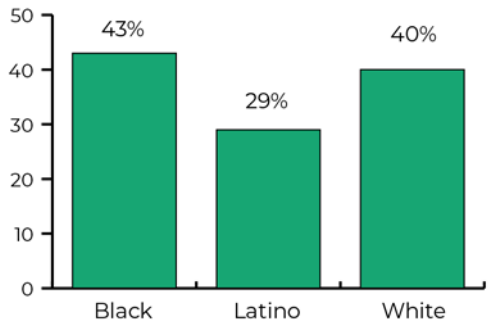
PK K12 PS WF

Definition: Individuals are employed in a position that offers a living wage, benefits, stable and predictable schedules, clear and fair advancement to higher pay, safe conditions, and job security.

Why it matters: According to the Organisation for Economic Co-operation and Development (OECD),[615] job quality is a key determinant of individual well-being. Higher wages and benefits are associated with multiple aspects of worker well-being, including life satisfaction, mortality, wealth accumulation, and mental health.[616, 617, 618, 619] A living wage is defined as "the minimum economic standard that, if met, draws a very fine line between the financial independence of the working poor and the need to seek out public assistance or suffer consistent and severe housing and food insecurity."[620] As this definition by the Massachusetts Institute of Technology (MIT) Living Wage Calculator indicates, a living wage is a minimum threshold, yet it typically exceeds the minimum wage. For instance, the living wage for a single mother with one child in the Atlanta metropolitan area is $30.74 per hour—more than four times higher than the local minimum wage of $7.25.[621] For those who pursue postsecondary education, it is also important to consider whether they are earning what they expect to earn in their field beyond the living wage threshold.[xiv]

Flexibility at work

Percentage of low-wage workers indicating their supervisor or mentor *"allows me the flexibility I need to balance life demands outside of work"*



Source: Fuller and Raman (2022).

Non-economic aspects of job quality also matter for workers' well-being and success. A recent study shows that aspects of job quality, such as stable and predictable scheduling and room for upward growth within a company, are meaningful to low-wage workers, defined as those earning less than approximately $40,000 per year.[622] As with wages, there are disparities in other aspects of job quality. For instance, less than half of low-wage workers report

[xiv] This is what the Postsecondary Value Commission calls "earnings premium."

having a supervisor who offers them flexibility regarding work-life balance, with only 29 percent of Latino respondents reporting sufficient flexibility compared with 40 percent of White workers and 43 percent of Black workers.

Recommended metric(s): Percentage of individuals employed in a quality job, as defined by scores on an indexed measure, such as the Good Jobs Scorecard,[623] which assesses pay and benefits, scheduling, potential career paths, safety, and security

Data source(s): Surveys

What to know about measurement: There are a variety of definitions and frameworks related to job quality, and despite agreement on the value of higher wages and other job characteristics, such as benefits and scheduling flexibility, there is no field-wide consensus definition of a "quality job." Differences in the nature of work across industries and geographies also pose challenges to establishing a standard measure of job quality that applies across contexts, as does the availability of job data beyond wages. We see this indicator as an area where the framework can promote a more widely validated and used measure. E-W institutions, such as school districts and colleges, may measure this indicator among their graduates by linking K–12, postsecondary, and workforce data.

Source frameworks: This indicator appeared in 10 source frameworks reviewed for this report. Our proposed definition and measure draw on work by the MIT Good Jobs Institute.[624]

Economic mobility

Definition: Individuals reach the level of earnings needed to enter the fourth income quintile or above, regardless of field of study.

Why it matters: Upward mobility is an important dimension of equitable opportunity and a central feature of an inclusive economy. In an equitable society, individuals should be able to access opportunities that allow them to be economically mobile despite their social class of origin. Students at approximately two-thirds of four-year institutions—both public and private—achieve economic mobility as defined by our proposed metric.[625] However, students who attended public two-year institutions are significantly less likely to meet economic mobility thresholds than those who attended four-year colleges. Much of the research on economic mobility focuses on *intergenerational* mobility, comparing household income levels during childhood to income levels in adulthood.[626, 627, 628] Rates of intergenerational upward mobility are lower for Black and Indigenous individuals compared to White and Latino individuals.[629]

Recommended metric(s): Percentage of individuals who reach the level of earnings needed to enter the fourth (60th to 80th percentile) income quintile in their state or above 1, 3, 5, 10, and 15 years after completing their highest degree or leaving education (high school or postsecondary)

Data source(s): Administrative data

What to know about measurement: Measuring this indicator at the individual level requires linking data from the K–12, postsecondary, and workforce sectors or surveying graduates about their earnings, which states can do with their state longitudinal data systems. To calculate this metric, institutions

would need to track the earnings of their students and determine whether those earnings fall above the appropriate threshold. To determine this threshold, institutions can use the 60th percentile of earnings in the state where the individual resides. An alternative and more feasible approach is to base the threshold on the state where the institution is located; however, this approach may be less relevant in locations where a high share of graduates move out of the state.

We acknowledge that much of the literature on "economic mobility" defines it as intergenerational. For example, Chetty et al. define it as "the fraction of students who come from families in the bottom income quintile and reach the top quintile."[630] However, measuring mobility in this way requires comprehensive longitudinal data sets. Our proposed indicator of mobility focuses on whether individuals reach certain earnings thresholds, regardless of their parents' economic status, drawing on work by the Postsecondary Value Commission. A measure of whether individuals reach a certain level of earnings can be collected more feasibly at scale. In addition, even among families that were not low income a generation ago, there are barriers to achieving a high level of earnings today, especially for people of color. For example, Black Americans are more likely to experience downward mobility than White Americans.[631]

Source frameworks: This indicator appeared in three source frameworks reviewed for this report. Our proposed measure aligns with work by the Postsecondary Value Commission.[632] The metric proposed by the Postsecondary Value Commission builds on a measure included in Opportunity Insights Mobility Report Cards, which define economic mobility as whether students in the bottom quintile reach the top earnings quintile.[633]

Economic security

PK K12 PS WF

Definition: Individuals reach median levels of wealth (net worth).

Why it matters: Although minimum economic return and high earnings are important stepping stones, establishing financial security and building meaningful savings require individuals to accumulate wealth (that is, build net worth). Wealth allows individuals and families to withstand serious financial hardships, such as illness, unemployment, or divorce. Personal wealth is also associated with a variety of positive outcomes, including home ownership, health, and intergenerational educational attainment.[634] Wealthier families can save more for their children's postsecondary education, establishing an intergenerational foundation for economic mobility and security. However, there are significant racial disparities in wealth accumulation: one analysis finds that the gap in median wealth between Black and White college-educated adults is more than $150,000 and widens to more than $200,000 for those with a post-college degree.[635]

Recommended metric(s): Percentage of individuals who reach median levels of wealth 10, 15, 20, and 30 years after completing their highest degree or leaving education (high school, workforce training, or postsecondary education)

Data source(s): Administrative data or surveys

What to know about measurement: Our proposed measure is aspirational in nature, given a lack of quality administrative data to measure wealth at scale. Killewald et al. describes a variety of challenges

related to measuring net worth, including that there is no consensus on how best to operationalize it, and that the distribution of wealth is highly skewed.[636] However, the authors also note advances in the availability of net worth data and describe nationally representative surveys that measure net worth on a regular basis at aggregate levels, including two that measure wealth annually: the Consumer Expenditure Survey and the Survey of Income and Program Participation. However, these sample only a small percentage of the U.S. population.

We also note an alternative definition of "security" frequently used in the field. Since 2013, the Federal Reserve Board has conducted the Survey of Household Economics and Decisionmaking (SHED), which asks about risks to households' financial stability.[637] The survey asks respondents to indicate (1) whether they have set aside emergency funds to cover expenses for three months and (2) whether they would be able to cover an immediate emergency cost of $400. The field often thinks of "financial security" in this way—as a more near-term measure of resilience against financial shocks. However, this definition is a lower bar than our proposed measure of median wealth, estimated to be above $100,000.[638]

Source frameworks: This indicator appeared in four source frameworks reviewed for this report. Our proposed indicator name and measure align with work by the Postsecondary Value Commission.[639]

Outcomes and milestones endnotes

[16] Magnuson, K. A., & Duncan, G. J. (2006). The role of family socioeconomic resources in the black–white test score gap among young children. *Developmental Review, 26*(4), 365–399. https://doi.org/10.1016/j.dr.2006.06.004

[17] Meloy, B., Gardner, M., & Darling-Hammond, L. (2019). Untangling the evidence on preschool effectiveness: Insights for policymakers. *Learning Policy Institute*. https://learningpolicyinstitute.org/product/untangling-evidence-preschool-effectiveness-report

[18] Phillips, D., Lipsey, M., Dodge, K. A., Haskins, R., Bassok, D., Burchinal, M. R., Duncan, G.J., Dynarsk, M., Magnuson, K. A., & Weiland, C. (2017). *Puzzling it out: The current state of scientific knowledge on pre-kindergarten effects.* Brookings Institution. https://www.brookings.edu/research/puzzling-it-out-the-current-state-of-scientific-knowledge-on-pre-kindergarten-effects/

[19] Gillispie, C. (2019). *Young learners, missed opportunities.* The Education Trust. https://edtrust.org/resource/young-learners-missed-opportunities/

[20] Hardy, E., & Huber, R. (2020). *Neighborhood preschool enrollment patters by race/ethnicity.* Diversity Data Kids. https://www.diversitydatakids.org/research-library/data-visualization/neighborhood-preschool-enrollment-patterns-raceethnicity

[21] National Center for Education Statistics. (2017). *Preprimary education enrollment.* Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/fastfacts/display.asp?id=516

[22] See Hardy & Huber (2020).

[23] Schmit, S., & Walker, C. (2016). *Disparate access: Head Start and CCDBG data by race and ethnicity.* Center for Law and Social Policy. https://www.clasp.org/publications/report/brief/disparate-access-head-start-and-ccdbg-data-race-and-ethnicity

[24] Friedman-Krauss, A. H., Barnett, W. S., Garver, K. A., Hodges, K. S., Weisenfeld, G. G., & Gardiner, B. A. (2020). *The state of preschool 2020*. The National Institute for Early Education Research. https://nieer.org/wp-content/uploads/2021/04/YB2020_Full_Report.pdf

[25] U.S. Department of Education, Office of Civil Rights. (2020). *Civil Rights Data Collection.* https://www2.ed.gov/about/offices/list/ocr/data.html

[26] CEELO & CCSSO. (2017). *Birth to grade 3 indicator framework: Opportunities to integrate early childhood in ESSA toolkit*. https://ccsso.org/resource-library/birth-grade-3-indicator-framework-opportunities-integrate-early-childhood-essa

[27] Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., Pagani, L. S., Feinstein, L., Engel, M., Brooks-Gunn, J., Sexton, H., Duckworth, K., & Japel, C. (2007). School readiness and later achievement. *Developmental Psychology, 43*(6), 1428–1446. https://doi.org/10.1037/0012-1649.43.6.1428

[28] NICHD Early Child Care Research Network. (2003). Does amount of time spent in child care predict socioemotional adjustment during the transition to kindergarten? *Child Development, 74*(4), 976–1005. https://doi.org/10.1111/1467-8624.00582

[29] National Early Literacy Panel. (2010). *Developing early literacy: Report of the National Early Literacy Panel.* National Institute of Child Health and Human Development, NIH, DHHS. https://www.nichd.nih.gov/publications/product/346

[30] Snow, C. E. (1991). The theoretical basis for relationships between language and literacy in development. *Journal of Research in Childhood education*, *6*(1), 5-10. https://doi.org/10.1080/02568549109594817

[31] Burchinal, M., McCartney, K., Steinberg, L., Crosnoe, R., Friedman, S. L., McLoyd, V., Pianta, R., & NICHD Early Child Care Research Network. (2011). Examining the Black–White achievement gap among low-income children using the NICHD study of early child care and youth development. *Child development*, *82*(5), 1404-1420. https://doi.org/10.1111/j.1467-8624.2011.01620.x

[32] Wang, A. H. (2008). A pre-kindergarten achievement gap? Scope and implications. *US-China Education Review*, *5*, 23–31. https://eric.ed.gov/?id=ED503007

[33] Nores, M., & Barnett, S. (2014). *Access to high quality early care and education: Readiness and opportunity gaps in America.* Center on Enhancing Early Learning Outcomes. https://eric.ed.gov/?id=ED555707

[34] Desired Results for Children and Families. (n.d.). *DRDP forms.* California Department of Social Services, Child Care and Development Division. https://www.desiredresults.us/drdp-forms

[35] Maryland State Department of Education. (2021). *Ready 4 kindergarten*. Division of Early Childhood. https://earlychildhood.marylandpublicschools.org/prek-grade-2/maryland-early-learning-framework/ready-4-kindergarten

[36] Teaching Strategies. (2022). *GOLD: Move beyond measurement.* https://teachingstrategies.com/product/gold/

[37] Riverside Insights. (2022). *Woodcock-Johnson IV ECAD kit.* https://riversideinsights.com/p/woodcock-johnson-iv-ecad-kit/

[38] Juniper Gardens Children's Project. (n.d.) *IGDI indicators.* https://igdi.ku.edu/what-are-igdis/igdi-introduction/

[39] Regenstein, E., Connors, M., Romero-Jurado, R., & Weinter, J. (2017). Uses and misuses of kindergarten readiness assessment results. *The Ounce Policy Conversations, (6)*1. Start Early. https://www.startearly.org/app/uploads/2020/09/PUBLICATION_Uses-and-Misuses-of-Kindergarten-Readiness-Assessment-Results.pdf

[40] Education Commission of the States. (2020). *50-state comparison: State K-3 policies.* https://www.ecs.org/kindergarten-policies/

[41] Bornfreund, L., & Sillers, A., (2017). *Don't use kindergarten readiness assessments for accountability.* New America. https://www.newamerica.org/education-policy/edcentral/dont-use-kindergarten-readiness-assessments-accountability/

[42] Snow, C. E., & Van Hemel, S. B. (2008). *Early childhood assessment: Why, what, and how*. The National Academies Press. https://eric.ed.gov/?id=ED555247

[43] Waterman, C., McDermott, P. A., Fantuzzo, J. W., & Gadsden, V. L. (2012). The matter of assessor variance in early childhood education—Or whose score is it anyway?. *Early Childhood Research Quarterly*, *27*(1), 46-54. https://doi.org/10.1016/j.ecresq.2011.06.003

[44] Moodie, S., Daneri, P., Goldhagen, S., Halle, T., Green, K., & LaMonte, L. (2014). *Early childhood developmental screening: A compendium of measures for children ages birth to five.* Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services. https://www.acf.hhs.gov/sites/default/files/documents/opre/compendium_2013_508_compliant_final_2_5_2014.pdf

[45] Kriener-Althen, K., Newton, E. K., Draney, K., & Mangione, P. L. (2020). Measuring readiness for kindergarten using the desired results developmental profile. *Early Education and Development, 31*(5), 739-763. https://doi.org/10.1080/10409289.2020.1743160

[46] Kim, D. H., Lambert, R. G., & Burts, D. C. (2013). Evidence of the validity of Teaching Strategies Gold assessment tool for English language learners and children with disabilities. *Early Education and Development, 24*, 574-595. https://eric.ed.gov/?id=EJ1010611

[47] Rhode Island KIDS COUNT. (2005). *Getting ready: National School Readiness Indicators.*https://www.rikidscount.org/Portals/0/Uploads/Documents/Early%20Learning/Getting%20Ready/Executive%20Summary.pdf

[48] Office of Head Start. (2021). *Head Start Early Learning Framework*. https://eclkc.ohs.acf.hhs.gov/school-readiness/article/head-start-early-learning-outcomes-framework

[49] National Mathematics Advisory Panel. (2008). *Foundations for success: The final report of the National Mathematics Advisory Panel*. U.S. Department of Education. https://eric.ed.gov/?id=ED500486

[50] Bailey, D. H., Siegler, R. S., & Geary, D. C. (2014). Early predictors of middle school fraction knowledge. *Developmental science*, *17*(5), 775-785. https://doi.org/10.1111/desc.12155

[51] Siegler, R. S., Duncan, G. J., Davis-Kean, P. E., Duckworth, K., Claessens, A., Engel, M., Susperreguy, M. I., & Chen, M. (2012). Early predictors of high school mathematics achievement. *Psychological Science, 23*(7), 691–697. https://doi.org/10.1177/0956797612440101

[52] Claessens, A., Duncan, G., & Engel, M. (2009). Kindergarten skills and fifth-grade achievement: Evidence from the ECLS-K. *Economics of Education Review*, *28*(4), 415-427. https://eric.ed.gov/?id=EJ842061

[53] Duncan, G. J., Claessens, A., Huston, A. C., Pagani, L. S., Engel, M., Sexton, H., Dowsett, C. J., Magnuson, K., Klevanov, P., Feinstein, L., Brooks-Gunn, J., Duckworth, K., & Japel, C. (2007). School readiness and later achievement. *Developmental Psychology*, *43*(6), 1428–1446. https://doi.org/10.1037/0012-1649.43.6.1428

[54] Klibanoff, R. S., Levine, S. C., Huttenlocher, J., Vasilyeva, M., & Hedges, L. V. (2006). Preschool children's mathematical knowledge: The effect of teacher "math talk.". *Developmental psychology*, *42*(1), 59. https://doi.org/10.1037/0012-1649.42.1.59

[55] Sarama, J., Lange, A. A., Clements, D. H., & Wolfe, C. (2012). The impacts of an early mathematics curriculum on oral language and literacy. *Early Childhood Research Quarterly, 27*(3), 489–502. https://doi.org/10.1016/j.ecresq.2011.12.002

[56] Nores, M., & Barnett, S. (2014). *Access to high quality early care and education: Readiness and opportunity gaps in America.* Center on Enhancing Early Learning Outcomes. https://eric.ed.gov/?id=ED555707

[57] Desired Results for Children and Families. (n.d.). *DRDP forms.* California Department of Social Services, Child Care and Development Division. https://www.desiredresults.us/drdp-forms

[58] Maryland State Department of Education. (2021). *Ready 4 kindergarten*. Division of Early Childhood. https://earlychildhood.marylandpublicschools.org/prek-grade-2/maryland-early-learning-framework/ready-4-kindergarten

[59] Teaching Strategies. (2022). *GOLD: Move beyond measurement.* https://teachingstrategies.com/product/gold/

[60] Riverside Insights. (2022). *Woodcock-Johnson IV ECAD kit.* https://riversideinsights.com/p/woodcock-johnson-iv-ecad-kit/

[61] Juniper Gardens Children's Project. (n.d.) *IGDI indicators.* https://igdi.ku.edu/what-are-igdis/igdi-introduction/

[62] Marsico Institute. (2022). *Early math measures.* Morgridge College of Education, University of Denver. https://morgridge.du.edu/marsico/early-math-resources/measures

[63] Rhode Island KIDS COUNT. (2005). *Getting ready: National School Readiness Indicators.*https://www.rikidscount.org/Portals/0/Uploads/Documents/Early%20Learning/Getting%20Ready/Executive%20Summary.pdf

[64] Office of Head Start. (2021). *Head Start Early Learning Framework*. https://eclkc.ohs.acf.hhs.gov/school-readiness/article/head-start-early-learning-outcomes-framework

[65] Che, J., Malgieri, P., Ramos, V., Page, H., & Holt, A. (2015). *Early elementary on-track indicators leading to third-grade reading proficiency.* Strategic Data Project, Harvard University. https://hwpi.harvard.edu/files/sdp/files/early_indicators_for_third_grade_reading_proficiency.pdf

[66] Sparks, S. D. (2013). *Dropout indicators found for 1st graders.* Education Week. https://www.edweek.org/leadership/dropout-indicators-found-for-1st-graders/2013/07?tkn=MWTFovaT4pTNnjj15Jb5BFO6dcI60rMPNQng&cmp=clp-edweek

[67] Romero, M., & Lee, Y. S. (2007). A *national portrait of chronic absenteeism in the early grades.* National Center for Children in Poverty, Columbia University. https://doi.org/10.7916/D89C7650

[68] Reardon, S. F., & Galindo, C. (2009). The Hispanic-white achievement gap in math and reading in the elementary grades. *American Educational Research Journal, 46*(3), 853–891. https://doi.org/10.3102/0002831209333184

[69] West, T. C. (2013). *Just the right mix: Identifying potential dropouts in Montgomery County public schools using an early warning indicators approach.* Montgomery County Public Schools. https://eric.ed.gov/?id=ED557733

[70] Education Commission of the States. (2020). *50-state comparison: State K-3 policies.* https://www.ecs.org/kindergarten-policies/

[71] See West (2013).

[72] Attendance Works. (2018). *Chronic absence.* https://www.attendanceworks.org/chronic-absence/the-problem/

[73] Gottfried, M. A. (2010). Evaluating the relationship between student attendance and achievement in urban elementary and middle schools: An instrumental variables approach. *American Educational Research Journal, 47*(2), 434–465. https://doi.org/10.3102/0002831209350494

[74] Gottfried, M. A. (2014). Chronic absenteeism and its effects on students' academic and socioemotional outcomes. *Journal of Education for Students Placed at Risk, 19*(2), 53–75. https://doi.org/10.1080/10824669.2014.962696

[75] Goodman, J. (2014). *Flaking out: Student absences and snow days as disruptions of instructional time.* National Bureau of Economic Research. https://www.nber.org/papers/w20221

[76] Balfanz, R., & Byrnes, V. (2012). *The importance of being in school: A report on absenteeism in the national's public schools.* Johns Hopkins University Center for Social Organization of Schools. http://new.every1graduates.org/wp-content/uploads/2012/05/FINALChronicAbsenteeismReport_May16.pdf

[77] Allensworth, E. M., & Easton, J. Q. (2007). *What matters for staying on-track and graduating in Chicago public high schools: A close look at course grades, failures, and attendance in the freshman year.* Consortium on Chicago School Research at the University of Chicago. https://consortium.uchicago.edu/sites/default/files/2018-10/07%20What%20Matters%20Final.pdf

[78] Crede, Marcus, Roch, S. G., & Kieszczynka, U. M. (2010). Class attendance in college: A meta-analytic review of the relationship of class attendance with grades and student characteristics. *Review of Educational Research*, *80*(2), 272-295. https://doi.org/10.3102/0034654310362998

[79] Hanover Research. (2017). *Early alert systems in higher education.* Hanover Research. https://www.hanoverresearch.com/wp-content/uploads/2017/08/Early-Alert-Systems-in-Higher-Education.pdf

[80] Barefoot, B. O., Griffin, B. Q., & Koch, A. K. (2012). *Enhancing student success and retention throughout undergraduate education: A national survey*. John N. Gardner Institute for Excellence in Undergraduate Education. https://static1.squarespace.com/static/59b0c486d2b857fc86d09aee/t/59bad33412abd988ad84d697/1505415990531/JNGI_national_survey_web.pdf

[81] Jordan, P. (2021). *Present danger: Solving the deepening student absenteeism crisis*. FutureEd, Georgetown University. https://www.future-ed.org/present-danger-solving-the-deepening-student-absenteeism-crisis/

[82] Korman, H. T. N., O'Keefe, B., & Repka, M. (2020). *Missing in the margins 2020: Estimating the scale of the COVID-19 attendance crisis.* Bellwether Education Partners. https://bellwethereducation.org/publication/missing-margins-estimating-scale-covid-19-attendance-crisis#:~:text=In%20October%202020%2C%20%E2%80%9CMissing%20in,a%20result%20of%20the%20pandemic.

[83] Chang, H. N., Gee, K., Hennessy, B., Alexandro, D., & Gopalakrishnan, A. (2021). *Chronic absence patterns and prediction during COVID-19. Insights from Connecticut.* Attendance Works. https://eric.ed.gov/?id=ED613690

[84] See Barefoot et al. (2012).

[85] Newman, S. (2020). *How to choose an attendance tracker for higher ed.* Involvio. https://www.involvio.com/blog/how-to-choose-an-attendance-tracker-for-higher-ed

[86] Harwell, D. (2019). *Colleges are turning students' phones into surveillance machines, tracking the locations of hundreds of thousands.* The Washington Post. https://www.washingtonpost.com/technology/2019/12/24/colleges-are-turning-students-phones-into-surveillance-machines-tracking-locations-hundreds-thousands/

[87] Attendance Works. (2018). *Toolkits: Use chronic absence data to determine need for additional supports.* https://www.attendanceworks.org/resources/toolkits/for-principals-leading-attendance/use-chronic-absence-data-to-determine-need-for-additional-supports/

[88] Carminucci, J., Hodgman, S., Rickles, J., & Garet, M. (2021). Student Attendance and Enrollment Loss in 2020-21. American Institutes for Research. https://www.air.org/sites/default/files/2021-07/research-brief-covid-survey-student-attendance-june-2021_0.pdf

[89] Bill & Melinda Gates Foundation. (2020). *P-16 framework*. https://usprogram.gatesfoundation.org/who-we-are/p16-framework

[90] CEELO & CCSSO. (2017). *Birth to grade 3 indicator framework: Opportunities to integrate early childhood in ESSA toolkit.* https://ccsso.org/resource-library/birth-grade-3-indicator-framework-opportunities-integrate-early-childhood-essa

[91] CORE Districts. (2017). *Improvement measures.* https://coredistricts.org/our-improvement-data/improvement-measures/

[92] Skiba, R., & Karega Rausch, M. (2004). *The relationship between achievement, discipline, and race: An analysis of factors predicting ISTEP scores. Children left behind policy briefs. Supplementary analysis 2-D*. Center for Evaluation and Education Policy, Indiana University. https://eric.ed.gov/?id=ED488899

[93] Lee, T., Cornell, D., Gregory, A., & Fan, X. (2011). High suspension schools and dropout rates for black and white students. *Education and Treatment of Children, 34*(2), 167–192. https://eric.ed.gov/?id=EJ920359

[94] Balfanz, R., Byrnes, V., & Fox, J. (2014). Sent home and put off-track: The antecedents, disproportionalities, and consequences of being suspended in the ninth grade. *Journal of Applied Research on Children,* 5(2), article 13. https://digitalcommons.library.tmc.edu/childrenatrisk/vol5/iss2/13/

[95] Bruce, M., Bridgeland, J. M., Fox, J. H., & Balfanz, R. (2011). *On track for success: The use of early warning indicator and intervention systems to build a grad nation.* Civic Enterprises. https://eric.ed.gov/?id=ED526421

[96] Losen, D. J., & Martinez, T. E. (2013). *Out of school and off track: The overuse of suspensions in American middle and high schools.* The Civil Rights Project/ Proyecto Derechos Civiles. https://eric.ed.gov/?id=ED541735

[97] Skiba, R. J., Horner, R. H., Chung, C. G., Karega Rausch, M., May, S. L., & Tobin, T. (2019). Race is not neutral: A national investigation of African American and Latino disproportionality in school discipline. *School Psychology Review*, *40*(1), 85–107. https://doi.org/10.1080/02796015.2011.12087730

[98] Riddle, T., & Sinclair, S. (2019). Racial disparities in school-based disciplinary actions are associated with county-level rates of racial bias. *Proceedings of the National Academy of Sciences, 116*(17), 8255–8260. https://doi.org/10.1073/pnas.1808307116

[99] U.S. Department of Education, Office of Civil Rights. (2016). *2013-2014 Civil rights data collection: Key data highlights on equity and opportunity gaps in our nation's public schools*. http://www2.ed.gov/about/offices/list/ocr/docs/crdc-2013-14.html

[100] Arundel, K. (2022). *The struggle over defining, reporting restraint and seclusion in schools.* K–12 Dive. https://www.k12dive.com/news/the-struggle-over-defining-reporting-restraint-and-seclusion-in-schools/618570/

[101] Bill & Melinda Gates Foundation. (2020). *P-16 framework.* https://usprogram.gatesfoundation.org/who-we-are/p16-framework

[102] CEELO & CCSSO. (2017). *Birth to grade 3 indicator framework: Opportunities to integrate early childhood in ESSA toolkit*. https://ccsso.org/resource-library/birth-grade-3-indicator-framework-opportunities-integrate-early-childhood-essa

[103] National Education Association (NEA). (2021). *Great public schools indicators framework.* https://www.nea.org/student-success/great-public-schools/what-students-deserve

[104] CORE Districts. (2017). *Improvement measures.* https://coredistricts.org/our-improvement-data/improvement-measures/

[105] Palacios, M., Vignola, E., Lyons, R., Hart, R., & Casserly, M. (2019). *Academic key performance indicators.* Council of the Great City Schools. https://eric.ed.gov/?q=council+of+the+great+city+schools+key+performance+indicators&id=ED603169

[106] Anderson, T., Blount, D., Lindsay, C., Blom, E., Gebrekristos, S., & Alba, F. (2019). *Robust and equitable measures to identify quality schools (REMIQS).* The Urban Institute. https://www.urban.org/sites/default/files/2019/04/15/remiqs-detailed-model-final.pdf

[107] Hernandez, D. J. (2012). *Double jeopardy: How third-grade reading skills and poverty influence high school graduation.* Annie E. Casey Foundation. https://eric.ed.gov/?id=ED518818

[108] Lesnick, J., George, R., Smithgall, C., & Gwynne, J. (2010). *Reading on grade level in third grade: How is it related to high school performance and college enrollment? A longitudinal analysis of third-grade students in Chicago in 1996-97 and their educational outcomes. A report to the Anne E. Casey Foundation.* Chapin Hall at the University of Chicago. https://eric.ed.gov/?id=ED517805

[109] Cumpton, G., Schexnayder, D., King, C. T., & Stolp, C. (2012). *Factors associated with education and work after high school for the classes of 2008 and 2009: A research report of the Central Texas Student Futures project.* Ray Marshall Center for the Study of Human Resources, University of Texas at Austin. http://hdl.handle.net/2152/20410

[110] Duncan, G. J., Claessens, A., Huston, A. C., Pagani, L. S., Engel, M., Sexton, H., Dowsett, C. J., Magnuson, K., Klevanov, P., Feinstein, L., Brooks-Gunn, J., Duckworth, K., & Japel, C. (2007). School readiness and later achievement. *Developmental Psychology, 43*(6), 1428–1446. https://doi.org/10.1037/0012-1649.43.6.1428

[111] Siegler, R. S., Duncan, G. J., Davis-Kean, P. E., Duckworth, K., Claessens, A., Engel, M., Susperreguy, M. I., & Chen, M. (2012). Early predictors of high school mathematics achievement. *Psychological Science, 23*(7), 691–697. https://doi.org/10.1177/0956797612440101

[112] Child Trends Data Bank. (2019). *Reading proficiency*. https://www.childtrends.org/indicators/reading-proficiency

[113] National Assessment of Educational Progress. (2019a). *NAEP report card: Mathematics.* https://www.nationsreportcard.gov/highlights/mathematics/2019/

[114] National Assessment of Educational Progress. (2019b). *NAEP report card: Reading.* https://www.nationsreportcard.gov/highlights/reading/2019/

[115] The Nation's Report Card. (2019a). *National achievement-level results: reading.* https://www.nationsreportcard.gov/reading/nation/achievement/?grade=4

[116] National Assessment of Educational Progress. (2017). *2017 state mapping analysis.* National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/nationsreportcard/studies/statemapping/table_2017a.aspx

[117] Partnership for Assessment of Readiness for College and Careers (PARCC). (2012). *PARCC model content frameworks: English language arts/literacy, grades 3-11*. https://eric.ed.gov/?id=ED582077

[118] Smarter Balanced. (2022). *Smarter content explorer.* The Regents of the University of California. https://contentexplorer.smarterbalanced.org/

[119] Gewertz, C. (2019). *Which states are using PARCC or Smarter Balanced? An interactive breakdown of states' 2016-17 testing plans.* EducationWeek. https://www.edweek.org/teaching-learning/which-states-are-using-parcc-or-smarter-balanced#:~:text=Only%20ONE%2DTHIRD%20of%20the,tests%20they%20designed%20or%20bought

[120] Tabaku, L., Carbuccia-Abbott, M., Saavedra, E. (2018). State assessments in languages other than English. American Institutes for Research. https://files.eric.ed.gov/fulltext/ED590178.pdf

[121] Helms, J. E. (2006). Fairness is not validity or cultural bias in racial-group assessment: A quantitative perspective. *American Psychologist, 61*(8), 845–859. https://doi.org/10.1037/0003-066X.61.8.845

[122] Jacob, B. A. (2016). *Student test scores: How the sausage is made and why you should care.* Brookings Institute. https://www.brookings.edu/research/student-test-scores-how-the-sausage-is-made-and-why-you-should-care/

[123] Gneezy, U., List, J. A., Livingston, J. A., Sadoff, S., Qin, X., & Xu, Y. (2017). Measuring success in education: The role of effort on the test itself. *American Economic Review: Insights, 1*(3), 291-308. https://doi.org/10.1257/aeri.20180633

[123] See Helms (2006).

[124] Brown, S. L. (2015). Motivating high school students to score proficient on state tests. *Journal of Education and Training Studies, 3*(3). https://doi.org/10.11114/jets.v3i3.700

[125] CORE Districts. (2017). *Improvement measures.* https://coredistricts.org/our-improvement-data/improvement-measures/

[126] Balfanz, B., & Byrnes, V. (2019). Chapter 4: Early warning indicators and intervention systems: State of the field. In J. Fredricks, A. Reschly, A. and S.L. Christenson (Eds.), *Handbook of student engagement interventions.* (pp. 45-55). Academic Press. https://doi.org/10.1016/B978-0-12-813413-9.00004-8

[127] Kennelly, L., & Monrad, M. (2007). *Approaches to dropout prevention: Heeding early warning signs with appropriate interventions*. National High School Center, American Institute for Research. https://eric.ed.gov/?id=ED499009

[128] Balfanz, R., Herzog, L., & Mac Iver, D. J. (2007). Preventing student disengagement and keeping students on the graduation path in urban middle-grades schools: Early identification and effective interventions. *Educational Psychologist, 42*(4), 223–235. https://doi.org/10.1080/00461520701621079

[129] Barber, B. K., & Olsen, J. A. (2004). Assessing the transitions to middle and high school. *Journal of Adolescent Research, 19*(1), 3-30. https://doi.org/10.1177/0743558403258113

[130] Friedel, J. M., Cortina, K. S., Turner, J. C., & Midgley, C. (2010). Changes in efficacy beliefs in mathematics across the transition to middle school: Examining the effects of perceived teacher and parent goal emphases. *Journal of Educational Psychology, 102*(1), 102–114. https://doi.org/10.1037/a0017590

[131] Anderman, E. M., & Midgley, C. (1997). Changes in achievement goal orientations, perceived academic competence, and grades across the transition to middle-level schools. *Contemporary Educational Psychology, 22*(3), 269-298. https://doi.org/10.1006/ceps.1996.0926

[132] Educational Testing Service. (2012). Middle school matters: Improving the life course of Black boys. *Policy Evaluation & Research Center, 12*(4). https://eric.ed.gov/?id=ED560943

[133] See Balfanz et al. (2007).

[134] Wilson, A. (2015). How to assess whether middle schoolers are ready for high school. EdSource. https://edsource.org/2015/how-to-assess-whether-middle-schoolers-are-ready-for-high-school/86094

[135] Achieve. (2018). *New brief shows few states include 9th grade on track to graduate measures in ESSA accountability plans.* https://www.achieve.org/new-brief-shows-few-states-include-9th-grade-track-graduate-measures-essa-accountability-plans

[136] See Achieve (2018).

[137] Malouff, J. M., & Thorsteinsson. (2016). Bias in grading: A meta-analysis of experimental research findings. *Australian Journal of Education, 60*(3), 245-256. https://doi.org/10.1177/0004944116664618

[138] Brookhart, S. M., Guskey, T. R., Bowers, A. J., McMillan, J. H., Smith, J. K., Smith, L. F., Stevens, M. T., & Welsh, M. E. (2016). A century of grading research: Meaning and value in the most common educational measure. *Review of Educational Research, 86*(4), 803–848. https://doi.org/10.3102/0034654316672069

[139] Bill & Melinda Gates Foundation. (2019). *Recommended improvements to K–12 student outcomes & indicators.*

[140] Balfanz, R., Herzog, L., & Mac Iver, D. J. (2007). Preventing student disengagement and keeping students on the graduation path in urban middle-grades schools: Early identification and effective interventions. *Educational Psychologist, 42*(4), 223–235. https://doi.org/10.1080/00461520701621079

[141] Sutton, A., Langenkamp, A.G., Muller, C., & Schiller, K.S. (2018). Who gets ahead and who falls behind during the transition to high school? Academic performance at the intersection of race/ethnicity and gender. *Social Problems,* 65(2), 154-173. https://doi.org/10.1093/socpro/spx044

[142] Allensworth, E. M., Gwynne, J. A., Moore, P., & de la Torre, M. (2014). *5 key findings for middle grades: From looking forward to high school and college.* University of Chicago Consortium on Chicago School Research. https://eric.ed.gov/?id=ED553151

[143] Balfanz, B., & Byrnes, V. (2019). Chapter 4: Early warning indicators and intervention systems: State of the field. In J. Fredricks, A. Reschly, A. and S.L. Christenson (Eds.), *Handbook of student engagement interventions.* (pp. 45-55). Academic Press. https://doi.org/10.1016/B978-0-12-813413-9.00004-8

[144] Wilson, A. (2015). How to assess whether middle schoolers are ready for high school. EdSource. https://edsource.org/2015/how-to-assess-whether-middle-schoolers-are-ready-for-high-school/86094

[145] See Wilson (2015).

[146] See Balfanz & Byrnes (2019).

[147] Achieve. (2018). *New brief shows few states include 9th grade on track to graduate measures in ESSA accountability plans.* https://www.achieve.org/new-brief-shows-few-states-include-9th-grade-track-graduate-measures-essa-accountability-plans

[148] Brookhart, S. M., Guskey, T. R., Bowers, A. J., McMillan, J. H., Smith, J. K., Smith, L. F., Stevens, M. T., & Welsh, M. E. (2016). A century of grading research: Meaning and value in the most common educational measure. *Review of Educational Research, 86*(4), 803–848. https://doi.org/10.3102/0034654316672069

[149] CORE Districts. (2017). *Improvement measures.* https://coredistricts.org/our-improvement-data/improvement-measures/

[150] Hernandez, D. J. (2012). *Double jeopardy: How third-grade reading skills and poverty influence high school graduation.* Annie E. Casey Foundation. https://eric.ed.gov/?id=ED518818

[151] Lesnick, J., George, R., Smithgall, C., & Gwynne, J. (2010). *Reading on grade level in third grade: How is it related to high school performance and college enrollment? A longitudinal analysis of third-grade students in Chicago in 1996-97 and their educational outcomes. A report to the Anne E. Casey Foundation.* Chapin Hall at the University of Chicago. https://eric.ed.gov/?id=ED517805

[152] Cumpton, G., Schexnayder, D., King, C. T., & Stolp, C. (2012). *Factors associated with education and work after high school for the classes of 2008 and 2009: A research report of the Central Texas Student Futures project.* Ray Marshall Center for the Study of Human Resources, University of Texas at Austin. http://hdl.handle.net/2152/20410

[153] Child Trends Data Bank. (2019). *Reading proficiency.* https://www.childtrends.org/indicators/reading-proficiency

[154] The Nation's Report Card. (2019b). *NAEP report card: Mathematics.* https://www.nationsreportcard.gov/highlights/mathematics/2019/

[155] The Nation's Report Card. (2019c). *NAEP report card: Reading.* https://www.nationsreportcard.gov/highlights/reading/2019/

[156] The Nation's Report Card (2019d). *National achievement-level results: mathematics.* https://www.nationsreportcard.gov/mathematics/nation/achievement?grade=8

[157] Bandeira de Mello, V., Rahman, T., Fox, M. A., & Ji, C. S. (2019). *Mapping state proficiency standards onto NAEP scales: Results from the 2017 NAEP reading and mathematics assessments* (NCES 2019-040). U.S. Department of Education, Washington, DC: Institute of Education Sciences, National Center for Education Statistics. https://nces.ed.gov/nationsreportcard/pubs/studies/2019040.aspx

[158] Partnership for Assessment of Readiness for College and Careers (PARCC). (2012). *PARCC model content frameworks: English language arts/literacy, grades 3-11.* https://eric.ed.gov/?id=ED582077

[159] Smarter Balanced. (2022). *Smarter content explorer.* The Regents of the University of California. https://contentexplorer.smarterbalanced.org/

[160] Gewertz, C. (2019). *Which states are using PARCC or Smarter Balanced? An interactive breakdown of states' 2016-17 testing plans.* EducationWeek. https://www.edweek.org/teaching-learning/which-states-are-using-parcc-or-smarter-balanced#:~:text=Only%20ONE%2DTHIRD%20of%20the,tests%20they%20designed%20or%20bought

[161] Tabaku, L., Carbuccia-Abbott, M., Saavedra, E. (2018). State assessments in languages other than English. American Institutes for Research. https://files.eric.ed.gov/fulltext/ED590178.pdf

[162] Helms, J. E. (2006). Fairness is not validity or cultural bias in racial-group assessment: A quantitative perspective. *American Psychologist, 61*(8), 845–859. https://doi.org/10.1037/0003-066X.61.8.845

[163] Jacob, B.A. (2016). *Student test scores: How the sausage is made and why you should care*. Brookings Institute. https://www.brookings.edu/research/student-test-scores-how-the-sausage-is-made-and-why-you-should-care/

[164] Gneezy, U., List, J. A., Livingston, J. A., Sadoff, S., Qin, X., & Xu, Y. (2017). Measuring success in education: The role of effort on the test itself. *American Economic Review: Insights, 1*(3), 291-308. https://doi.org/10.1257/aeri.20180633

[164] See Helms (2006).

[165] Brown, S.L. (2015). Motivating high school students to score proficient on state tests. *Journal of Education and Training Studies, 3*(3). https://doi.org/10.11114/jets.v3i3.700

[166] CORE Districts. (2017). *Improvement measures.* https://coredistricts.org/our-improvement-data/improvement-measures/

[167] Muller, R., & Beatty, A. (2008). *The building blocks of success: Higher-level math for all students.* Achieve. https://www.achieve.org/BuildingBlocksofSuccess

[168] Evan, A., Gray, T., & Olchefske, J. (2006). *The gateway to student success in mathematics and science: A call for middle school reform-the research and its implications*. American Institutes for Research. https://www.air.org/sites/default/files/2021-06/Call_for_middle_school_reform_11_1_06_version_0.pdf

[169] U.S. Department of Education Office for Civil Rights. (2018). *2015-16 Civil rights data collection: STEM course taking.* https://www2.ed.gov/about/offices/list/ocr/docs/stem-course-taking.pdf

[170] See Evan et al. (2006).

[171] U.S. Department of Education. (2018). *A leak in the STEM pipeline: Taking Algebra early.* https://www2.ed.gov/datastory/stem/algebra/index.html

[172] Palacios, M., Vignola, E., Lyons, R., Hart, R., & Casserly, M. (2019). *Academic key performance indicators.* Council of the Great City Schools. https://eric.ed.gov/?q=council+of+the+great+city+schools+key+performance+indicators&id=ED603169

[173] Easton, J. Q., Johnson, E., & Sartrain, L. (2017). *The predictive power of ninth-grade GPA.* University of Chicago. https://consortium.uchicago.edu/publications/predictive-power-ninth-grade-gpa

[174] Allensworth, E. M., & Easton, J. Q. (2007). *What matters for staying on-track and graduating in Chicago public high schools: A close look at course grades, failures, and attendance in the freshman year.* Consortium on Chicago School Research at the University of Chicago. https://consortium.uchicago.edu/sites/default/files/2018-10/07%20What%20Matters%20Final.pdf

[175] Kemple, J., Segeritz, M. D., & Stephenson, N. (2013). Building on-track indicators for high school graduation and college readiness: Evidence from New York City. *Journal of Education for Students Place at Risk, 18*(1), 7–28. https://doi.org/10.1080/10824669.2013.747945

[176] See Allensworth & Easton (2007).

[177] Roderick,M., Kelley-Kemple. (2021). The preventable failure. University of Chicago Consortium on School Research. https://consortium.uchicago.edu/publications/the-preventable-failure

[178] Balfanz, B., & Byrnes, V. (2019). Chapter 4: Early warning indicators and intervention systems: State of the field. In J. Fredricks, A. Reschly, A. and S.L. Christenson (Eds.), *Handbook of student engagement interventions.* (pp. 45-55). Academic Press. https://doi.org/10.1016/B978-0-12-813413-9.00004-8

[179] See Balfanz & Byrnes (2019).

[180] Achieve. (2018). *New brief shows few states include 9th grade on track to graduate measures in ESSA accountability plans.* https://www.achieve.org/new-brief-shows-few-states-include-9th-grade-track-graduate-measures-essa-accountability-plans

[181] Palacios, M., Vignola, E., Lyons, R., Hart, R., & Casserly, M. (2019). *Academic key performance indicators.* Council of the Great City Schools. https://eric.ed.gov/?q=council+of+the+great+city+schools+key+performance+indicators&id=ED603169

[182] Bill & Melinda Gates Foundation. (2019). *Recommended improvements to K–12 student outcomes & indicators.*

[183] Allensworth, E. M., & Clark, K. (2020). High school GPAs and ACT scores as predictors of college completion: Examining assumptions about consistency across high schools. *Educational Researcher, 49*(3), 198–211. https://doi.org/10.3102%2F0013189X20902110

[184] Denning, J. T., Patterson, R. W., Warnick, M., Eide, E. R., & Mumford, K. J. (2021). Lower bars, higher college GPAs. *Higher Education Research, 22*(1). https://www.educationnext.org/lower-bars-higher-college-gpas-how-grade-inflation-boosting-college-graduation-rates/

[185] National Association of Colleges and Employers. (2018). *Job outlook 2019.* https://www.naceweb.org/store/2018/job-outlooK–2019/

[186] The Nation's Report Card. (2009). *Race/ethnicity: Grade point average.* https://www.nationsreportcard.gov/hsts_2009/race_gpa.aspx?tab_id=tab2&subtab_id=Tab_1

[187] National Center for Education Statistics. (2013). *Profile of undergraduate students: Attendance, distance, and remedial education, degree program and field of study, demographics, financial aid, financial literacy, employment, and military status: 2015-16.* Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2019467

[188] Allensworth, E. M., & Luppescu, S. (2018). *Why do students get good grades, or bad ones? The influence of the teacher, class, school, and student.* University of Chicago Consortium on School Research. https://consortium.uchicago.edu/publications/why-do-students-get-good-grades-or-bad-ones-influence-teacher-class-school-and-student

[189] Malouff, J. M., & Thorsteinsson, E. B. (2016). Bias in grading: A meta-analysis of experimental research findings. *Australian Journal of Education, 60*(3), 245-256. https://doi.org/10.1177/0004944116664618

[190] Livnevich, A. A., Guskey, T. R., Murano, D. M., & Smith, J. K. (2020). What do grades mean? Variation in grading criteria in American college and university courses. *Assessment in Education: Principles, Policy & Practice, 27*(5), 480-500. https://doi.org/10.1080/0969594X.2020.1799190

[191] See Denning et. al. (2021).

[192] Brookhart, S. M., Guskey, T. R., Bowers, A. J., McMillan, J. H., Smith, J. K., Smith, L. F., Stevens, M. T., & Welsh, M. E. (2016). A century of grading research: Meaning and value in the most common educational measure. *Review of Educational Research, 86*(4), 803–848. https://doi.org/10.3102/0034654316672069

[193] Allensworth, E. M., Nagaoka, J., & Johnson, D. W. (2018). *High school graduation and college readiness indicator systems.* University of Chicago Consortium on School Research. https://consortium.uchicago.edu/publications/high-school-graduation-and-college-readiness-indicator-systems-what-we-know-what-we

[194] Roderick, M., Nagaoka, J., Allensworth, E., Coca, V.M., Correa, M., & Stoker, G. (2006). *From high school to the future: A first look at Chicago Public school graduates' college enrollment, college preparation, and graduation from four-year colleges.* University of Chicago Consortium on School Research. https://consortium.uchicago.edu/publications/high-school-future-first-look-chicago-public-school-graduates-college-enrollment

[195] Collins, M. (2022). *Use of GPA as candidate selection tool falls*. National Association of Colleges and Employers (NACE). https://www.naceweb.org/talent-acquisition/candidate-selection/use-of-gpa-as-candidate-selection-tool-falls/

[196] Hernandez, D. J. (2012). *Double jeopardy: How third-grade reading skills and poverty influence high school graduation.* Annie E. Casey Foundation. https://eric.ed.gov/?id=ED518818

[197] Lesnick, J., George, R. M., Smithgall, C., & Gwynne, J. (2010). *Reading on grade level in third grade: how is it related to high school performance and college enrollment? A longitudinal analysis of third-grade students in Chicago in 1996-97 and their educational outcomes. A report to the Annie E. Casey Foundation.* Chaplin Hall at the University of Chicago. https://eric.ed.gov/?id=ED517805

[198] Duncan, G. J., Claessens, A., Huston, A. C., Pagani, L. S., Engel, M., Sexton, H., Dowsett, C. J., Magnuson, K., Klevanov, P., Feinstein, L., Brooks-Gunn, J., Duckworth, K., & Japel, C. (2007). School readiness and later achievement. *Developmental Psychology, 43*(6), 1428–1446. https://doi.org/10.1037/0012-1649.43.6.1428

[199] Siegler, R. S., Duncan, G. J., Davis-Kean, P. E., Duckworth, K., Claessens, A., Engel, M., Susperreguy, M. I., & Chen, M. (2012). Early predictors of high school mathematics achievement. *Psychological Science, 23*(7), 691–697. https://doi.org/10.1177/0956797612440101

[200] Hoxby, C., & Turner, S. (2013). *Expanding college opportunities for high-achieving, low-income students.* National Bureau of Economic Research. https://www8.gsb.columbia.edu/programs/sites/programs/files/finance/Applied%20Microeconomics/Caroline%20Hoxby.pdf

[201] Dynarski, S. (2018). *ACT/SAT for all: A cheap, effective way to narrow income gaps in college.* Brookings Institute. https://www.brookings.edu/research/act-sat-for-all-a-cheap-effective-way-to-narrow-income-gaps-in-college/

[202] Allensworth, E. M., Nagaoka, J., & Johnson, D. W. (2018). *High school graduation and college readiness indicator systems*. UChicago Consortium on School Research. https://consortium.uchicago.edu/publications/high-school-graduation-and-college-readiness-indicator-systems-what-we-know-what-we

[203] The Nation's Report Card. (2019e). *NAEP report card: Reading. National student group scores and score gaps*. https://www.nationsreportcard.gov/reading/nation/groups/?grade=12

[204] Anderson, T., Blount, D., Lindsay, C., Blom, E., Gebrekristos, S., & Alba, F. (2019). *Robust and equitable measures to identify quality schools (REMIQS).* The Urban Institute. https://www.urban.org/sites/default/files/2019/04/15/remiqs-detailed-model-final.pdf

[205] CORE Districts. (2017). *Improvement measures.* https://coredistricts.org/our-improvement-data/improvement-measures/

[206] National Academies of Sciences, Engineering, and Medicine. (2019). *Monitoring Educational Equity.* The National Academies Press.

[207] Jimenez, L., & Sargrad, S. (2018). *Are high school diplomas really a ticket to college and work? An audit of state high school graduation requirements.* Center for American Progress. https://www.americanprogress.org/article/high-school-diplomas/

[208] Mejia, M. C., Rodriguez, O., & Johnson, H. (2016). *Preparing students for success in California's community colleges.* Public Policy Institute of California. https://eric.ed.gov/?id=ED570976

[209] California Department of Education. (2021). *2020-21 four-year adjusted cohort graduation rate.* https://dq.cde.ca.gov/dataquest/dqcensus/CohRate.aspx?cds=00&agglevel=state&year=2020-21

[210] National Association for College Admission Counseling (NACAC). (2022). *High school classes required for college.* https://www.nacacfairs.org/learn/prep/high-school-classes-required-for-college-admission/

[211] Education Commission of the States. (2020). *50-state comparison: State K-3 policies.* https://www.ecs.org/kindergarten-policies/

[212] See Jimenez & Sargrad (2018).

[213] Anderson, T., Blount, D., Lindsay, C., Blom, E., Gebrekristos, S., & Alba, F. (2019). *Robust and equitable measures to identify quality schools (REMIQS).* The Urban Institute. https://www.urban.org/sites/default/files/2019/04/15/remiqs-detailed-model-final.pdf

[214] National Education Association (NEA). (2021). *Great public schools indicators framework.* https://www.nea.org/student-success/great-public-schools/what-students-deserve

[215] An, B. P. (2013). The impact of dual enrollment on college degree attainment: Do low-SES students benefit? *Educational Evaluation and Policy Analysis*, 35(1), 57–75. https://doi.org/10.3102/0162373712461933

[216] Berger, A., Turk-Bicakci, L., Garet, M., Song, M., Knudson, J., Haxton, C., Zeiser, K., Hohen, G., Ford, J., Stephan, J., Keating, K., & Cassidy, L. (2013). *Early college, early success. Early college high school initiative impact study.* American Institutes for Research. https://eric.ed.gov/?id=ED577243

[217] Edmunds, J. A., Unlu, F., Glennie, E., Bernstein, L., Fesler, L., Furey, J., & Arshavsky, N. (2017). Smoothing the transition to postsecondary education: The impact of the early college model. *Journal of Research on Educational Effectiveness*, 10(2), 297-325. https://doi.org/10.1080/19345747.2016.1191574

[218] Shields, K. A., Bailey, J., Hanita, M., & Zhang, X. (2021). *The effects of accelerated college credit programs on educational attainment in Rhode Island.* Regional Educational Laboratory, Northeast & Islands.Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/rel/Project/5680

[219] Cumpton, G., Schexnayder, D., King, C. T., & Stolp, C. (2012). *Factors associated with education and work after high school for the classes of 2008 and 2009: A research report of the Central Texas Student Futures project.* Ray Marshall Center for the Study of Human Resources, University of Texas at Austin. http://hdl.handle.net/2152/20410

[220] Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college*. U.S. Department of Education. https://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf

[221] Long, M. C., Conger, D., & Iatorala, P. (2012). Effects of high school course-taking on secondary and postsecondary success. *American Educational Research Journal,* 39(2), 285–322. https://doi.org/10.3102/0002831211431952

[222] Smith, J., Hurwitz, M., & Avery, C. (2017). Giving college credit where it is due: Advanced placement exam scores and college outcomes. *Journal of Labor Economics,* 35(1). https://doi.org/10.1086/687568

[223] Warne, R. T. (2017). Research on the academic benefits of the advanced placement program: Taking stock and looking forward. *SAGE Journals, 7*(1). https://doi.org/10.1177/2158244016682996

[224] Chatterjee, R., Quirk, A., & Campbell, E. (2021). *Closing advanced coursework equity gaps for all students*. Center for American Progress. https://www.americanprogress.org/article/closing-advanced-coursework-equity-gaps-students/

[225] Xu, D., Fink, J., & Solanki, S. (2019). College acceleration for all? Mapping racial/ethnic gaps in advanced placement and dual enrollment participation. *American Educational Research Journal,* 58(5), 954–992. https://doi.org/10.3102/0002831221991138

[226] Education Commission of the States. (2014). *Blueprint for college readiness:* A 50-*state blueprint*. Education Commission of the States. https://eric.ed.gov/?id=ED556058

[227] Hackmann, D. G., Malin, J., & Bragg, D. D. An analysis of college and career readiness emphasis in ESSA state accountability plans. *Education Policy Analysis Archives*, *27*(160), 1–31. https://doi.org/10.14507/epaa.27.4441

[228] Education Strategy Group. (2017). *Destination known: Valuing college and career readiness in state accountability systems.* https://edstrategy.org/resource/destination-known/

[229] National Academies of Sciences, Engineering, and Medicine. (2020). *Building educational equity indicator systems: A guidebook for states and school districts.* The National Academies Press. https://nap.nationalacademies.org/read/25833/chapter/2

[230] National Association for College Admission Counseling. (2020). *NACAC encourages public institutions and systems to make submitting standardized admission test scores optional for the 2021-22 admission cycle.* https://www.nacacnet.org/news--publications/newsroom/press-releases-2020/nacac-encourages-public-institutions-and-systems-test-optional/

[231] FairTest. (2022). *1,820+ accredited, 4-year colleges & universities with ACT/SAT-optional testing policies for fall, 2022 admissions.* https://fairtest.org/university/optional

[232] Hoxby, C., & Turner, S. (2013). *Expanding college opportunities for high-achieving, low-income students.* National Bureau of Economic Research. https://www8.gsb.columbia.edu/programs/sites/programs/files/finance/Applied%20Microeconomics/Caroline%20Hoxby.pdf

[233] Dynarski, S. (2018). *ACT/SAT for all: A cheap, effective way to narrow income gaps in college.* Brookings Institute. https://www.brookings.edu/research/act-sat-for-all-a-cheap-effective-way-to-narrow-income-gaps-in-college/

[234] The Nation's Report Card. (2019b). *NAEP report card: Mathematics.* https://www.nationsreportcard.gov/highlights/mathematics/2019/

[235] The Nation's Report Card. (2019c). *NAEP report card: Reading.* https://www.nationsreportcard.gov/highlights/reading/2019/

[236] Sackett, P. R., Kuncel, N. R., Beatty, A. S., Rigdon, J. L., Shen, W., & Kiger, T. B. (2012). The role of socioeconomic status in SAT-grade relationships and in college admissions decisions. *Psychological Science*, *23*(9), 1000–1007. https://doi.org/10.1177/0956797612438732

[237] Reeves, R. V., & Halikias, D. (2017). *Race gaps in SAT scores highlight inequality and hinder upward mobility.* Brookings Institute. https://www.brookings.edu/research/race-gaps-in-sat-scores-highlight-inequality-and-hinder-upward-mobility/

[238] Robinson, A. (2021). *University of California drops SAT/ACT scores: What it means for you*. PrepScholar. https://blog.prepscholar.com/university-of-california-schools-no-sat-act-score-requirement#:~:text=Test%20blind%20means%20that%20UC,for%20Chancellor's%20or%20Regents%20scholarships.

[239] Helms, J. E. (2006). Fairness is not validity or cultural bias in racial-group assessment: A quantitative perspective. *American Psychologist, 61*(8), 845–859. https://doi.org/10.1037/0003-066X.61.8.845

[240] Helms, J. (2003). Racial identity and racial socialization as aspects of adolescents' identity development. In R. M. Lerner, F. Jacobs, & D. Wertlieb *Handbook of applied developmental science: Promoting positive child, adolescent, and family development through research, policies, and programs* (Vol. 4, pp. 143–164). SAGE Publications, Inc., https://dx.doi.org/10.4135/9781452233642.n7

[241] Letukas, L. (2015). *Nine facts about the SAT that might surprise you*. College Board. https://eric.ed.gov/?id=ED562751

[242] Jaschik, S. (2010). *New evidence of racial bias on SAT.* Inside Higher Ed. https://www.insidehighered.com/news/2010/06/21/new-evidence-racial-bias-sat

[243] Santelices, M. V., & Wilson, M. (2010). Unfair treatment? The case of Freedle, the SAT, and the standardization approach to differential item functioning. *Harvard Educational Review, 80*(1), 106–134. https://eric.ed.gov/?id=EJ930622

[244] Moore, R., Sanchez, E., & San Pedro, M. O. (2018). *Investigating test prep impact on score gains using quasi-experimental propensity score matching.* ACT, Inc. https://eric.ed.gov/?id=ED593130

[245] Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology, 69*(5), 797–811. https://doi.org/10.1037/0022-3514.69.5.797

[246] Nieto del Rio, G. M. (2021, May 15). University of California will no longer consider SAT and ACT scores. *The New York Times*. https://www.nytimes.com/2021/05/15/us/SAT-scores-uc-university-of-california.html

[247] Hyman, J. (2017). ACT for all: The effect of mandatory college entrance exams on postsecondary attainment and choice. *Education Finance and Policy, 12*(3), 281–311. https://doi.org/10.1162/EDFP_a_00206

[248] Dutta, P. (2020). *Analysis: In defense of the SAT — eliminating college admissions exams only worsens entrenched inequities.* The 74 (the74million.org). https://www.the74million.org/article/analysis-in-defense-of-the-sat-eliminating-college-admissions-exams-only-worsens-entrenched-inequities/

[249] National Association for College Admission Counseling. (2020). *Ensuring all students have access to higher education: The role of standardized testing in the time of COVID-19 and beyond. Guidance for colleges and universities.* NACAC Task Force on Standardized Admission Testing for International and US Students. https://www.nacacnet.org/knowledge-center/standardized-testing/nacac-report-on-standardized-testing/

[250] Gewertz, C. (2017). *Which states require students to take the SAT or ACT?* Education Week. https://www.edweek.org/teaching-learning/which-states-require-students-to-take-the-sat-or-act

[251] ACT. (2022). *ACT scores for higher education professionals.* https://www.act.org/content/act/en/products-and-services/the-act-postsecondary-professionals/scores.html

[252] Education Strategy Group (ESG). *Career readiness and the Every Student Succeeds Act: Mapping career readiness in state ESSA plans. Appendix. Table of state activities under ESSA.* https://careertech.org/resource/mapping-career-readiness-essa-appendix

[253] Annenberg Institute for School Reform, University of Chicago Consortium on Chicago School Research, & John W. Gardner Center for Youth. (2014). *College readiness indicator systems resource series (CRIS).* UChicago Consortium on School Research. https://consortium.uchicago.edu/publications/college-readiness-indicator-systems-resource-series

[254] Cumpton, G., Schexnayder, D., King, C. T., & Stolp, C. (2012). *Factors associated with education and work after high school for the classes of 2008 and 2009: A research report of the Central Texas Student Futures project.* Ray Marshall Center for the Study of Human Resources, University of Texas at Austin. http://hdl.handle.net/2152/20410

[255] Roderick, M., Nagaoka, J., Coca, V., Moeller, E., Roddie, K., Gilliam, J., & Patton, D. (2008). *From high school to the future: Potholes on the road to college*. Consortium on Chicago School Research. https://eric.ed.gov/?id=ED500519

[256] DeBaun, B. (2019). *Survey data strengthen association between FAFSA completion and enrollment.* National College Attainment Network. https://www.ncan.org/news/456025/Survey-Data-Strengthen-Association-Between-FAFSA-Completion-and-Enrollment.htm

[257] See DeBaun (2019).

[258] See Roderick et al. (2008).

[259] Bahr, S., Sparks, D., & Mulvaney Hoyer, K. (2018). *Why didn't students complete a free application for federal student aid (FAFSA)? A detailed look.* Institute of Education Sciences, National Center for Education Statistics, U.S. Department of Education. https://nces.ed.gov/pubs2018/2018061/index.asp

[260] Holzman, B., & Hanson, V. S. (2020). *Summer melt and free application for federal student aid verification.* Houston Education Research Consortium. https://eric.ed.gov/?id=ED607689

[261] Kofoed, M. (2017). To apply or not to apply: FAFSA completion and financial aid gaps. *Research in higher education, 58*(1), 1–39. https://doi.org/10.1007/s11162-016-9418-y

[262] National College Attainment Network. (n.d.). *Universal FAFSA completion with supports.* https://www.ncan.org/page/UniversalFAFSA

[263] National College Attainment Network. (n.d.). *Student-level FAFSA data sharing: Policies by state.* https://www.ncan.org/page/fafsadatasharing

[264] Collins, B., Dortch, C. (2022). *The FAFSA Simplification Act.* Congressional Research Service. https://crsreports.congress.gov/product/pdf/R/R46909

[265] National Conference of State Legislatures. (2021). *Undocumented student tuition: Overview.* https://www.ncsl.org/research/education/undocumented-student-tuition-overview.aspx

[266] Reyna, R., & Norton, L. (2020). *From tails to heads: Building momentum for postsecondary success*. Education Strategy Group. https://edstrategy.org/resource/from-tails-to-heads/

[267] Smith, J. (2011). *Can applying to more colleges increase enrollment rates?* College Board. https://eric.ed.gov/?id=ED562599

[268] See Smith (2011).

[269] Roderick, M., Nagaoka, J., Coca, V., Moeller, E., Roddie, K., Gilliam, J., & Patton, D. (2008). *From high school to the future: Potholes on the road to college*. Consortium on Chicago School Research. https://eric.ed.gov/?id=ED500519

[270] Tate, E. (2019). *Naviance wields much 'power and influence' in college admissions, Harvard researcher finds.* EdSurge. https://www.edsurge.com/news/2019-04-18-naviance-wields-much-power-and-influence-in-college-admissions-harvard-researcher-finds

[271] Busta, Hallie (2021). *Common App data shows applications are up, but only for some colleges.* Higher Ed Dive. https://www.highereddive.com/news/common-app-data-shows-applications-are-up-but-only-for-some-colleges/594002/

[272] Knowledge is Power Program (KIPP). (2018). *College match strategies framework.* https://www.kipp.org/wp-content/uploads/2019/04/Match-Strategies-Framework_020419.pdf

[273] Reyna, R., & Norton, L. (2020). *From tails to heads: Building momentum for postsecondary success*. Education Strategy Group, https://edstrategy.org/resource/from-tails-to-heads/

[274] Bill & Melinda Gates Foundation. (2019). *Recommended improvements to K–12 student outcomes & indicators.*

[275] What Works Clearinghouse (WWC). (2017). *Preventing dropout in secondary schools.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/practiceguide/24

[276] Oreopoulos, P., & Salvanes, K. G. (2011). Priceless: The nonpecuniary benefits of schooling. Journal of Economic Perspectives 25(1), 159–84. https://doi.org/10.1257/jep.25.1.159

[277] Belfield, C. R., & Levin, H. M. (2007). *The price we pay: Economic and social consequences of inadequate education.* Brookings Institution Press. https://www.jstor.org/stable/10.7864/j.ctt126269

[278] Rumberger, R. W. (2011). *Dropping out: Why students drop out of high school and what can be done about it*. Harvard University Press. https://doi.org/10.4159/harvard.9780674063167

[279] Long, B. T. (2010). *Dropout prevention and college prep*. National Bureau of Economic Research. https://www.nber.org/books-and-chapters/targeting-investments-children-fighting-poverty-when-resources-are-limited/dropout-prevention-and-college-prep

[280] Bureau of Labor Statistics. (2021). *Employment Projections.* U.S. Department of Labor. https://www.bls.gov/emp/tables/unemployment-earnings-education.htm

[281] See WWC (2017).

[282] See Rumberger (2011).

[283] DePaoli, J. L., Balfanz, R., Bridgeland, J., Atwell, M., & Ingram, E. S. (2017). *Building a grad nation: Progress and challenge in raising high school graduation rates.* Civic Enterprises. https://eric.ed.gov/?id=ED585524

[284] National Center for Educational Statistics. (2021). *Public high school graduation rates.* Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/programs/coe/indicator/coi

[285] Education Commission of the States. (2019a). *50-state comparison: High school graduation requirements*. https://www.ecs.org/high-school-graduation-requirements/

[286] America's Promise Alliance. (2022). *Are high school graduation gains real?* https://www.americaspromise.org/are-high-school-graduation-gains-real

[287] Harris, D. N. (2020). *Are America's high school graduation rates real—or just an accountability-fueled mirage?* Brookings Institution. https://www.brookings.edu/blog/brown-center-chalkboard/2020/03/02/are-americas-rising-high-school-graduation-rates-real-or-just-an-accountability-fueled-mirage/

[288] CORE Districts. (2017). *Improvement measures.* https://coredistricts.org/our-improvement-data/improvement-measures/

[289] Smith, J., Pender, M., & Howell, J. (2012). The full extent of student-college academic undermatch. *Economics of Education Review*, 32, 247–261. https://doi.org/10.1016/j.econedurev.2012.11.001

[290] Wiske Dillon, E., & Smith, J.A. (2017). Determinants of the match between student ability and college quality. *Journal of Labor Economics*, 35(1). https://doi.org/10.1086/687523

[291] Dale, S. B., & Krueger, A. B. (2002). Estimating the payoff to attending a more selective college: An application of selection on observables and unobservables. *The Quarterly Journal of Economics*, *117*(4), 1491–1527. https://www.jstor.org/stable/4132484

[292] Hoxby, C. M., & Avery, C. (2013). *The missing "one-offs": The hidden supply of high-achieving, low-income students.* Brookings Institute. https://www.brookings.edu/wp-content/uploads/2016/07/2013a_hoxby.pdf

[293] National Student Clearinghouse. (2021). *StudentTracker.* https://www.studentclearinghouse.org/colleges/studenttracker/

[294] See National Student Clearinghouse (2021).

[295] National Student Clearinghouse. (2022). *Enrollment coverage workbook (June 2021).*

https://nscresearchcenter.org/workingwithourdata/

[296] Education Commission of the States. (2021). *50-state comparison: Statewide longitudinal data systems 2021.* https://reports.ecs.org/comparisons/statewide-longitudinal-data-systems-2021-03

[297] Gonzalez, N., & Thal, D. (2020). *Understanding college match among KIPP northern California students.* Mathematica. https://www.mathematica.org/publications/understanding-college-match-among-kipp-northern-california-students

[298] Castleman, B. L., Page, L. C., & Snowdon, A. L. (2013). *Summer melt handbook: A guide to investigating and responding to summer melt.* Center for Education Policy Research, Harvard University. https://sdp.cepr.harvard.edu/files/sdp/files/sdp-summer-melt-handbook_0.pdf?m=1518272938

[299] Castleman, B. L., & Page, L. C. (2014). A trickle or a torrent? Understanding the extent of summer "melt" among college-intending high school graduates. *Social Science Quarterly*, 95(1), 202–220. https://www.jstor.org/stable/26612158

[300] Roderick, M., Nagaoka, J., Coca, V., Moeller, E., Roddie, K., Gilliam, J., & Patton, D. (2008). *From high school to the future: Potholes on the road to college*. Consortium on Chicago School Research. https://eric.ed.gov/?id=ED500519

[301] Castleman, B. L., & Page, L. C. (2015). Summer nudging: Can personalized text messages and peer mentor outreach increase college going among low-income high school graduates? *Journal of Economic Behavior & Organization*, 115, 144-160. https://doi.org/10.1016/j.jebo.2014.12.008

[302] Tackett, W. L., Pasatta, K., Pauken, E. (2018). Lessons Learned from a Summer Melt Prevention Program. *Journal of College Access*, *4*(1), 40-50. https://scholarworks.wmich.edu/jca/vol4/iss1/5

[303] Page, L., & Gehlbach, H. (2018). *How Georgia State University Used an Algorithm to Help Students Navigate the Road to College*. Harvard Business Review. https://hbr.org/2018/01/how-georgia-state-university-used-an-algorithm-to-help-students-navigate-the-road-to-college

[304] See Castleman et al. (2013).

[305] National Student Clearinghouse. (2022). *Enrollment coverage workbook (June 2021).*

https://nscresearchcenter.org/workingwithourdata/

[306] Oreopolous, P., & Petronijevic, U. (2013). *Making college worth it: A review of research on the returns to higher education*. National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w19053/w19053.pdf

[307] Long, M. C. (2010). Changes in the returns to education and college quality. *Economics of Education Review*, 29(3), 338–347. https://doi.org/10.1016/j.econedurev.2009.10.005

[308] Koropeckyj, S., Lafakis, C., & Ozimek, A. (2017). *The economic impact of increasing college completion*. American Academy of Arts & Sciences. https://www.amacad.org/sites/default/files/publication/downloads/CFUE_Economic-Impact.pdf

[309] Reber, S., Sinclair, C., & Van Drie, H. (2020). *Public colleges are the workhorses of middle-class mobility*. Brookings Institute. https://www.brookings.edu/blog/up-front/2020/07/22/public-colleges-are-the-workhorses-of-middle-class-mobility/

[310] Chetty, R., Friedman, J., Saez, E., Turner, N., & Yagan, D. (2017). *Mobility report cards: The role of colleges in intergenerational mobility*. National Bureau of Economic Research. https://www.nber.org/papers/w23618

[311] National Center for Education Statistics. (2019a). *Table 302.20.Percentage of recent high school completers enrolled in college, by race/ethnicity: 1960 through 2018.* Digest of Education Statistics. Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/programs/digest/d19/tables/dt19_302.20.asp

[312] Coca, V. M., Nagaoka, J., & Seekin, A. (2017). *Patterns of two-year and four-year college enrollment among Chicago Public Schools graduates*. University of Chicago Consortium on School Research. https://eric.ed.gov/?id=ED589667#:~:text=Nineteen%20percent%20of%202009%20CPS,year%20colleges%20within%20four%20years.

[313] National Student Clearinghouse. (2021). *StudentTracker.* https://www.studentclearinghouse.org/colleges/studenttracker/

[314] See National Student Clearinghouse (2021).

[315] National Student Clearinghouse. (2022). *Enrollment coverage workbook (June 2021).*

https://nscresearchcenter.org/workingwithourdata/

[316] Education Commission of the States. (2021). *50-state comparison: Statewide longitudinal data systems 2021.* https://reports.ecs.org/comparisons/statewide-longitudinal-data-systems-2021-03

[317] Reyna, R., & Norton, L. (2020). *From tails to heads: Building momentum for postsecondary success*. Education Strategy Group. https://edstrategy.org/resource/from-tails-to-heads/

[318] Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college*. U.S. Department of Education. https://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf

[319] Attewell, P., & Monaghan, D. (2016). How many credits should an undergraduate take? *Research in Higher Education, 57,* 682–713. https://doi.org/10.1007/s11162-015-9401-z

[320] Belfield, C., Jenkins, D., & Lahr, H. (2016). *Momentum: The academic and economic value of a 15-credit first semester course load for college students in Tennessee*. Community College Research Center. http://ccrc.tc.columbia.edu/media/k2/attachments/momentum-15-credit-course-load.pdf

[321] Moore, C., Shulock, N., & Offerstein, J. (2009). *Steps to success: Analyzing milestone achievement to improve community college student outcomes*. Institute for Higher Education Leadership & Policy. https://edinsightscenter.org/Portals/0/ReportPDFs/steps-to-success.pdf?ver=2016-01-15-155407-973

[322] McCormick, A. C., & Carroll, C. D. (1999). *Credit production and progress toward the bachelor's degree: An analysis of postsecondary transcripts for beginning students at 4-year institutions.* Institute of Education Sciences, National Center for Education Statistics, U.S. Department of Education. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=1999179

[323] Chen, X., & Carroll, C. D. (2005). *First generation students in postsecondary education: A look at their college transcripts*. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/pubs2005/2005171.pdf

[324] See Moore et al. (2009).

[325] Janice, A., & Voight, M. (2016). *Toward convergence: A technical guide for the postsecondary metrics framework*. Institute for Higher Education Policy. https://www.ihep.org/publication/toward-convergence-a-technical-guide-for-the-postsecondary-metrics-framework./

[326] Bailey, T., Jaggars, S. S., & Jenkins, D. (2015). *What we know about guided pathways.* Community College Research Center, Teachers College, Columbia University. https://eric.ed.gov/?id=ED562052

[327] Waugh, A. (2016). *Meta-majors. An essential first step on the path to college completion.* Jobs for the Future. https://eric.ed.gov/?id=ED567866

[328] Jenkins, D., & Cho, S. W. (2012). *Get with the program: Accelerating community college students' entry into and completion of programs of study*. Community College Research Center, Columbia University. https://eric.ed.gov/?id=ED518094

[329] Nguyen, A., Molloy, K., White, M., & Nguyen, V. (2020). Using data to identify and/or verify meta-majors. The RP Group. https://eric.ed.gov/?id=ED612043

[330] See Jenkins & Cho (2012).

[331] Janice, A., & Voight, M. (2016). *Toward convergence: A technical guide for the postsecondary metrics framework.* Institute for Higher Education Policy. https://sites.ihep.org/postsecdata/resources-reports/metrics-framework-technical-guide

[332] Moore, C., Shulock, N., & Offerstein, J. (2009). *Steps to success: Analyzing milestone achievement to improve community college student outcomes*. Institute for Higher Education Leadership & Policy. https://edinsightscenter.org/Portals/0/ReportPDFs/steps-to-success.pdf?ver=2016-01-15-155407-973

[333] Complete College America. (2012). *Remediation: Higher education's bridge to nowhere*. https://eric.ed.gov/?id=ED536825

[334] Janice, A., & Voight, M. (2016). Toward convergence: A technical guide for the postsecondary metrics framework. Institute for Higher Education Policy. https://www.ihep.org/publication/toward-convergence-a-technical-guide-for-the-postsecondary-metrics-framework/

[335] See Janice & Voight (2016).

[336] National Student Clearinghouse. (2021). Persistence and retention. https://nscresearchcenter.org/persistence-retention/

[337] Janice, A., & Voight, M. (2016). Toward convergence: A technical guide for the postsecondary metrics framework. Institute for Higher Education Policy. https://www.ihep.org/publication/toward-convergence-a-technical-guide-for-the-postsecondary-metrics-framework/

[338] Belfield, C. (2013). *The economic benefits of attaining an associate degree before transfer: Evidence from North Carolina*. Community College Research Center. https://ccrc.tc.columbia.edu/media/k2/attachments/economic-benefits-associate-degree-before-transfer.pdf

[339] Shapiro, D., Dundar, A., Ziskin, M., Chiang, Y. C., Chen, J., Harrell, A., & Torres, V. (2013). *Baccalaureate attainment: A national view of the postsecondary outcomes of students who transfer from two-year to four-year institutions*. National Student Clearinghouse. https://nscresearchcenter.org/wp-content/uploads/SignatureReport5.pdf

[340] U.S. Bureau of Labor Statistics. (2021). *Earnings and employment rates by educational attainment, 2020*. U.S. Department of Labor, Bureau of Labor Statistics. https://www.bls.gov/emp/chart-unemployment-earnings-education.htm

[341] Wassmer, R., Moore, C., & Shulock, S. (2004). Effect of racial/ethnic composition on transfer rates in community colleges: Implications for policy and practice. *Research in Higher Education, 45*, 651–672. https://doi.org/10.1023/B:RIHE.0000040267.68949.d1

[342] Campaign for College Opportunity. (2021). *Chutes or ladders? Strengthening California community college transfer so more students earn the degrees they seek*. https://collegecampaign.org/wp-content/uploads/2021/06/Chutes-or-Ladders-final-web.pdf

[343] Shapiro, D., Dundar, A., Huie, F., Wakhangu, P. K., Yuan, X., Narhan, A., & Hwang, Y. (2017). *Tracking transfer: Measures of effectiveness in helping community college students to complete bachelor's degrees*. National Student Clearinghouse. https://files.eric.ed.gov/fulltext/ED580214.pdf

[344] Hodara, M., Martinez-Wenzl, M., Stevens, D., & Mazzeo, C. (2016). Improving credit mobility for community college transfer students. *Education Northwest.* https://www.luminafoundation.org/wp-content/uploads/2017/08/improving-credit-mobility.pdf

[345] Janice, A., & Voight, M. (2016). Toward convergence: A technical guide for the postsecondary metrics framework. Institute for Higher Education Policy. https://www.ihep.org/publication/toward-convergence-a-technical-guide-for-the-postsecondary-metrics-framework/

[346] Baum, S., Holzer, H., & Luetmer, G. (2020). *Should the federal government fund short-term postsecondary certificate programs?* Urban Institute.

[347] Xu, D., & Trimble, M. (2016). What about certificates? Evidence on the labor market returns to nondegree community college awards in two states. *Educational Evaluation and Policy Analysis, 38*(2), 272–292. https://doi.org/10.3102/0162373715617827

[348] Jepsen, C., Troske, K., & Coomes, P. (2014). The labor-market returns to community college degrees, diplomas, and certificates. *Journal of Labor Economics, 32*(1), 95–121. https://doi.org/10.1086/671809

[349] Dadgar, M., & Trimble, M. J. (2015). Labor market returns to sub-baccalaureate credentials: How much does a community college degree or certificate pay? *Educational Evaluation and Policy Analysis, 37*(4), 399–418. https://doi.org/10.3102/0162373714553814

[350] Belfield, C., & Bailey, T. (2017). *The labor market returns to sub-baccalaureate college: A review a CAPSEE working paper.* Center for Analysis of Postsecondary Education and Employment. https://eric.ed.gov/?id=ED574804

[351] Long, M.C. (2010). Changes in the returns to education and college quality. *Economics of Education Review, 29*(3), 338-347. https://doi.org/10.1016/j.econedurev.2009.10.005

[352] Hout, M. (2012). Social and economic returns to college education in the United States. *Annual Review of Sociology, 38*, 379–400. http://www.collegetransitions.com/wp-content/uploads/2014/05/hout-returns-to-college-education.pdf

[353] Oreopolous, P., & Petronijevic, U. (2013). *Making college worth it: A review of research on the returns to higher education*. National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w19053/w19053.pdf

[354] Koropeckyj, S., Lafakis, C., & Ozimek, A. (2017). *The economic impact of increasing college completion*. American Academy of Arts & Sciences. https://www.amacad.org/sites/default/files/publication/downloads/CFUE_Economic-Impact.pdf

[355] U.S. Bureau of Labor Statistics. (2021). *Earnings and employment rates by educational attainment, 2020*. U.S. Department of Labor, Bureau of Labor Statistics. https://www.bls.gov/emp/chart-unemployment-earnings-education.htm

[356] Belley, P., & Lochner, L. (2007). The changing role of family income and ability in determining educational achievement. *Journal of Human Capital, 1*(1), 37–89. https://doi.org/10.1086/524674

[357] National Center for Education Statistics. (2019). *Table 302.20. Percentage of recent high school completers enrolled in college, by race/ethnicity: 1960 through 2018.* Digest of Education Statistics. Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/programs/digest/d19/tables/dt19_302.20.asp

[358] De Brey, C., Musu, L., McFarland, J., Wilkinson-Flicker, S., Diliberti, M., Zhang, A., Branstetter, C., & Wang, X. (2019). *Status and trends in the education of racial and ethnic groups 2018*. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/pubs2019/2019038.pdf

[359] Dynarski, S. M., Hemelt, S. W., & Hyman, J. M. (2015). The missing manual: Using national student clearinghouse data to track postsecondary outcomes. *Education Evaluation and Policy Analysis, 37*(1), 53S-79S. https://doi.org/10.3102/0162373715576078

[360] Deutsch, J., Johnson, M., & Gill, B. (2020). *The promotion power impacts of Louisiana high schools.* Mathematica Policy Research. https://eric.ed.gov/?id=ED607741

[361] Nagaoka, J., & Mahaffie, S. (2020). *Tracking Two-Year College Outcomes: Comparing National Student Clearinghouse and Illinois Community College Board as Sources of Two-Year College Data.* UChicago Consortium. https://consortium.uchicago.edu/sites/default/files/2020-12/Tracking%20Two-Year%20College%20Outcomes_NSC_ICCB-Dec2020-Consortium.pdf

[362] Janice, A., & Voight, M. (2016). Toward convergence: A technical guide for the postsecondary metrics framework. Institute for Higher Education Policy. https://www.ihep.org/publication/toward-convergence-a-technical-guide-for-the-postsecondary-metrics-framework/

[363] Tamborini, C. R., Kim, C. H., & Sakamoto, A. (2015). Education and lifetime earnings in the United States. *Demography*, 52(4), 1383–1407. https://dx.doi.org/10.1007%2Fs13524-015-0407-0

[364] Altonji, J. G., & Zhong, L. (2016). The labor market returns to advanced degrees. *Journal of Labor Economics, 39*(2), 303–360. https://www.journals.uchicago.edu/doi/full/10.1086/710959

[365] Newsome, M. (2019). *A few universities help black and Hispanic students reach and finish graduate school.* The Hechinger Report. https://hechingerreport.org/a-few-universities-help-black-and-hispanic-students-reach-and-finish-graduate-school/

[366] Espinosa, L. L., Turk, J. M., Taylor, M., & Chessman, H. M. (2019). *Race and ethnicity in higher education: A status report.* American Council on Education. https://www.equityinhighered.org/resources/report-downloads/

[367] Baum, S., & Steele, P. (2017). *Who goes to graduate school and who succeeds?* Urban Institute. https://www.urban.org/research/publication/who-goes-graduate-school-and-who-succeeds

[368] See Espinosa et al. (2019).

[369] National Student Clearinghouse. (2022). *Enrollment coverage workbook (June 2021).*

https://nscresearchcenter.org/workingwithourdata/

[370] Scheetz, A. (2022). *Reporting of NSC additional data elements.* National Student Clearinghouse Research Center. https://nscresearchcenter.org/wp-content/uploads/Reporting_of_NSC_Additional_Data_Elements.pdf

[371] Janice, A., & Voight, M. (2016). *Toward convergence: A technical guide for the postsecondary metrics framework.* Institute for Higher Education Policy. https://www.ihep.org/publication/toward-convergence-a-technical-guide-for-the-postsecondary-metrics-framework/

[372] Tamborini, C. R., Kim, C. H., & Sakamoto, A. (2015). Education and lifetime earnings in the United States. *Demography*, 52(4), 1383–1407. https://dx.doi.org/10.1007%2Fs13524-015-0407-0

[373] Altonji, J. G., & Zhong, L. (2016). The labor market returns to advanced degrees. *Journal of Labor Economics, 39*(2), 303–360. https://www.journals.uchicago.edu/doi/full/10.1086/710959

[374] United Stated Census Bureau. (2022). *Educational attainment in the United States: 2021.* https://www.census.gov/data/tables/2021/demo/educational-attainment/cps-detailed-tables.html

[375] Espinosa, L. L., Turk, J. M., Taylor, M., & Chessman, H. M. (2019). *Race and ethnicity in higher education: A status report.* American Council on Education. https://www.equityinhighered.org/resources/report-downloads/

[376] Scheetz, A. (2022). *Reporting of NSC additional data elements.* National Student Clearinghouse Research Center. https://nscresearchcenter.org/wp-content/uploads/Reporting_of_NSC_Additional_Data_Elements.pdf

[377] Janice, A., & Voight, M. (2016). *Toward convergence: A technical guide for the postsecondary metrics framework.* Institute for Higher Education Policy. https://www.ihep.org/publication/toward-convergence-a-technical-guide-for-the-postsecondary-metrics-framework/

[378] Hyson, M. (2004). *The emotional development of young children: Building an emotion-centered curriculum, 2nd ed*. Teachers College Press. https://eric.ed.gov/?id=ED400933

[379] Kostelnik, M. J., Soderman, A. K., Whiren, A. P., Rupiper M. L., & Gregory, K. M. (2015). *Guiding children's social development and learning: Theory and skills, 8th ed*. Cengage.

[380] Jones, D. E., Greenberg, M., & Crowley, M. (2015). Early social-emotional functioning and public health: The relationship between kindergarten social competence and future wellness. *American Journal of Public Health, 105*(11), 2283–2290. http://dx.doi.org/10.2105/AJPH.2015.302630

[381] Chernoff, J. J., Denton, K. D., McPhee, C., & Park, J. (2007). *Preschool: First findings from the third follow-up of the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B)*. National Center for Educational Statistics, Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/pubs2008/preschool3/

[382] Aratani, Y., Wight, V. R., & Cooper, J. L. (2011). *Racial gaps in early childhood: Socio-emotional health, developmental, and educational outcomes among African-American boys.* National Center for Children in Poverty, Columbia University. https://eric.ed.gov/?Id=ED522681

[383] Garcia, E. (2015). *Inequalities at the starting gate: Cognitive and noncognitive skills gaps between 2010-2011 kindergarten classmates*. Economic Policy Institute. https://eric.ed.gov/?id=ED560407

[384] Desired Results for Children and Families. (n.d.). *DRDP forms.* California Department of Social Services, Child Care and Development Division. https://www.desiredresults.us/drdp-forms

[385] Maryland State Department of Education. (2021). *Ready 4 kindergarten*. Division of Early Childhood. https://earlychildhood.marylandpublicschools.org/prek-grade-2/maryland-early-learning-framework/ready-4-kindergarten

[386] Teaching Strategies. (2022). *GOLD: Move beyond measurement.* https://teachingstrategies.com/product/gold/

[387] Virginia Kindergarten Readiness Program. (2021). *Teacher reports on self-regulation and social skills.* Center for Advanced Study of Teaching and Learning (CASTL), University of Virginia. https://vkrponline.org/virginia-kindergarten-readiness-program-2/how-it-works/the-assessments/social-skills-and-self-regulation-cbrs/

[388] Devereux Center for Resilient Children. (2022). *Devereux early childhood assessment (DECA) preschool program, 2nd edition.* https://centerforresilientchildren.org/preschool/assessments-resources/the-devereux-early-childhood-assessment-preschool-program-second-edition/

[389] Barbarin, O. A. (1993). Emotional and social development of African American children. *Journal of Black Psychology.* https://doi.org/10.1177/00957984930194001

[390] Halle, T. G., Whittaker, J. V., Zepeda, M., Rothenberg, L., Anderson, R., Daneri, P., Wessel, J., & Buysse, V. (2014). The social-emotional development of dual language learners: Looking back at existing research and moving forward with purpose. *Early Childhood Research Quarterly, 29*(4), 734–749. https://doi.org/10.1016/j.ecresq.2013.12.002

[391] Halle, T. G., & Darling-Churchill, K. E. (2016). Review of measures of social and emotional development. *Journal of Applied Developmental Psychology, 45*, 8–18. https://doi.org/10.1016/j.appdev.2016.02.003

[392] Rhode Island KIDS COUNT. (2005). *Getting ready: National School Readiness Indicators.*https://www.rikidscount.org/Portals/0/Uploads/Documents/Early%20Learning/Getting%20Ready/Executive%20Summary.pdf

[393] Office of Head Start. (2021). *Head Start Early Learning Framework*. https://eclkc.ohs.acf.hhs.gov/school-readiness/article/head-start-early-learning-outcomes-framework

[394] McClelland, M. M., Morrison, F. J., & Holmes, D. L. (2000). Children at risk for early academic problems: The role of learning-related social skills. *Early Childhood Research Quarterly, 15*(3), 307–329. https://doi.org/10.1016/S0885-2006(00)00069-7

[395] Fantuzzo, J., Perry, M. A., & McDermott, P. (2004). Preschool approaches to learning and their relationship to other relevant classroom competencies for low-income children. *School Psychology Quarterly, 19*(3), 212–230. https://doi.org/10.1521/scpq.19.3.212.40276

[396] McWayne, C. M., Fantuzzo, J. W., & McDermott, P. A. (2004). Preschool Competency in Context: An Investigation of the Unique Contribution of Child Competencies to Early Academic Success. *Developmental Psychology, 40*(4), 633–645. https://doi.org/10.1037/0012-1649.40.4.633

[397] Blair, C., & Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Development, 78*(2), 647–663. https://doi.org/10.1111/j.1467-8624.2007.01019.x

[398] Brock, L. L., Rimm-Kaufman, S. E., Nathanson, L., & Grimm, K. J. (2009). The contributions of 'hot' and 'cool' executive function to children's academic achievement, learning-related behaviors, and engagement in kindergarten. *Early Childhood Research Quarterly, 24*(3), 337–349. https://doi.org/10.1016/j.ecresq.2009.06.001

[399] See McClelland et al. (2000).

[400] Hughes, C., & Ensor, R. (2011). Individual differences in growth in executive function across the transition to school predict externalizing and internalizing behaviors and self-perceived academic success at 6 years of age. *Journal of Experimental Child Psychology, 108*(3), 663–676. https://doi.org/10.1016/j.jecp.2010.06.005

[401] García, E., & Weiss, E. (2017). Education inequalities at the school starting gate: Gaps, trends, and strategies to address them. *Economic Policy Institute*. https://eric.ed.gov/?id=ED588751

[402] Garcia, E. (2015). *Inequalities at the starting gate: Cognitive and noncognitive skills gaps between 2010-2011 kindergarten classmates*. Economic Policy Institute. https://eric.ed.gov/?id=ED560407

[403] Desired Results for Children and Families. (n.d.). *DRDP forms.* California Department of Social Services, Child Care and Development Division. https://www.desiredresults.us/drdp-forms

[404] Teaching Strategies. (2022). *GOLD: Move beyond measurement.* https://teachingstrategies.com/product/gold/

[405] Virginia Kindergarten Readiness Program. (2021). *Teacher reports on self-regulation and social skills.* Center for Advanced Study of Teaching and Learning (CASTL), University of Virginia. https://vkrponline.org/virginia-kindergarten-readiness-program-2/how-it-works/the-assessments/social-skills-and-self-regulation-cbrs/

[406] Oregon State University. (2022). *Head-toes-knees-shoulders (HTKS) measure of self-regulation.* The Kindergarten Readiness Research Program. https://health.oregonstate.edu/labs/kreadiness/measure

[407] Reflection Sciences. (2020). *Minnesota executive function scale (MEFS).* https://reflectionsciences.com/mefs/

[408] D'Amato, R. C., Fetcher-Janzen, E., & Reynolds, C. R. (Eds.). (2005). *Handbook of school neuropsychology.* John Wiley. https://psycnet.apa.org/record/2005-08811-000

[409] Weisenfeld, G. G. (2017). *Assessment tools used in kindergarten entry assessments (KEAs) state scan.* Center on Enhancing Early Learning Outcomes. https://eric.ed.gov/?id=ED582674

[410] Rhode Island KIDS COUNT. (2005). *Getting ready: National School Readiness Indicators.*https://www.rikidscount.org/Portals/0/Uploads/Documents/Early%20Learning/Getting%20Ready/Executive%20Summary.pdf

[411] Office of Head Start. (2021). *Head Start Early Learning Framework*. https://eclkc.ohs.acf.hhs.gov/school-readiness/article/head-start-early-learning-outcomes-framework

[412] Sattelmair, J., & Ratey, J. J. (2009). Physically active play and cognition: An academic matter. In Board of Trustees of the University of Illinois (Eds.), *American Journal of Play* (pp. 365–374). University of Illinois.

[413] Wilson, A., Piek, J. P., & Kane, R. (2013). The mediating role of social skills in the relationship between motor ability and internalizing symptoms in pre-primary children. *Infant and Child Development, 22*(2), 151–164. http://doi.org/10.1002/icd.1773

[414] Harter, S., & Pike, R. (1984). The pictorial scale of perceived competence and social acceptance for young children. *Child Development, 55*(6), 1969–1982. http://doi.org/10.2307/1129772

[415] Pagani, L. S., & Messier, S. (2012). Links between motor skills and indicators of school readiness at kindergarten entry in urban disadvantaged children. *Journal of Educational and Developmental Psychology, 2*(1), 95–107. http://doi.org/10.5539/jedp.v2n1p95

[416] Skinner, R. A., & Piek, J. P. (2001). Psychosocial implications of poor motor coordination in children and adolescents. *Human Movement Science, 20*(1–2), 73–94. https://doi.org/10.1016/s0167-9457(01)00029-x

[417] Grissmer, D., Grimm, K. J., Aiyer, S. M., Murrah, W. M., & Steele, J. S. (2010). Fine motor skills and early comprehension of the world: Two new school readiness indicators. *Developmental Psychology, 46*(5), 1008–1017.

[418] Son, S. H., & Meisels, S. J. (2006). The relationship of young children's motor skills to later reading and math achievement. *Merrill-Palmer Quarterly,* 52(4), 755–778. https://www.jstor.org/stable/23096032

[419] Bowman, O. J., & Wallace, B. (1990). The effects of socioeconomic status on hand size and strength, vestibular function, visuomotor integration, and praxis in preschool children. *American Journal of Occupational Therapy, 44,* 610–621. https://doi.org/10.5014/ajot.44.7.610

[420] West, J., Denton, K., & Germino-Hausken, E. (2000). *America's kindergartners: Findings from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99: Fall 1998* (NCES Publication No. 2000-605). Office of Educational Research and Improvement, U.S. Department of Education. https://eric.ed.gov/?q=sample&pg=8280&id=ED438089

[421] McPhillips, M., & Jordan-Black, J. A. (2007). The effect of social disadvantage on motor development in young children: a comparative study. *Journal of Child Psychology and Psychiatry, 48*(12), 1214–1222. https://doi.org/10.1111/j.1469-7610.2007.01814.x

[422] Desired Results for Children and Families. (n.d.). *DRDP forms.* California Department of Social Services, Child Care and Development Division. https://www.desiredresults.us/drdp-forms

[423] Maryland State Department of Education. (2021). *Ready 4 kindergarten*. Division of Early Childhood. https://earlychildhood.marylandpublicschools.org/prek-grade-2/maryland-early-learning-framework/ready-4-kindergarten

[424] Teaching Strategies. (2022). *GOLD: Move beyond measurement.* https://teachingstrategies.com/product/gold/

[425] Folio, M.R., & Fewell, R.R. (2000). *Peabody developmental motor scales, 2nd edition.* Pearson. https://www.pearsonassessments.com/store/usassessments/en/Store/Professional-Assessments/Motor-Sensory/Peabody-Developmental-Motor-Scales-%7C-Second-Edition/p/100000249.html

[426] Rhode Island KIDS COUNT. (2005). *Getting ready: National School Readiness Indicators.*https://www.rikidscount.org/Portals/0/Uploads/Documents/Early%20Learning/Getting%20Ready/Executive%20Summary.pdf

[427] Office of Head Start. (2021). *Head Start Early Learning Framework*. https://eclkc.ohs.acf.hhs.gov/school-readiness/article/head-start-early-learning-outcomes-framework

[428] Moffitt, T. E., Arsenault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., Houts, R., Poulton, R., Roberts, B. W., Ross, S., Sears, M. R., Murray Thomson, W., & Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences of the United States of America, 108*(7), 2693–2698. https://doi.org/10.1073/pnas.1010076108

[429] Claro, S., & Loeb, S. (2019). *Self-management skills and student achievement gains: Evidence from California's CORE districts.* Policy Analysis for California Education, Stanford University. https://eric.ed.gov/?id=ED600478

[430] Kautz, T., Feeney, K., Chiang, H., Lauffer, S., Barlett, M., & Tilley, C. (2021). *Using a survey of social and emotional learning and school climate to inform decision making.* Regional Educational Laboratories, Mid-Atlantic. Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/rel/Project/6706

[431] See Claro & Loeb (2019).

[432] Brunh, A., Mcdaniel, S., & Kreigh, C. (2015). Self-Monitoring Interventions for Students with Behavior Problems: A Systematic Review of Current Research. *Behavioral Disorders*, 40(2), 102-121. https://doi.org/10.17988/BD-13-45.1

[433] CORE Districts. (2021a). *Social-emotional learning, well-being, & school culture.* CORE survey data: Hearing from our students, staff, and families. https://coredistricts.org/our-improvement-data/social-emotional-learning-well-being-and-school-culture/

[434] Stanford University. (n.d-a) *The shift-and-persist scale (child).* SPARQtools. http://sparqtools.org/mobility-measure/shift-and-persist-child/

[435] Stanford University. (n.d-b). *Shift and persist (teen, adult).* SPARQtools. http://sparqtools.org/mobility-measure/shift-and-persist-teen-adult/

[436] Transforming Education. (2016). *Measuring MESH: Student and teacher surveys curated for the CORE Districts*. https://transformingeducation.org/resources/measuring-mesh/

[437] West, M. R., Buckley, K., Bartolino Krachman, S., & Bookman, N. (2018). Development and implementation of student social-emotional surveys in the CORE Districts. *Journal of Applied Developmental Psychology, 55*, 119–129. https://doi.org/10.1016/j.appdev.2017.06.001

[438] Boon-Falleur, M., Bouguen, A., Charpentier, A., Algan, Y., Huillery, E., & Chevallier, C. (2022). Simple questionnaires outperform behavioral tasks to measure socio-emotional skills in students. *Scientific Reports, 12*(442). https://doi.org/10.1038/s41598-021-04046-5

[439] CORE Districts. (2021b). *Student social-emotional learning.* https://coredistricts.org/our-improvement-data/improvement-measures/

[440] See West et al. (2018).

[441] Liu Sun, K. (2018). The Role of Mathematics Teaching in Fostering Student Growth Mindset. *Journal for Research in Mathematics Education*, 49(3), 330-355. https://doi.org/10.5951/jresematheduc.49.3.0330

[442] Claro, S., & Loeb, S. (2019). *Self-management skills and student achievement gains: Evidence from California's CORE districts.* Policy Analysis for California Education, Stanford University. https://eric.ed.gov/?id=ED600478

[443] Yeager, D. S., Hanselman, P., Walton, G. M., Murray, J. S., Crosnoe, R., Muller, C., Tipton, E., Schneider, B., Hulleman, C. S., Hinojosa, C. P., Paunesku, D., Romero, C., Flint, K., Roberts, A., Trott, J., Iachan, R., Buontempo, J., Man Yang, S., Carvalho, C. M....Dweck, C. S. (2019). A national experiment reveals where a growth mindset improves achievement. *Nature, 573*, 364–369. https://doi.org/10.1038/s41586-019-1466-y

[444] Paunesku, D., Walton, G. M., Romero, C., Smith, E. M., Yeager, D. S., & Dweck, C. S. (2015). Mindset interventions are a scalable treatment for academic underachievement. *Psychological Science, 26*(6), 784–789. https://doi.org/10.1177/0956797615571017

[445] Sriram, R. (2014). Rethinking intelligence: The role of mindset in promoting success for academically high-risk students. *Journal of College Student Retention: Research, Theory, & Practice, 15*(4), 515–536. https://doi.org/10.2190/CS.15.4.c

[446] Boaler, J., Dieckmann, J. A., Perez-Nunez, G., Liu Sun, K., & Williams, C. (2018). *Changing students minds and achievement in mathematics: The impact of a free online student course.* Frontiers in Education. https://doi.org/10.3389/feduc.2018.00026

[447] Broda, M., Yun, J., Schneider, B., Yeager, D. S., Walton, G. M., & Diemer, M. (2018). Reducing inequality in academic success for incoming college students. A randomized trial of growth mindset and belonging interventions. *Journal of Research on Educational Effectiveness*, 11(3), 317-338. https://doi.org/10.1080/19345747.2018.1429037

[448] Sisk, V. F., Burgoyne, A. P., Sun, J., Butler, J. L., & Macnamara, B. N. (2018). To what extent and under which circumstances are growth mind-sets important to academic achievement? Two meta-analyses. *Psychological Science*, 29(4), 549–571. https://doi.org/10.1177/0956797617739704

[449] Aronson, J., Fried, C. B., & Good, C. (2002). Reducing the effects of stereotype threat on African American college students by shaping theories of intelligence. *Journal of Experimental Social Psychology, 3*(2), 113-125. https://doi.org/10.1006/jesp.2001.1491

[450] See Yeager et al. (2019).

[451] See Broda et al. (2018).

[452] Brez, C., Hampton, E. M., Behrendt, L., Brown, L., & Powers, J. (2020). Failure to replicate: Testing a growth mindset intervention for college student success. *Basic and Applied Social Psychology*, 42(6), 460-468. https://doi.org/10.1080/01973533.2020.1806845

[453] CORE Districts. (2021a). *Social-emotional learning, well-being, & school culture.* CORE survey data: Hearing from our students, staff, and families. https://coredistricts.org/our-improvement-data/social-emotional-learning-well-being-and-school-culture/

[454] Dweck, C. (n.d.). *Growth mindset scale.* Stanford University. https://sparqtools.org/mobility-measure/growth-mindset-scale/

[455] See Dweck (n.d.).

[456] CORE Districts. (2021b). *Student social-emotional learning.* https://coredistricts.org/our-improvement-data/improvement-measures/

[457] Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin, 120*(2), 261–288. https://doi.org/10.1037/0033-2909.130.2.261

[458] Cikrikci, O. (2017). The effect of self-efficacy on student achievement. *The Factors Effecting Student Achievement.* https://doi.org/10.1007/978-3-319-56083-0_6

[459] Claro, S., & Loeb, S. (2019). *Self-management skills and student achievement gains: Evidence from California's CORE districts.* Policy Analysis for California Education, Stanford University. https://eric.ed.gov/?id=ED600478

[460] Lin, L., Lee, T., & Anderson Snyder, L. (2018). Math self-efficacy and STEM intentions: a person-centered approach. *Frontiers in Psychology*, 9. https://doi.org/10.3389/fpsyg.2018.02033

[461] Parker, P. D., Marsh, H. W., Ciarrochi, J., Marshall, S., & Abdulijabbar, A. S. (2014). Juxtaposing math self-efficacy and self-concept as predictors of long-term achievement outcomes. *Educational Psychology*, 34(1), 29-48. https://doi.org/10.1080/01443410.2013.797339

[462] West, M. R., Buckley, K., Bartolino Krachman, S., & Bookman, N. (2018). Development and implementation of student social-emotional surveys in the CORE Districts. *Journal of Applied Developmental Psychology*, 55, 119–129. https://doi.org/10.1016/j.appdev.2017.06.001

[463] CORE Districts. (2021a). *Social-emotional learning, well-being, & school culture.* CORE survey data: Hearing from our students, staff, and families. https://coredistricts.org/our-improvement-data/social-emotional-learning-well-being-and-school-culture/

[464] Stanford University. (n.d-c). *New general self-efficacy scale.* SPARQtools. https://sparqtools.org/mobility-measure/new-general-self-efficacy-scale/

[465] PERTS (2021). *Ascend: Measures Summary.* https://docs.google.com/document/d/1zHlJjWDZopaAnmPpKtFgz3-JXjIwONhcgflDroAzh_c/edit#heading=h.glbllmpxzs6z

[466] CORE Districts. (2021b). *Student social-emotional learning.* https://coredistricts.org/our-improvement-data/improvement-measures/

[467] Jones, D. E., Greenberg, M., & Crowley, M. (2015). Early social-emotional functioning and public health: The relationship between kindergarten social competence and future wellness. *American Journal of Public Health, 105*(11), 2283–2290. http://dx.doi.org/10.2105/AJPH.2015.302630

[468] Kautz, T., Feeney, K., Chiang, H., Lauffer, S., Barlett, M., & Tilley, C. (2021). *Using a survey of social and emotional learning and school climate to inform decision making.* Regional Educational Laboratories, Mid-Atlantic. Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/rel/Project/6706

[469] West, M. R., Pier, L., Fricke, H., Hough, H., Loeb, S., Meyer, R. H., & Rice, A. B. (2020). Trends in student social emotional learning: Evidence from the CORE districts. *Educational Evaluation and Policy Analysis.* https://doi.org/10.3102/0162373720912236

[470] Lippman, L. H., Ryberg, R., Carney, R., & Moore, K. A. (2015). *Workforce connections: Key "soft skills" that foster youth workforce success: Toward a consensus across fields.* Child Trends. https://www.childtrends.org/publications/key-soft-skills-that-foster-youth-workforce-success-toward-a-consensus-across-fields

[471] CORE Districts. (2021a). *Social-emotional learning, well-being, & school culture.* CORE survey data: Hearing from our students, staff, and families. https://coredistricts.org/our-improvement-data/social-emotional-learning-well-being-and-school-culture/

[472] Elliott, S. N. *The social skills rating system.* https://pearsonclinical.in/solutions/social-skills-rating-system-ssrs/

[473] National Work Readiness Council. (2021). *National Work Readiness Credential.* https://www.nwrc.org/national-work-readiness-credential

[474] CORE Districts. (2021b). *Student social-emotional learning.* https://coredistricts.org/our-improvement-data/improvement-measures/

[475] Johnson, M., Bashay, M., & Bergson-Shilcock, A. (2019). *The roadmap for racial equity. An imperative for workforce development advocates.* National Skills Coalition. https://eric.ed.gov/?id=ED603236

[476] Lippman, L. H., Ryberg, R., Carney, R., & Moore, K. A. (2015). *Workforce connections: Key "soft skills" that foster youth workforce success: Toward a consensus across fields.* Child Trends. https://www.childtrends.org/publications/key-soft-skills-that-foster-youth-workforce-success-toward-a-consensus-across-fields

[477] Horowitz, J. M., Brown, A., & Cox, K. (2019). *Race in America 2019.* Pew Research Center. https://www.pewresearch.org/social-trends/2019/04/09/race-in-america-2019/

[478] Territorium. (2022). *HEIghten: Demonstrate and measure critical skills levels.* https://territorium.com/heighten/

[479] Intercultural Development Inventory (IDI). (2022). *The roadmap to intercultural competence using the IDI.* https://idiinventory.com/

[480] See IDI (2022).

[481] American Association of Colleges and Universities. (2022a). *VALUE rubrics.* https://www.aacu.org/initiatives/value-initiative/value-rubrics

[482] CORE Districts. (2021a). *Social-emotional learning, well-being, & school culture.* CORE survey data: Hearing from our students, staff, and families. https://coredistricts.org/our-improvement-data/social-emotional-learning-well-being-and-school-culture/

[483] National Research Council. (2012). *Key national education indicators: Workshop summary.* The National Academies Press. https://doi.org/10.17226/13453

[484] Anderson, T., Blount, D., Lindsay, C., Blom, E., Gebrekristos, S., & Alba, F. (2019). *Robust and equitable measures to identify quality schools (REMIQS).* The Urban Institute. https://www.urban.org/sites/default/files/2019/04/15/remiqs-detailed-model-final.pdf

[485] Thoits, P. A., & Hewitt, L. N. (2001). Volunteer Work and Well-Being. *Journal of Health and Social Behavior, 42,* 115–131. https://doi.org/10.2307/3090173

[486] Van Goethem, A., van Hoof, A., Orobio de Castro, B., Van Aken, M., & Hart, D. (2014). The role of reflection in the effects of community service on adolescent development: A meta-analysis. *Child Development, 85*(6), 2114–21130. https://doi.org/10.1111/cdev.12274

[487] Lundberg, K. (2021). *Despite pandemic, civically engaged youth report higher well-being.* Center for Information & Research on Civic Learning and Engagement, Tufts University. https://circle.tufts.edu/latest-research/despite-pandemic-civically-engaged-youth-report-higher-well-being

[488] Foster-Bey, J. (2008). Do race, ethnicity, citizenship, and socio-economic status determine civic engagement? Center for Information & Research on Civic Learning & Engagement (CIRCLE). https://eric.ed.gov/?id=ED505266

[489] Syvertsen, A. K., Wray-Lake, L., & Metzger, A. (2015). *Youth civic and character measures toolkit.* Search Institute. https://www.researchgate.net/publication/286457343_Youth_Civic_and_Character_Measures_Toolkit

[490] Keeter, S., Jenkins, K., Zukin, C., & Andolina, M. (2003). *Three core measures of community-based civic engagement: Evidence from the youth civic engagement indicators project*. Child Trends. https://www.semanticscholar.org/paper/Three-Core-Measures-of-Community-Based-Civic-from-Keeter/c1bbd1bff61a5b61b648d86b818d03a9f76b6fd4

[491] Andolina, M., Keeter, S., Zukin, C., & Jenkins, K. (2003). *A guide to the index of civic and political engagement.* https://www.researchgate.net/publication/267399505_A_guide_to_the_index_of_civic_and_political_engagement

[492] Postsecondary Value Commission. (2021). *Equitable value: Promoting economic mobility and social justice through postsecondary education.* Institute for Higher Education Policy. https://postsecondaryvalue.org/reports/

[493] University of California Irvine. (2021). *Next generation undergraduate success measurement project framework*. https://education.uci.edu/next-gen-ug-success-project.html

[494] Turner, M. A., Acs, G., Brown, S., Solari, C. D., & Fudge, K. (2020). *Boosting upward mobility: Metrics to inform local action summary.* Urban Institute. https://www.urban.org/research/publication/boosting-upward-mobility-metrics-inform-local-action-summary

[495] Race Counts. (n.d.). *Economic opportunity*. https://www.racecounts.org/issue/economic/

[496] National Research Council. (2012). *Key national education indicators: Workshop summary.* The National Academies Press. https://doi.org/10.17226/13453

[497] Brown, M., Setren, E., & Topa, G. (2016). Do informal referrals lead to better matches? Evidence from a firm's employee referral system. Journal of Labor Economics, 34(1), 161–209. https://doi.org/10.1086/682338

[498] National Conference on Citizenship. (2012). *Civic health and unemployment: Can engagement strengthen the economy?* https://ncoc.org/research-type/civic-health-and-unemployment/

[499] Moren-Cross, J. L., & Lin, N. (2006). Social networks and health. Handbook of aging and the social sciences, pp. 111–126. Elsevier. https://doi.org/10.1016/B978-012088388-2/50010-9

[500] Parks-Yancy, R. (2006). The effects of social group membership and social capital resources on careers. Journal of Black Studies, 36(4), 515–545. https://doi.org/10.1177/0021934704273501

[501] Search Institute. (2022). *Social capital assessment + learning for equity (SCALE) measures.* https://searchinstitute.org/resources-hub/social-capital-assessment-learning-for-equity-scale-measures

[502] Putnam, R. D. (2019). Social Capital Community Benchmark Survey, 2000. https://doi.org/10.17605/OSF.IO/UWMRJ

[503] Charania, M., & Freeland Fisher, J. (2020). *The missing metrics: Emerging practices for measuring students' relationships and networks.* Christensen Institute. https://files.eric.ed.gov/fulltext/ED607287.pdf

[504] Chetty, R., Hendren, N., Kline, P., & Saez, E. (2014). Where is the land of opportunity? The geography of intergenerational mobility in the United States. *The Quarterly Journal of Economics, 129*(4), 1553–1623. https://doi.org/10.1093/qje/qju022

[505] Rupasingha, A., Goetz, S. J. (2007). Social and political forces as determinants of poverty: A spatial analysis. *Agricultural Economics, Sociology and Education*, 36(4), 650-671. https://doi.org/10.1016/j.socec.2006.12.021

[506] National Research Council. (2012). *Key national education indicators: Workshop summary.* The National Academies Press. https://doi.org/10.17226/13453

[507] Reinert, M., Fritze, D., & Nguyen, T. (2021). *The state of mental health in America 2022.* Mental Health America. https://archive.hshsl.umaryland.edu/handle/10713/17070

[508] Keyes, K. M., Gary, D., O'Malley, P. M., Hamilton, A., & Schulenberg. (2019). Recent increases in depressive symptoms among U.S. adolescents: Trends from 1991 to 2018. *Social Psychiatry and Psychiatric Epidemiology, 54*, 987–996. https://doi.org/10.1007/s00127-019-01697-8

[509] Mojtabai, R., Olfson, M., & Han, B. (2016). National trends in the prevalence and treatment of depression in adolescents and young adults. *Pediatrics, 138*(6), https://doi.org/10.1542/peds.2016-1878

[510] Mullen, S. (2018). Major depressive disorder in children and adolescents. *Mental Health Clinician, 8*(6), 275–283. https://doi.org/10.9740/mhc.2018.11.275

[511] Office of Head Start. (2014). *Birth to 5: Watch me thrive! A compendium of screening measures for young children.* https://eclkc.ohs.acf.hhs.gov/publication/birth-5-watch-me-thrive-compendium-screening-measures-young-children

[512] National Center on Safe and Supportive Learning Environments. (2022). *Mental health screening tools for grades K–12.* American Institute for Research (AIR). https://safesupportivelearning.ed.gov/information-and-tools-promote-student-mental-health

[513] Stanford University. (n.d-d). *Psychological wellbeing scale.* SPARQtools. https://sparqtools.org/mobility-measure/psychological-wellbeing-scale/

[514] See National Center on Safe and Supportive Learning Environments (2022).

[515] StriveTogether. (2021). *A guide to racial and ethnic equity systems indicators.* https://www.strivetogether.org/wp-content/uploads/2021/09/A-guide-to-racial-and-ethnic-equity-systems-indicators.pdf

[516] National Center for Chronic Disease Prevention and Health Promotion. (n.d.) *Health and academic achievement.* U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion. https://www.cdc.gov/healthyyouth/health_and_academics/pdf/health-academic-achievement.pdf

[517] Hummer, R. A., & Hernandez, E. M. (2013). The effect of educational attainment on adult mortality in the United States. *Population Bulletin, 68*(1), 1–16. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4435622/

[518] Arias, E., Tejada-Vera, B., Ahmad, F., & Kochanek, K. D. (2021). *Provisional life expectancy estimates for 2020.* Centers for Disease Control and Prevention. https://dx.doi.org/10.15620/cdc:100392

[519] Perry, A. M., Romer, C., & Barr, A. (2021). *Why is life expectancy so low in Black neighborhoods?* Brookings Institute. https://www.brookings.edu/blog/the-avenue/2021/12/20/why-is-life-expectancy-so-low-in-black-neighborhoods/

[520] California Healthy Kids Survey. (2021). Physical health and nutrition module. California Department of Education. https://calschls.org/site/assets/files/1103/hs-physhealth-2122_final.pdf

[521] Stanford University. (n.d-e.). *Self-rated health.* SPARQtools. https://sparqtools.org/mobility-measure/self-rated-health/

[522] Stanford University. (n.d-f.). *Health-related quality of life scale*. SPARQtools. https://sparqtools.org/mobility-measure/health-related-quality-of-life-scale/

[523] Sylvia, L. G., Bernstein, E. E., Hubbard, J. L., Keating, L., & Anderson, E. J. (2014). Practical guide to measuring physical activity. *Journal of the Academy of Nutrition and Dietetics, 114*(2), 199–208. https://doi.org/10.1016/j.jand.2013.09.018

[524] Jones, C. (2020). *Plan to cut PE test—and its body-fat measurement—in California sparks debate*. EdSource. https://edsource.org/2020/newsoms-plan-to-eliminate-p-e-test-sparks-debate-about-body-fat-measurements/624303

[525] Turner, M. A., Acs, G., Brown, S., Solari, C. D., & Fudge, K. (2020). *Boosting upward mobility: Metrics to inform local action summary.* Urban Institute. https://www.urban.org/research/publication/boosting-upward-mobility-metrics-inform-local-action-summary

[526] Chicago Public Schools. (2020). *Chicago Public Schools announces 97.5 percent of seniors submitted concrete post-secondary plan as part of Learn.Plan.Succeed.* https://www.cps.edu/press-releases/chicago-public-schools-announces-97.5-percent-of-seniors-submitted-concrete-post-secondary-plan-as-part-of-learn.plan.succeed/

[527] Department of Defense. (2022). *Servicemembers Civil Relief Act (SCRA) website.* https://scra-e.dmdc.osd.mil/scra/#/home

[528] Reyna, R., & Norton, L. (2020). *From tails to heads: Building momentum for postsecondary success*. Education Strategy Group. https://edstrategy.org/resource/from-tails-to-heads/

[529] Clearinghouse for Labor Evaluation and Research. (2013a). *Evidence on the effectiveness of career academies for high school students*. https://clear.dol.gov/topic-area/career-academies

[530] Carnevale, A. P., Garcia, T. I., Ridley, N., Quinn, M. C. (2020). *The overlooked value of certificates and associate's degrees: What students need to know before they go to college*. https://cew.georgetown.edu/cew-reports/subba/

[531] Ositelu, M. O., McCann, C., & Laitinen, A. (2021). The short-term credentials landscape. New America. https://www.newamerica.org/education-policy/reports/the-short-term-credentials-landscape/

[532] Kreisman, D., & Stange, K. (2017). *Vocational and career tech education in American high schools: The value of depth over breadth.* National Bureau of Economic Research. https://www.nber.org/papers/w23851

[533] Dougherty, S. M. (2016). *Career and technical education in high school: Does it improve student outcomes?* Thomas Fordham Institute. https://eric.ed.gov/?id=ED570132

[534] Perkins Collaborative Resource Network. *Perkins IV*. https://cte.ed.gov/legislation/about-perkins-iv#:~:text=Perkins%20Career%20and%20Technical%20Education,education%20programs%20across%20the%20nation.

[535] Mokher, C. (2011). *Aligning career and technical education with high-wage and high-demand occupations in Tennessee.* Regional Educational Laboratories, Appalachia, Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=242&display=1

[536] Maryland State Department of Education. (n.d.) *Career and Technical Education (CTE) Progression in Maryland Public Schools and Community Colleges.* https://www.mdctedata.org/dashboards/progression.php

[537] Anderson, T., Blount, D., Lindsay, C., Blom, E., Gebrekristos, S., & Alba, F. (2019). *Robust and equitable measures to identify quality schools (REMIQS).* The Urban Institute. https://www.urban.org/sites/default/files/2019/04/15/remiqs-detailed-model-final.pdf

[538] Reyna, R., & Norton, L. (2020). *From tails to heads: Building momentum for postsecondary success*. Education Strategy Group, https://edstrategy.org/resource/from-tails-to-heads/

[539] Carnevale, A. P., Strohl, J., Gulish, A., Van Der Werf, M., & Campbell, P. C. (2019). *The unequal race for good jobs: How Whites made outsized gains in education and good jobs compared to Blacks and Latinos.* Georgetown University Center on Education and the Workforce. https://cew.georgetown.edu/wp-content/uploads/ES-The_Unequal_Race_for_Good_Jobs.pdf

[540] Council of Chief State School Officers. (2018). *Credential currency: How states can identify and promote credentials of value.* https://ccsso.org/resource-library/credential-currency-how-states-can-identify-and-promote-credentials-value

[541] Grossman, J., Kato, L., Mallon, T., Maguire, S., & Conway, M. (2015). *The value of credentials for disadvantaged workers: Findings from the sector employment impact study.* Aspen Institute. https://doi.org/10.13140/RG.2.1.2637.4005

[542] Lumina Foundation. (2015). *Connecting credentials: Making the case for reforming the U.S. credentialing system*. https://www.luminafoundation.org/resource/connecting-credentials-making-the-case/

[543] ExcelinEd. (2021). *Credentials matter. Report 1: A national landscape of high school student credential attainment compared to workforce demand.* Carnegie Corporation. https://www.carnegie.org/publications/credentials-matter-report-1-national-landscape-high-school-student-credential-attainment-compared-workforce-demand/

[544] See ExcelinEd (2021).

[545] Education Strategy Group, Advance–CTE, & Council of Chief State Education Officers. (2018). *Credential currency: How states can identify and promote credentials of value*. https://ccsso.org/resource-library/credential-currency-how-states-can-identify-and-promote-credentials-value

[546] See ExcelinEd (2021).

[547] Association for Career and Technical Education & Advance CTE. (2017). *State policies impacting CTE: 2017 year in review*. https://careertech.org/resource/2017-state-policies-impacting-cte

[548] U.S. Department of Labor. (2018). *WIOIA performance indicators and measures.* Employment and Training Administration. https://www.dol.gov/agencies/eta/performance/performance-indicators

[549] Cotner, H., Bragg, D., Goold, G., Heiser, E., Miller, D. G., & Van Noy, M. (2021). *Designing and delivering career pathways at community colleges. A practice guide for educators.* What Works Clearinghouse, Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/PracticeGuide/27

[550] American Association of Colleges and Universities. (2022b). *High-impact practices.* https://www.aacu.org/trending-topics/high-impact

[551] Deutsch, J. Allison-Clark, K., & Yanez, A. (2021). A research evidence scan of key strategies related to WIOA. Mathematica Policy Research. https://eric.ed.gov/?id=ED614830

[552] Reed, D., Yung-Hsu Liu, A., & Kleinman, R. (2012). *An effectiveness assessment and cost-benefit analysis of registered apprenticeship in 10 states.* Mathematica. https://www.mathematica.org/publications/an-effectiveness-assessment-and-costbenefit-analysis-of-registered-apprenticeship-in-10-states

[553] Hanks, A., McGrew, A., Zessoules, D. (2018). *The apprenticeship wage and participation gap.* Center for American Progress. https://www.americanprogress.org/article/apprenticeship-wage-participation-gap/

[554] Hora, M., Colston, J., Chen, Z., & Pasqualone, A. (2021). National survey of college internships (NSCI) 2021 report. University of Wisconsin. https://ccwt.wceruw.org/the-national-survey-of-college-internships-nsci/

[555] Center for Postsecondary and Economic Success at CLASP. (2013). *A framework for measuring career pathways innovation: A working paper.* Alliance for Quality Career Pathways. https://www.clasp.org/sites/default/files/public/resources-and-publications/files/CLASP-AQCP-Metrics-Feb-2013.pdf

[556] Bill & Melinda Gates Foundation. (n.d.). *Pathways driver diagram.*

[557] Lei, H., Xiong, Y., Chiu, M. M., Zhang, J., & Cai, Z. (2021). The relationship between ICT literacy and academic achievement among students: A meta-analysis. *Children and Youth Services Review, 127.* https://doi.org/10.1016/j.childyouth.2021.106123

[558] Ritzhaupt, A. D., Liu, F., Dawson, K., Barron, A. E. (2013). Differences in student information and communication technology literacy based on socio-economic status, ethnicity, and gender: Evidence of a digital divide in Florida schools. *Journal of Research on Technology in Education, 45*(4), 291–307. https://doi.org/10.1080/15391523.2013.10782607

[559] Tichavakunda, A. A., & Tierney, W. G. (2018). The "wrong" side of the divide: Highlighting race for equity's sake. *The Journal of Negro Education, 87*(2), 110–124. https://www.jstor.org/stable/10.7709/jnegroeducation.87.2.0110

[560] Covello, S. (2010). *A review of digital literacy assessment instruments.* Syracuse University. https://www.academia.edu/7935447/A_Review_of_Digital_Literacy_Assessment_Instruments

[561] Hohlfeld, T. N., Ritzhaupt, A. D., & Barron, A. E. (2010). Development and validation of the student tool for technology literacy (ST2L). *Journal of Research on technology in Education, 42*(4), 361–389. https://doi.org/10.1080/15391523.2010.10782556

[562] Organization for Economic Development. (n.d.). *Education & skills online assessment.* https://www.oecd.org/skills/ESonline-assessment/

[563] Lei, J., & Zhao, Y. (2005). Technology uses and student achievement: A longitudinal study. *Computers & Education, 49*(2), 284–296. https://doi.org/10.1016/j.compedu.2005.06.013

[564] Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010). Generation m2: Media in the lives of 8- to 18-year-olds. Kaiser Family Foundation. https://eric.ed.gov/?id=ED527859

[565] Walsh, J. L., Fielder, R. L., Carey, K. B., & Carey, M. P. (2013). Female college students' media use and academic outcomes: Results from a longitudinal cohort study. *Emerging Adulthood, 1*(3), 219–232. https://doi.org/10.1177/2167696813479780

[566] Hurwitz, L. B., & Schmitt, K. L. (2020). Can children benefit from early internet exposure? Short- and long-term links between internet use, digital skill, and academic performance. *Computers & Education, 146*, 103750. https://doi.org/10.1016/j.compedu.2019.103750

[567] Bill & Melinda Gates Foundation. (2020). *P-16 framework.* https://usprogram.gatesfoundation.org/who-we-are/p16-framework

[568] Anderson, T., Blount, D., Lindsay, C., Blom, E., Gebrekristos, S., & Alba, F. (2019). *Robust and equitable measures to identify quality schools (REMIQS).* The Urban Institute. https://www.urban.org/sites/default/files/2019/04/15/remiqs-detailed-model-final.pdf

[569] Rios, J. A., Ling, G., Pugh, R., Becker, D., & Bacall, A. (2020). Identifying critical 21st-century skills for workplace success: A content analysis of job advertisements. *Educational Researcher*. https://doi.org/10.3102/0013189X19890600

[570] World Economic Forum. (2016). *The future of jobs: Employment, skills, and workforce strategy for the fourth industrial revolution.* https://reports.weforum.org/future-of-jobs-2016/

[571] Gray, K. (2021). *Competencies: Employers weigh importance versus new grad proficiency.* National Association of Colleges and Employers. https://www.naceweb.org/career-readiness/competencies/competencies-employers-weigh-importance-versus-new-grad-proficiency/

[572] Zahner, D., & Lehrfeld, J. (2018). *Employers' and advisors' assessments of the importance of critical thinking and written communication skills post-college.* Council for Aid to Education. http://hdl.voced.edu.au/10707/569929

[573] Lippman, L. H., Ryberg, R., Carney, R., & Moore, K. A. (2015). *Workforce connections: Key "soft skills" that foster youth workforce success: Toward a consensus across fields.* Child Trends. https://www.childtrends.org/publications/key-soft-skills-that-foster-youth-workforce-success-toward-a-consensus-across-fields

[574] Education Commission of the States. (2019a). *50-state comparison: High school graduation requirements.* https://www.ecs.org/high-school-graduation-requirements/

[575] American Association of Colleges and Universities. (2022c) *Essential learning outcomes.* https://www.aacu.org/initiatives/value-initiative/essential-learning-outcomes

[576] Council for Aid to Education. (2022). *Solutions*.

[577] See Council for Aid to Education (2022).

[578] See Council for Aid to Education (2022).

[579] Territorium. (2022). *HEIghten: Demonstrate and measure critical skills levels.* https://territorium.com/heighten/

[580] National Work Readiness Council. (2021). *National Work Readiness Credential.* https://www.nwrc.org/national-work-readiness-credential

[581] American Association of Colleges and Universities. (2022a). *VALUE rubrics.* https://www.aacu.org/initiatives/value-initiative/value-rubrics

[582] Grogger, J. (2011). Speech patterns and racial wage inequality. *The Journal of Human Resources, 46*(1), 1–25. https://www.jstor.org/stable/25764802

[583] Arum, R., Eccles, J. S., Heckhausen, J., Orona, G. A., von Keyserlingk, L., Wegemer, C. M., Wright, C. E., & Yamaguchi-Pedroza, K. (2021). *Ensuring a more equitable future: Assessing student learning and growth in higher education.* Postsecondary Value Commission. https://www.postsecondaryvalue.org/wp-content/uploads/2021/05/PVC-Arum-FINAL.pdf

[584] See Lippman et al. (2015).

[585] Rios, J. A., Ling, G., Pugh, R., Becker, D., & Bacall, A. (2020). Identifying critical 21st-century skills for workplace success: A content analysis of job advertisements. *Educational Researcher*. https://doi.org/10.3102/0013189X19890600

[586] World Economic Forum. (2016). *The future of jobs: Employment, skills, and workforce strategy for the fourth industrial revolution.* https://reports.weforum.org/future-of-jobs-2016/

[587] Gray, K. (2021). *Competencies: Employers weigh importance versus new grad proficiency.* National Association of Colleges and Employers. https://www.naceweb.org/career-readiness/competencies/competencies-employers-weigh-importance-versus-new-grad-proficiency/

[588] Lippman, L. H., Ryberg, R., Carney, R., & Moore, K. A. (2015). *Workforce connections: Key "soft skills" that foster youth workforce success: Toward a consensus across fields.* Child Trends. https://www.childtrends.org/publications/key-soft-skills-that-foster-youth-workforce-success-toward-a-consensus-across-fields

[589] Zahner, D., & Lehrfeld, J. (2018). *Employers' and advisors' assessments of the importance of critical thinking and written communication skills post-college.* Council for Aid to Education. http://hdl.voced.edu.au/10707/569929

[590] Education Commission of the States. (2019b). *50-state comparison: High school graduation requirements: What are the states' non-course requirements for high school graduation?* https://reports.ecs.org/comparisons/high-school-graduation-requirements-02

[591] American Association of Colleges and Universities. (2022c) *Essential learning outcomes.* https://www.aacu.org/initiatives/value-initiative/essential-learning-outcomes

[592] See Lippman et al. (2019).

[593] Council for Aid to Education. (2022). *Solutions*. https://cae.org/solutions/

[594] See Council for Aid to Education (2022).

[595] Territorium. (2022). *HEIghten: Demonstrate and measure critical skills levels.* https://territorium.com/heighten/

[596] Pearson. (2022). *Watson Glaser critical thinking appraisal.* Talent Lens. https://www.talentlens.com/uk/recruitment/assessments/watson-glaser-critical-thinking-appraisal.html

[597] Postsecondary Value Commission. (2021). *Equitable value: Promoting economic mobility and social justice through postsecondary education.* Institute for Higher Education Policy. https://postsecondaryvalue.org/reports/

[598] See Postsecondary Value Commission (2021).

[599] Arum, R., Eccles, J. S., Heckhausen, J., Orona, G. A., von Keyserlingk, L., Wegemer, C. M., Wright, C. E., & Yamaguchi-Pedroza, K. (2021). *Ensuring a more equitable future: Assessing student learning and growth in higher education.* Postsecondary Value Commission. https://www.postsecondaryvalue.org/wp-content/uploads/2021/05/PVC-Arum-FINAL.pdf

[600] Lippman, L. H., Ryberg, R., Carney, R., & Moore, K. A. (2015). *Workforce connections: Key "soft skills" that foster youth workforce success: Toward a consensus across fields.* Child Trends. https://www.childtrends.org/publications/key-soft-skills-that-foster-youth-workforce-success-toward-a-consensus-across-fields

[601] The Pew Charitable Trusts. (2020). *Student loan default has serious financial consequences*. https://www.pewtrusts.org/-/media/assets/2020/04/studentloandefaulthasseriousfinancialconsequences_.pdf

[602] Postsecondary Value Commission. (2021). *Equitable value: Promoting economic mobility and social justice through postsecondary education.* Institute for Higher Education Policy. https://postsecondaryvalue.org/reports/

[603] See Postsecondary Value Commission (2021)

[604] See Postsecondary Value Commission (2021).

[605] The Pew Charitable Trusts. (2020). *Student loan default has serious financial consequences*. https://www.pewtrusts.org/-/media/assets/2020/04/studentloandefaulthasseriousfinancialconsequences_.pdf

[606] Espinosa, L. L., Turk, J. M., Taylor, M., & Chessman, H. M. (2019). *Race and ethnicity in higher education: A status report.* American Council on Education. https://www.equityinhighered.org/resources/report-downloads/

[607] Hanson, M. (2021). *Student loan debt by race.* EducationData.org. https://educationdata.org/student-loan-debt-by-race#:~:text=Report%20Highlights.&text=Black%20and%20African%20American%20college,12.5%25%20more%20than%20they%20borrowed

[608] Vaghul, K., & Steinbaum, M. (2016). *How the student debt crisis affects African Americans and Latinos*. Washington Center for Equitable Growth. https://equitablegrowth.org/how-the-student-debt-crisis-affects-african-americans-and-latinos/

[609] Miller, B. (2019). *The continued student loan crisis for black borrowers*. Center for American Progress. https://www.americanprogress.org/article/continued-student-loan-crisis-black-borrowers/

[610] U.S. Federal Reserve. (2015). *Report on the economic well-being of U.S. households in 2014*. https://www.federalreserve.gov/econresdata/2014-report-economic-well-being-us-households-201505.pdf

[611] U.S. Department of Education. (2022). *Technical documentation: College scorecard institution-level data.* https://collegescorecard.ed.gov/data/documentation/

[612] See U.S. Department of Education. (2022).

[613] Janice, A., & Voight, M. (2016). *Toward convergence: A technical guide for the postsecondary metrics framework.* Institute for Higher Education Policy. https://www.ihep.org/publication/toward-convergence-a-technical-guide-for-the-postsecondary-metrics-framework/

[614] See U.S. Department of Education. (2022).

[615] Cazes, S., Hijzen, A., & Saint-Martin, A. (2016). *Measuring and assessing job quality.* OECD. https://doi.org/10.1787/5jrp02kjw1mr-en

[616] Kahneman, D., & Deaton, A. (2010). High income improves evaluation of life but not emotional well-being. *Proceedings of the National Academy of Sciences of the United States, 107*(38), 16489–1693.

https://www.slideshare.net/sustainablebrands/high-income-improves-evaluation-of-life-but-not-emotional-wellbeing-47890287

[617] Sullivan, D., & von Wachter, T. (2009). Job displacement and mortality: An analysis using administrative data. *The Quarterly Journal of Economics, 124*(3), 1265–1206. https://doi.org/10.1162/qjec.2009.124.3.1265

[618] Thaler, R. H., & Benartzi, S. (2004). Save more tomorrow: using behavioral economics to increase employee saving. *Journal of Political Economy, 112*(1), 164–S87. https://doi.org/10.1086/380085

[619] Bullinger, L. R. (2019). The effect of paid family leave on infant and parental health in the United States. *Journal of Health Economics, 66*, 101–116. https://doi.org/10.1016/j.jhealeco.2019.05.006

[620] Nadeau, C. A. (2021). *Living Wage Calculator: User's guide/Technical notes. 2020-2021 update.* Department of Urban Studies and Planning, Massachusetts Institute of Technology. https://livingwage.mit.edu/resources/Living-Wage-Users-Guide-Technical-Documentation-2021-12-28.pdf

[621] MIT Living Wage Calculator (2021). *Living wage calculation for Atlanta-Sandy Springs-Roswell, GA.* https://livingwage.mit.edu/metros/12060

[622] Fuller, J. B., & Raman, M. (2022). *Building from the bottom up*. Harvard Business School. https://www.hbs.edu/managing-the-future-of-work/research/Pages/building-from-the-bottom-up.aspx

[623] Good Jobs Institute. (2007). *Good jobs scorecard.* https://goodjobsinstitute.org/good-jobs-scorecard/

[624] See Good Jobs Institute (2007).

[625] See Postsecondary Value Commission (2021).

[626] Hertz, T. (2006). *Understanding mobility in America.* The Center for American Progress. https://www.americanprogress.org/article/understanding-mobility-in-america/

[627] Chetty, R., Friedman, J., Saez, E., Turner, N., & Yagan, D. (2017). *Mobility report cards: The role of colleges in intergenerational mobility*. National Bureau of Economic Research. https://www.nber.org/papers/w23618

[628] Corak, M. (2013). Income inequality, equality of opportunity, and intergenerational mobility. *Journal of Economic Perspectives*, *27*(3), 79–102. https://www.aeaweb.org/articles?id=10.1257/jep.27.3.79

[629] Chetty, R., Hendren, N., Jones, M. R., & Porter, S. R. (2019) Race and economic opportunity in the United States: an intergenerational perspective. *The Quarterly Journal of Economics*, *135*(2), 711–783. https://doi.org/10.1093/qje/qjz042

[630] See Chetty et al. (2017).

[631] See Chetty et al. (2019).

[632] Postsecondary Value Commission. (2021). *Equitable value: Promoting economic mobility and social justicethrough postsecondary education.* Institute for Higher Education Policy. https://postsecondaryvalue.org/reports/

[633] See Chetty et al. (2017).

[634] Killewald, A. Pfeffer, F. T., & Schachner, J. N. (2017). Wealth inequality and accumulation. *Annual Review of Sociology, 43, 379–404.* https://doi.org/10.1146/annurev-soc-060116-053331

[635] See Postsecondary Value Commission. (2021).

[636] See Killewald et al. (2017).

[637]Federal Reserve Board. (2021). *Economic well-being of U.S. households (SHED).* Board of Governors of the Federal Reserve System. https://www.federalreserve.gov/publications/report-economic-well-being-us-households.htm

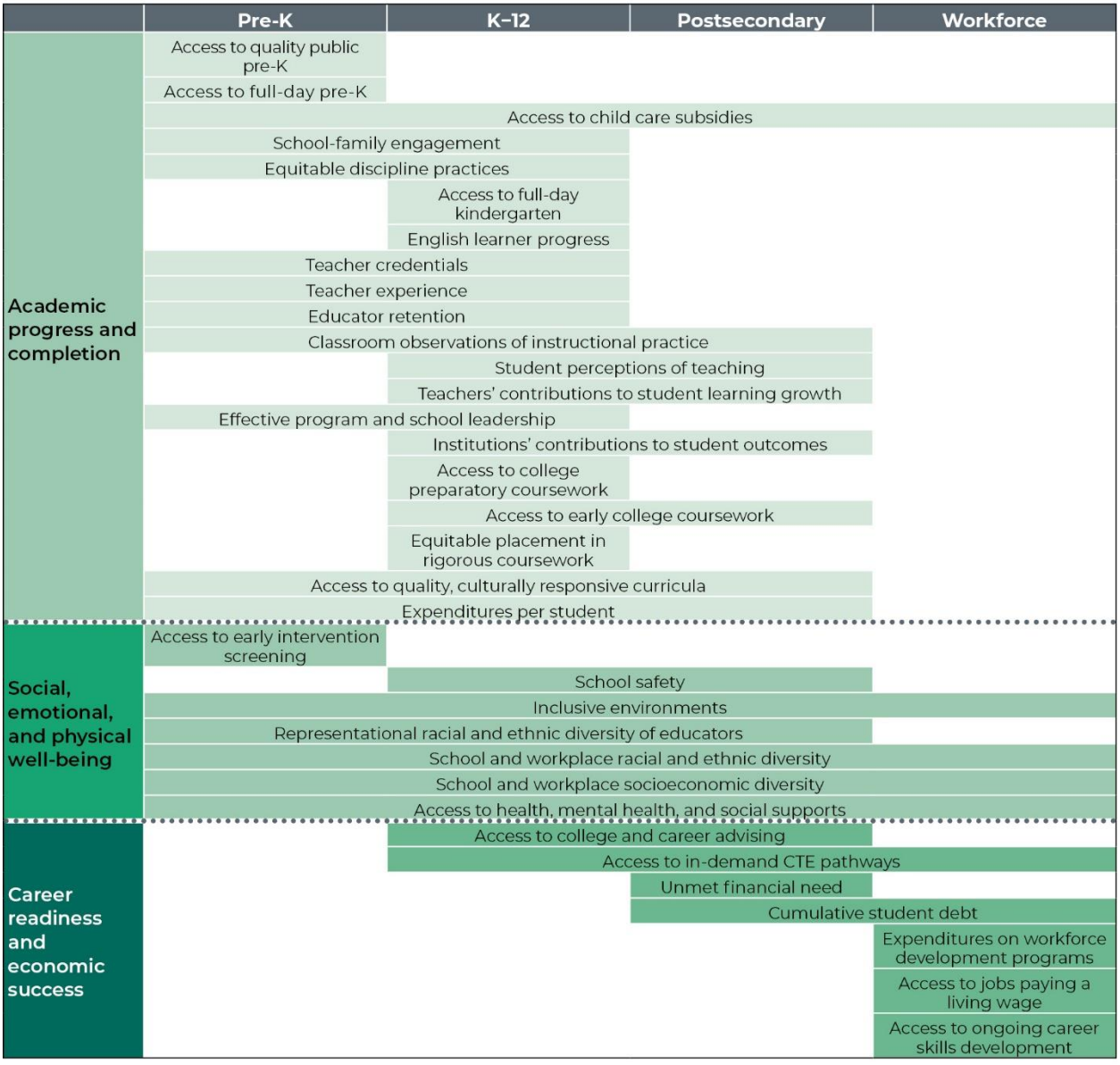
[638] Horowitz, J. M., Igielnik, R., & Kochhar, R. (2020). *Trends in income and wealth inequality.* Pew Research Center. https://www.pewresearch.org/social-trends/2020/01/09/trends-in-income-and-wealth-inequality/

[639] See Postsecondary Value Commission. (2021).

C. E-W system conditions

E-W system conditions include institutional or systemic environments, policies, and practices that help or hinder the ability to achieve positive E-W outcomes. Exhibit II.5 presents a summary view of the E-W system conditions indicators in each domain and sector.

Exhibit II.5. E-W system conditions indicators



CTE = career and technical education; K = kindergarten.

DOMAIN: Academic progress and completion

Access to quality public pre-K

Definition: Children have access to a high-quality public pre-K program.

Why it matters: A high-quality pre-K program can meaningfully enhance children's early learning and development, thereby producing long-term improvements in school success and generating benefits to both individuals and society that far exceed the costs.[640, 641] The positive effects of access to quality pre-K on children's math and reading achievement are even larger in districts with a majority of Black students.[642] Although Black children enroll in pre-K at rates roughly similar to their White peers (and have higher rates of enrollment in publicly funded programs), the quality of their experiences differ. On average, Black children attend programs rated as lower quality than White children.[643, 644, 645] For instance, a study of New York City's universal pre-K program found that Black children attended programs with quality scores about 0.5 standard deviations lower than White children; put differently, more than two-thirds of Black children attended pre-K programs of lower quality than White children.[646]

Recommended metric(s): Percentage of public pre-K programs that meet Quality Rating and Improvement Systems (QRIS) state benchmarks of quality

Data source(s): Administrative data; classroom observations

What to know about measurement: QRIS has been implemented in all or part of 38 states and is based on quality standards determined by each state.[647] Each state uses QRIS to collect data on the quality of pre-K program sites. Because states may use some of the same QRIS indicators and measure them in the same ways, it is possible to compare ratings across most states. Framework users can consult the QRIS Compendium[648] to examine which indicators and metrics used to define quality align across states. QRIS capture mandatory requirements that must be met to legally operate, funding standards to be eligible for specific funding sources, and voluntary quality standards and best practices. Many of the elements—particularly mandatory requirements and funding standards—captured in these systems are the minimal standards that support pre-K program quality. QRIS data are also limited in that most states do not include additional criteria for effectively serving children with disabilities, although some states are working on or considering inclusion in their QRIS designs.[649] The measurement tools often used in QRIS currently (such as the Early Childhood Environment Rating Scales) may not fully capture whether programs are meeting the needs of all students.

To measure the quality of state pre-K *policies*, National Institute of Early Education Research (NIEER) publishes the State of Preschool Yearbook, which annually tracks states' minimum policies in place to support public pre-K quality according to a set of quality standards. Information on the quality of states' pre-K policies can supplement the program-level quality data provided by QRIS.

Source frameworks: Eleven source frameworks reviewed for this report include a measure of access to Pre-K. Our approach to measuring quality using QRIS benchmarks aligns with recommendations put forth by the Center on Enhancing Early Learning outcomes (CEELO) and the Council of Chief State School Officers (CCSSO).[650]

Access to full-day pre-K

Definition: Children have access to full-day, publicly funded pre-K programs.

Why it matters: Attending a full-day pre-K program is linked to improved outcomes for students, including greater school readiness in language development, math, and reading.[651, 652] Expanding access to full-day pre-K programs increases children's enrollment in these programs. For example, after Chicago Public Schools expanded full-day pre-K, Black students' enrollment these programs more than quadrupled. Expanding access to full-day pre-K can also raise mothers' participation in the workforce. In Washington, DC, introducing universal access to full-day pre-K[653] led to a 10-percentage point increase in mothers' workforce participation rates, with even larger increases for Black mothers and those with low incomes.[654] Although more White children are enrolled in preschool than any other group (43 percent, compared to 38 percent of Black children and 34 percent of Latino children), they are the least likely group to be enrolled in full-day programs.[655] Enrollment in full-day (versus half-day) programs is more common in households where the mother works outside the home. However, access to affordable, full-day pre-K is still limited: among districts that offer publicly funded pre-K, less than half offer full-day programs.[656]

Recommended metric(s): Percentage of public pre-K programs that are six hours per day for five days per week

Data source(s): Administrative data

What to know about measurement: Information on the duration of pre-K programs could be collected and compared across states. We recommend collecting this information to measure this indicator instead of relying on "full-day" versus "half-day" designations used by states and districts, which are based on varying definitions and are therefore less comparable.[657] Our recommended metric is based on the definition used by Civil Rights Data Collection (CDRC), which gathers data from all public districts on whether they offer full-day or half-day pre-K programs.

The CRDC publishes information at the district level, which is not sufficient to assess equitable access to full-day pre-K. Because many school districts offer both full-day and half-day programs, not all families necessarily have equitable access to full-day pre-K, even in districts that offer full-day programs (for example, if they do not live close to any of the schools that offer full-day pre-K). For this reason, it is important to collect information on duration at the program level.

Source frameworks: Three source frameworks reviewed for this report included a measure of access to pre-K. Our proposed approach to measuring both program quality *and* length of school day aligns with the approach taken in the P-16 framework, which notes that "students who attend high-quality full-day pre-kindergarten are better prepared for kindergarten." [658]

Access to child care subsidies

PK K12 PS WF

Definition: Eligible families have access to child care by using subsidies to pay for care.

Why it matters: Child care subsidies can help improve the economic well-being of families with low incomes by allowing them to afford child care, find employment, or pursue further education.[659, 660, 661, 662] These subsidies also allow families to choose higher-quality child care than they could afford without the subsidy, which in turn is linked with optimal child outcomes.[663, 664, 665] An analysis from the Center for Law and Social Policy found that in 2019, "just 8 percent of potentially eligible children received subsidies based on federal income eligibility limits and 12 percent of potentially eligible children received subsidies based on state income eligibility limits." Black children had the highest rates of access, and Asian and Latino children had the lowest rates of access nationally. Barriers to child care subsidy receipt for eligible families include lack of knowledge of the availability of subsidies, lack of a perceived need for help, and challenges in navigating and coordinating services from multiple agencies to apply for and continue receiving the subsidy.[666, 667]

Recommended metric(s): Percentage of eligible families receiving assistance to pay for child care through subsidies[xv]

Data source(s): Administrative data

What to know about measurement: Each state receives resources from the federal Child Care and Development Fund (CCDF) program, which is the primary federal funding source for child care subsidies to help eligible families access child care. Federal reporting requirements for the CCDF block grant ask states to provide case-level data on a monthly or quarterly basis about children and families receiving child care subsidies.[668] However, because state data systems differ, and many agencies issue subsidy authorizations or payments on different schedules, it may be difficult to make comparisons across states. For example, the time unit of data collection for child care subsidy services may differ because it is determined by the state's payment policies.[669]

Source frameworks: This indicator appeared in three source frameworks reviewed for this report. Our proposed definition draws from the National School Readiness Indicators framework prepared by Rhode Island KIDS COUNT.[670] Our recommendation to focus on eligible families, rather than eligible children, draws from the CCDF federal reporting requirements outlined above.

[xv] Child care subsidies are funded by the CCDF, a block grant in which states have the flexibility to decide how to use the funds to help children in need. In general, the federal eligibility guidelines state that the subsidy is for parents or primary caregivers with children 13 or younger, or younger than 19 if they are incapable of self-care or under court supervision, and must be from low-income or very low-income households. The parents or primary caregivers must also be either employed or, in some states, enrolled in a training or education program.

School-family engagement[xvi]

Definition: There are effective partnerships between schools and families, such that parents have access to school systems and are meaningfully included in school processes and student learning.

Why it matters: School outreach to and engagement with families provides benefits to students academically and socially, both in short-term school success and long-term outcomes, such as high school graduation and college enrollment.[671, 672] Although family engagement is widely understood to be key to students' educational success, not all schools successfully build a culture that welcomes and engages all families, and especially families of color. For example, an analysis of parent survey data in California found that perceptions of how well the school encouraged parental involvement were significantly lower among Indigenous parents compared to other groups.[673] Research suggests that school-family engagement is influenced by factors that disproportionately affect families of color, such as parents' work schedules, transportation, child care needs, and differences in cultural norms.[674, 675, 676, 677]

Recommended metric(s):

- Pre-K: Percentage of families and percentage of teachers or caregivers reporting positive relationship quality with one another, using a tool such as the Family and Provider/Teacher Relationship Quality (FPTRQ) parent survey[678]
- K–12: Mean scores on family surveys, such as the Panorama Family-School Relationships Survey[679] or CORE Districts School Culture & Climate Survey parent assessment of school-community engagement[680]

Data source(s): Surveys

What to know about measurement: We recommend surveying families to measure their perceptions of school-family engagement. Several survey tools exist to measure this indicator and related constructs. We have identified and suggested tools with an evidence base; however, others may also be appropriate. For example, the Early Childhood Learning & Knowledge Center offers a database of standardized measures related to family engagement efforts and effects and the National Center on Safe Supportive Learning Environments offers a survey item bank to measure various aspects of school climate, including parent engagement. Although family engagement can also be measured using teacher surveys—for example, using the Involved Families component of the UChicago 5Essentials Survey—we emphasize the importance of elevating families' voices in measuring this indicator. School climate surveys, which at least 13 states implement, typically include instruments for students, staff, and families.[681]

As with all surveys, data users should pay attention to response rates in interpreting and reporting school climate survey data. For instance, the California Department of Education recommends a minimum response rate of 70 percent for students and staff and 25 percent for parents.[682] The Georgia

[xvi] This indicator is one of several that, together, signal school climate. The full set of school climate indicators includes *school-family engagement*, *equitable discipline practices*, *student perceptions of teaching*, *school safety*, and *inclusive environments*.

Department of Education requires a 75 percent response rate for students and staff, and at least 15 parent surveys for reporting purposes.[683] The thresholds used are lower for parent surveys because response rates among parents tend to be significantly lower than for students and staff, who take the surveys during school hours.[684] However, efforts to boost parent response rates would help ensure the resulting data are valid and representative of all families. (For best practices to boost school survey response rates, see Panorama Education.)[685]

Source frameworks: This indicator appeared in 10 source frameworks reviewed for this report. Our proposed approach to measuring family engagement is consistent with recommendations by StriveTogether,[686] CORE Districts,[687] and the National Research Council.[688]

Equitable discipline practices[xvii]

PK K12 PS WF

Definition: Schools treat students similarly and appropriately for disciplinary infractions.

Why it matters: School practices play a key role in determining students' disciplinary outcomes,[689] and different approaches to discipline, such as restorative justice and positive behavioral interventions and supports (PBIS), may be related to improvements in school culture and climate.[690, 691] Research documents large and persistent disparities in exclusionary discipline—that is, disciplinary actions that remove students from their usual educational setting, such as an in- or out-of-school suspension—along race, socioeconomic background, and disability status.[692] (See the indicator on *positive behavior* for additional information on patterns of disproportionality in suspension and expulsion rates.) There are also disparities in the types of discipline practices implemented in schools.[693] For instance, schools with more Black students are less likely to use restorative disciplinary practices as an alternative to punitive discipline.[694]

Identifying and addressing disproportionate discipline in Maryland

In partnership with the Regional Education Laboratory (REL) Mid Atlantic, the Maryland State Department of Education (MSDE) is systematically identifying and addressing disproportionality in exclusionary discipline. All local school systems in the State of Maryland have discipline review teams tasked with examining removals from the classroom and increasing the use of non-exclusionary discipline practices.

Discipline data are disaggregated by race and ethnicity and disability status, allowing practitioners and researchers to understand disciplinary trends and examine school characteristics related to disproportionate discipline. MSDE is using data to identify resources and interventions that can promote preventive strategies and non-exclusionary behavioral supports, such as restorative justice practices and positive behavioral interventions and supports.

[xvii] This indicator is one of several that, together, signal school climate. The full set of school climate indicators includes *school-family engagement*, *equitable discipline practices*, *student perceptions of teaching*, *school safety*, and *inclusive environments*.

Recommended metric(s):

- Differences in the rates at which students from key demographic subgroups ever experience different forms of school discipline (office referrals, suspensions, expulsions, restraint, and exclusion) relative to those students' representation in their school population as a whole
- Disproportionalities along the lines of key demographic characteristics in the level of school discipline experienced (for example, number of days suspended).

Data source(s): Administrative data

What to know about measurement: Schools regularly collect discipline data as part of their normal operations and report aggregate data by subgroups to the Civil Rights Data Collection (CRDC). Although suspensions and expulsions generally are defined and tracked comparably, there are opportunities for states to apply more consistent definitions in determining what counts as physical restraint and seclusion by adopting the revised federal definitions proposed by the Office of Civil Rights. (See Arundel[695] for a discussion of challenges in defining and reporting restraint and seclusion in schools.)

We acknowledge that there are multiple methods for determining disproportionality. (See Bollmer et al.[696] for guidance on approaches to measuring disproportionality.) In addition, proportionate outcomes do not imply that effective disciplinary practices are in place, especially in schools where most students are students of color. For instance, it is possible for expulsion rates to be proportionate but high. We encourage systems to closely monitor absolute rates as well as the number of days students experience exclusionary discipline and consider alternative discipline practices such as PBIS and restorative justice.

Source frameworks: Disciplinary measures appeared in nine source frameworks reviewed for this report. Our proposed approach to measuring disciplinary practices at the systems level is consistent with recommendations by the CORE Districts[697] and the National Research Council.[698]

Access to full-day kindergarten

Definition: Children have access to full-day kindergarten programs taught by the same certificated staff member in a day.

Why it matters: Full-day kindergarten is an increasingly popular option for families due to dual parental workforce participation and has been shown to narrow achievement disparities for children of color.[699, 700] Latino students enrolled in full-day kindergarten have been shown to have particularly large gains relative to their peers in half-day kindergarten: the disparity in literacy scores between Latino and non-Latino children attending full-day kindergarten is 0.3 standard deviations, compared to 0.9 standard deviations for children in half-day programs.[701] As of 2020, 18 states required districts to offer full-day kindergarten,[702] and more than 80 percent of kindergarteners attended a full-day program.[703] Full-day programs are more prevalent in schools with higher shares of students from low-income households and students of color; however, enrollment in full-day kindergarten is significantly lower for Latino students than for Black students.[704]

It is worth noting that only 20 states require children to attend kindergarten, and overall enrollment fell sharply during the COVID-19 pandemic.[705] Nationwide, kindergarten enrollment declined by 9 percent between the 2019–2020 and 2020–2021 school years, with larger decreases for Black students (10 percent), White students (11 percent), and Indigenous students (13 percent).[706]

Recommended metric(s): Percentage of schools and districts offering kindergarten programs that are six hours per day for five days per week

Data source(s): Administrative data

What to know about measurement: In states that do not require districts to offer full-day kindergarten, provision can vary widely. As one example, in California, where full-day kindergarten is not required, 19 percent of districts offered only half-day programs.[707] Given that participation is not required in many states, systems should also monitor enrollment in these programs.

We note that this indicator does not encompass quality because there is less consensus in the field as to how to define and measure quality kindergarten. For example, some have used Classroom Assessment Scoring System (CLASS®) scores to measure classroom quality, with kindergarten CLASS scores predicting higher test scores in language, math, and executive function skills at the end of kindergarten.[708] Others have measured kindergarten quality based on measures of teacher experience and small class sizes, and found these elements were related to higher scores on standardized academic cognitive assessments and higher salaries in adulthood.[709] To assess quality in kindergarten, we encourage framework users to measure multiple K–12 system indicators that appear in the framework, such as *teacher experience* and *classroom observations of instructional practice*, for all relevant grades, including kindergarten.

Source frameworks: This indicator appeared in three source frameworks reviewed for this report. Our proposed approach builds on work by the Center on Enhancing Early Learning outcomes (CEELO) in collaboration with the Council of Chief State School Officers (CCSSO), which recommends measuring the "percent of schools and/or districts offering full day kindergarten."[710]

English learner progress

Definition: Emerging multilingual students achieve English proficiency within five years of being classified as English learners.

Why it matters: There are widely documented disparities in the outcomes of English learner students and non-English learner students, which are especially pronounced for students who do not achieve English proficiency within five years. Long-term English learners tend to have a grade point average (GPA) below a 2.0 and to be two to three years below grade level in English language arts and math.[711] The longer a student remains classified as an English learner, their risk of dropping out of school[712] and having other adverse academic outcomes increases.[713] In Arizona, for example, only 49 percent of long-term English learners graduated high school on time, compared to 81 percent of long-term proficient former English learners and 85 percent of never English learners.[714] Long-term placement in English learner education can limit students' opportunity to take college preparatory and early college courses.[715, 716]

Rates of economic disadvantage or disability status are generally higher for long-term English learners than English learner students reclassified earlier. For example, more than 50 percent of long-term English learner students in secondary grades in Arizona were eligible to receive individualized education program (IEP) services, compared to less than 15 percent of former English learners who had been reclassified as English proficient.[717]

Recommended metric(s): Percentage of English learner students who are reclassified in five years or less, based on local reclassification criteria

Data source(s): Administrative data

What to know about measurement: Data on English learner students' reclassification status is widely collected because the Every Student Succeeds Act (ESSA) requires districts to track students' English language proficiency annually.[718] States and districts vary in the assessments and criteria they use to test and reclassify English learner students.[719] Although not perfectly comparable, this metric conveys a similar meaning across most contexts. In addition to tracking reclassification rates, which can be impacted by multiple criteria, systems should also monitor student performance on the required assessments of English proficiency.

Source frameworks: Four source frameworks reviewed for this report include a measure of English language learner progress or reclassification. Our proposed definition and measure draw on work by the CORE Districts.[720]

Teacher credentials

Definition: Students have access to teachers who have earned credentials demonstrating their knowledge and preparation for teaching.

Why it matters: During the COVID-19 pandemic, many schools have struggled to fully staff classrooms, and more students than before are being taught by substitute teachers or those with emergency certificates.[721] Research is divided on the importance of teacher credentials. In pre-K, some analyses find that teachers' levels of education are related to higher-quality early childhood learning environments,[722] whereas other analyses show no relationship to classroom quality or children's academic gains.[723] In K–12, there is some evidence that being taught by a K–12 teacher with a regular or full certificate, as opposed to an emergency or provisional license, benefits students' math and English language arts achievement,[724] but many other studies conclude that teacher credentials, such as National Board certification or graduate degrees, are not a meaningful signal of teaching quality.[725, 726] Nevertheless, the current challenges of staffing schools raise concerns about increasing inequities, as there was already evidence of disparate access to teachers with higher-level credentials.[727, 728, 729] For example, in 2016, schools enrolling a high proportion of students of color were four times more likely to employ uncertified teachers than those with a low share of students of color (4.8 versus 1.2 percent), although it was an uncommon practice.[730]

Recommended metric(s):[xviii]

- Pre-K:
  - Percentage of lead teachers with at least a bachelor's degree
  - Percentage of lead teachers with specialized training in pre-K
- K–12:
  - Percentage of courses taught by full-time equivalent (FTE) teachers (that is, teachers other than substitutes or those with emergency or provisional licenses)
  - Percentage of courses taught by teachers certified to teach the given subject or grade level

Data source(s): Administrative data

What to know about measurement: Data on teacher credentials can be tracked as part of districts' or states' staff data management systems. Virtually all states with a Quality Rating and Improvement System (QRIS) for their pre-K programs include staff education and training as part of their program quality rating indicators.[731] K–12 districts must report school-level data to the Civil Rights Data Collection (CRDC) on the number of math and science courses taught by certified teachers.

Source frameworks: This indicator appeared in 11 source frameworks reviewed for this report. Our recommendations for the pre-K sector align with the National Institute of Early Education Research (NIEER) national standards for high-quality pre-K[732] as well as the definition of Early Education Teacher Credentials put forth by Rhode Island KIDS COUNT.[733] Our proposed metric in the K–12 sector is adapted from the definition for "teacher qualifications" in StriveTogether's Guide to Racial and Ethnic Equity.[734]

Teacher experience

PK K12 PS WF

Definition: Students have equitable access to experienced teachers.

Why it matters: Research consistently shows that more experienced teachers make greater contributions to student achievement, especially compared to teachers who are early in their careers.[735, 736, 737, 738] After teachers gain about five years of experience, however, the difference between a more or less experienced teacher (that is, one with 10 versus 5 years of experience) is not significant.[739] Students do not have equal access to experienced teachers; Black and Latino students, and those from low-income households, are more likely than their peers to be taught by teachers who are newest to the profession.[740, 741] In 2016, 9 percent of teachers in schools with a low share of students

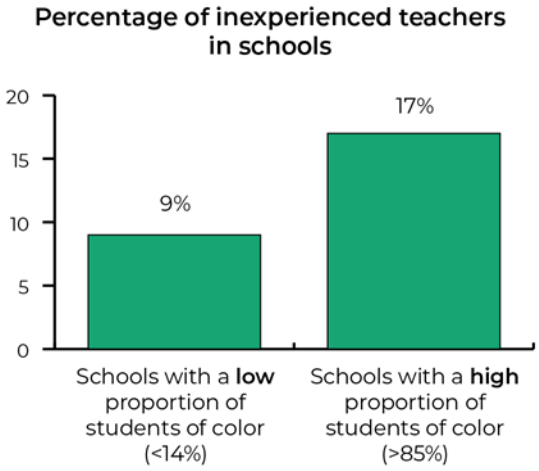
[xviii] In the postsecondary context, we explored whether to include a measure of the percentage of courses taught by tenured professors, which we ultimately do *not* recommend. Research has produced mixed findings about the extent to which having more classes with adjunct professors matters for student outcomes. For example, Bettinger and Long find a small positive impact of having adjuncts on students' likelihood of taking additional courses in the same subject. Hoffmann and Oreopoulos find no average differences in dropout patterns, grades, or future course selection based on whether students have more classes with adjunct professors. Ran and Xu find that adjuncts have a positive impact on course grades, but a negative impact on future course outcomes. Figlio et al. find that non-tenure track faculty in the bottom quarter of the value-added distribution produce better student outcomes than tenure-track faculty.

of color were in their first or second year of teaching, compared with 17 percent of teachers in schools with a high proportion of students of color.[742]

Recommended metric(s):

- Pre-K: Percentage of teachers with less than one year, one to five years, and more than five years of experience
- K–12: Percentage of teachers with less than one year, one to five years, and more than five years of experience

Data source(s): Administrative data



Data source: U.S. Department of Education, Civil Rights Data Collection (2016).

What to know about measurement: Data on teacher experience can be tracked as part of districts' or states' staff data management systems. About one-third of states with a Quality Rating and Improvement System (QRIS) for their pre-K programs include experience indicators as part of their program quality ratings.[743] K–12 districts must report school-level data to the Civil Rights Data Collection (CRDC) on the number of teachers in their first and second years of teaching, and commonly base salaries on teachers' years of experience.

Source frameworks: This indicator appeared in three source frameworks reviewed for this report. Our recommendations draw from a definition put forth by the National Academies[744] which focuses on group differences in access to novice, experienced, and certified teachers. The thresholds selected in our proposed metric align with research by Kraft and Papay[745] mentioned above.

Educator retention

PK K12 PS WF

Definition: Teachers and school leaders return to the same school in consecutive years.

Why it matters: Retaining effective educators is linked with improved school climate[746] and better outcomes for students. Research in early learning settings shows that having the same teacher throughout an academic year is linked to higher rates of school readiness,[747] and that teachers who leave their program tend to receive lower ratings in teacher–child interaction quality.[748] Studies in K–12 settings have produced mixed findings on the impact of teacher turnover. However, one study involving more than 850,000 students in New York City found that teacher turnover results in lower performance in English language arts and math, with especially negative impacts on Black students and students who struggle academically.[749] This study suggests that turnover impacts student outcomes by affecting students' access to experienced, effective teachers, but also by having a disruptive effect on schools. Educator turnover tends to be more common in schools that serve a higher share of disadvantaged students; for example, in 2017, 21 percent of school leaders in high-poverty schools left their positions, compared to 15 percent of school leaders in low-poverty schools.[750]

Recommended metric(s): We recommend two measures for this indicator:

- Teacher retention: Percentage of teachers who return to teaching in the same school from year to year
- School leader tenure: Percentage of school leaders who have served in their current positions for less than two years, two to three years, and four or more years

Data source(s): Educator administrative data

What to know about measurement: Educator retention can be computed using administrative records from districts' or states' staff data management systems linking teachers and principals to schools from one year to the next. For school leaders, we recommend examining their tenure in the same school. In 2017, the national average tenure of principals at their current schools was four years, with 35 percent of principals staying at their school for less than two years.[751] A recommended best practice is also to disaggregate retention by measures of educator effectiveness, such as those based on teacher performance ratings or value-added scores, to better assess the impact of staff turnover.[752] Currently, 20 states publicly report data on teacher retention.[753]

Source frameworks: This indicator appeared in two source frameworks reviewed for this report: the Urban Institute's Robust and Equitable Measures to Identify Quality Schools (REMIQS) framework[754] and National Education Association's Great Public Schools Indicator Framework.[755]

Classroom observations of instructional practice[xix]

Definition: Teachers demonstrate high-quality instructional practices and interactions with students.

Why it matters: Teachers are viewed as one of the most important contributors to student learning and social-emotional development.[756, 757, 758, 759, 760, 761, 762, 763] Although research on teaching effectiveness defines and measures this construct in various ways, with each approach demonstrating different benefits and limitations, most studies conclude that teachers play a key role in shaping student outcomes. One measurement approach is to conduct classroom observations of instructional practice, such as those that measure the quality of teacher–child interactions. Children with higher-quality interactions with their teachers enjoy greater learning gains in reading and math achievement, social skills, and executive functioning in pre-K[764, 765, 766] and K–12.[767, 768, 769] There is also evidence that using observations as a formative tool can result in improvements in teaching effectiveness, from pre-K to the postsecondary level.[770]

Some studies find that students from underserved backgrounds have less access to effective teachers, though results vary depending on the measures used and the study context.[771, 772] As one illustration, a study of teacher effectiveness (as measured by both classroom observation ratings and value-added to student achievement) in the School District of Philadelphia found that smaller percentages of economically disadvantaged (92 percent), Black (92 percent), and Latino (90 percent) students were

[xix] This indicator is one of several that, together, signal teaching effectiveness. The full set of teaching effectiveness indicators includes *classroom observations of instructional practice*, *student perceptions of teaching*, and *teachers' contributions to student learning growth*.

taught by teachers rated proficient or distinguished than non-economically disadvantaged (94 percent) and White students (97 percent).[773]

Recommended metric(s):

- Pre-K: Scores on measures of teacher–child interactions, such as the Classroom Assessment Scoring System (CLASS),[774] the Early Childhood Environment Rating Scale (ECERS) Interactions subscale,[775] or the Assessing Classroom Sociocultural Equity Scale (ACSES)[776] (which assesses equitable classroom interactions)
- K–12: Teachers' overall and subscale scores on an observation rubric associated with an educator observation system; examples of common frameworks include the Danielson's Framework for Teaching[777, 778] and the Marzano Causal Teacher Evaluation Model[779]
- Postsecondary: There are currently no widely used standardized rubrics for peer observations of college teaching, though multiple researchers and universities have produced guidance surrounding the peer observation process[780, 781, 782, 783]

Data source(s): Classroom observation

Classroom Assessment Scoring System (CLASS)

Observations of teacher–child interactions in Louisiana. In 2012, Louisiana began a set of reforms to create a unified early childhood system for publicly funded centers, including Head Start, state pre-kindergarten, and subsidized child care. A major part of these reforms included conducting annual observations using CLASS, which provides ratings of the quality of teacher–child interactions, for every classroom in centers receiving public funds. CLASS observations are the only quality measure currently used to calculate program ratings for the state's early childhood accountability system. The rating process was piloted in the 2015–2016 school year, and ratings from the 2016–2017 school year were the first to factor into licensing and funding decisions. The first accountability ratings were released in 2017; subsequent annual ratings are published online in centers' Performance Profiles, which also include other information about the center. Classrooms are observed by local community networks; these observations are audited by a third-party contractor. Observations from both are used to generate the rating that goes into the Performance Profile.

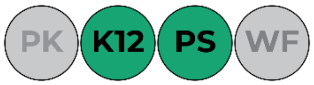
What to know about measurement: Given the widespread use of classroom observations, this measure should be relatively feasible to collect. In early childhood, most states have a Quality Rating and Improvement System (QRIS) for publicly funded pre-K programs that includes structured classroom observations to measure the quality of teacher–child interactions using tools such as the CLASS or ECERS.[784] Head Start also collects CLASS observations, although not for every classroom.[785] Newer assessments focused on improving measurement of equitable pre-K classroom practices, such as the ACSES (noted above), are increasingly being used.

In K–12, classroom observations frequently form part of educator evaluation systems. Almost three-quarters of states plus the District of Columbia (36 out of 51) report using teacher observations as part of their evaluation systems, with another five states reporting local control over teacher observations. Only six states report that teacher observations are not included in their educator evaluation systems. At the postsecondary level, peer observation of a college instructor's teaching commonly is used for formative and summative evaluation purposes. [786] However, observation tools and practices can vary widely across institutions. Users should take care in comparing classroom observation data across contexts.

We caution against using teacher observations as a singular measure of teaching effectiveness (our recommendations also include measures based on student survey and student outcome data—see student perceptions of teaching and teachers' contributions to student learning growth). Research documents that observation ratings among Black teachers; male teachers; and those in classrooms with higher concentrations of Black, Latino, male, and low-performing students tend to be systematically lower than those of their colleagues.[787, 788, 789] Observations conducted by trained observers from outside of the school who are not familiar with the instructor tend to be more valid than those conducted by school administrators.[790]

Source frameworks: This specific indicator appeared in three source frameworks, while a version of this indicator, most commonly as a measure of effective teaching, appeared in five other source frameworks. Our recommendation to include quality student interactions in the indicator's definition is supported by work from the Center on Enhancing Early Learning outcomes (CEELO) and the Council of Chief State School Officers (CCSSO)[791] and the Center for Collaborative Education.[792] Our inclusion and focus on teacher observations for the proposed metric aligns with recommendations from the National Education Association,[793] the National Research Council,[794] and the CEELO & CCSSO.[795]

Student perceptions of teaching[xx, xxi]



Definition: Students report having a supportive, engaging teacher who sets clear, fair, and high expectations, and helps them learn.

Why it matters: Measures of teaching effectiveness do not always incorporate student voice, even though students spend more time with their instructors than any other observer. Although there are important drawbacks to relying only on student perceptions to measure teaching effectiveness (for example, multiple studies have shown that student evaluations of their college instructors can be biased based on the gender, race, and ethnicity of the instructor),[796, 797] research suggests that student perception data from well-constructed and administered surveys can differentiate between effective and ineffective teachers.[798] For instance, a study in seven urban school districts found that students taught by a teacher in the top 25th percentile, according to student responses on the Tripod Student Survey, learned the equivalent of almost five additional months of instruction in math in a year than students taught by a teacher who ranked in the bottom 25th percentile.[799] Many K–12 school climate surveys also include questions about students' perceptions of teachers as an important dimension of school climate.[800] In California, for example, 40 percent of Latino and Indigenous students reported high expectations from adults at school, compared to almost half of Asian, Black, and White students.[801]

Recommended metric(s):

- K–12: Students' perceptions of their teacher's effectiveness, using a survey instrument such as the Pedagogical Effectiveness subscale of the Panorama Student Survey[802] the Tripod Student

[xx] This indicator is one of several that, together, signal teaching effectiveness. The full set of teaching effectiveness indicators includes *student perceptions of teaching*, *classroom observations of instructional practice*, and *teachers' contributions to student learning growth*.

[xxi] This indicator is one of several that, together, signal school climate. The full set of school climate indicators includes *school-family engagement*, *equitable discipline practices*, *student perceptions of teaching*, *school safety*, and *inclusive environments*.

Survey,[803] the Ambitious Instruction and Supportive Environment domains of the 5Essentials Survey,[804] or the Elevate survey's Feedback for Growth, Meaningful Work, Student Voice, Teacher Caring, Learning Goals, Supportive Teaching, and Well-organized Class scales[805]

- Postsecondary: Students' perceptions of whether college instructors implement effective teaching practices, using a survey instrument such as the National Survey of Student Engagement[806] or the Ascend survey's Institutional Growth Mindset and Trust and Fairness scales[807]

Data source(s): Classroom observations; surveys

What to know about measurement: Measuring students' perceptions of their instructors requires institutions to administer annual student-level surveys, which is increasingly common. As of 2020, 14 states reported using or encouraging the use of student surveys to evaluate K–12 teachers.[808] In addition, 16 states were administering or piloting school climate or engagement student surveys.[809] At the postsecondary level, student evaluations of college instructors are often used by administrators as a measure of teaching effectiveness (though as noted above, these data can be biased).[810] As an alternative to these course evaluations of individual instructors, surveys such as the National Survey of Student Engagement ask questions about students' overall experiences with instructors and whether instructors have exhibited effective teaching practices during the course of the school year.[811]

The 5Essentials System (5Es)

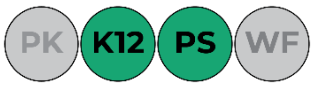
The 5Es is an evidence-based school climate survey used to measure five essential factors for school improvement: effective leaders, collaborative teachers, involved families, supportive environment, and ambitious instruction. The survey is based on research by the UChicago Consortium on School Research, which has shown that the 5Es predict student outcomes such as academic proficiency, attendance, GPA, 9th grade on track status, and postsecondary enrollment. In CPS, students in grades 4–12 and teachers in grades pre-K–12 take the survey each year. The 5Es includes several student-reported measures of teacher-student interaction, including "academic press" (the degree to which teachers expect their students to succeed) under the ambitious instruction domain and "student-teacher trust" under the supportive environment domain. The 5Es survey has been validated in both elementary and secondary school contexts, and has been used by over 6,000 schools. It is currently part of the Illinois Every Student Succeeds Act (ESSA) school accountability plan, and is also used by the Network for School Improvement. Survey results are integrated into a reporting site, where schools can identify and target measures for improvement based on the survey's findings.

It is important to select a survey instrument with proven validity and reliability—that is, one that predicts student outcomes and demonstrates relative consistency. In addition, as with all surveys, data users must pay attention to response rates and gauge how well respondents represent the students taught by the instructor. We have identified and suggested a sampling of tools with an evidence base, though other instruments may also be appropriate to measure this indicator. Because survey tools (and response rates) are likely to vary across states and localities, users should take care in comparing perceptions data across contexts.

We caution against using student perceptions data as a singular measure of teaching effectiveness. (Our recommendations also include measures based on classroom observation data and student outcome data—see *classroom observations of instructional practice* and *teachers' contributions to student learning growth*.) Experts tend to agree that student ratings should not be the sole or primary method of evaluating teachers, but rather one component of a comprehensive teacher evaluation system.[812, 813, 814]

Source frameworks: This indicator appeared in eight source frameworks. Our proposed definition aligns with the P-16 framework.[815]

Teachers' contributions to student learning growth[xxii]



Definition: Teachers contribute to students' learning growth.

Why it matters: As noted earlier, teachers are viewed as one of the most important contributors to student learning and social-emotional development.[816, 817, 818, 819, 820, 821, 822, 823] One approach to measuring their contributions to student learning relies on measuring their students' growth on learning outcomes (sometimes called "value-added"). Relative to status measures like proficiency rates, which conflate *who* instructors teach with *how well* they teach them, value-added models measure contributions to student outcomes by considering students' initial performance levels (for example, using prior test scores) or other background characteristics.

When teaching effectiveness is measured as instructors' contributions to student learning, evidence of disparities in access to highly effective instructors is mixed. Some studies find no differences in the average value-added of teachers of students from low- versus high-income households.[824, 825] Others do find disparities along student household income, race, and ethnicity, though they are usually small.[826, 827, 828, 829, 830] One study of more than 11,000 teachers in 10 school districts found that the highest performing teachers (in value-added to student achievement) were underrepresented in the most disadvantaged middle schools, but not in elementary schools, though these patterns varied across districts.[831] At the postsecondary level, less research has been done on college instructors' contributions to student learning, though existing studies have found substantial differences in instructors' value-added on student outcomes such as course grades and subsequent course-taking patterns.[832, 833, 834] However, these studies have not examined whether students from low-income households and students of color have equal access to effective college instructors.

Recommended metric(s): Percentage of instructors demonstrating above average contributions to student learning, as measured by student growth on state standardized tests or other outcomes (for example, using value-added models or student growth percentiles)

Data source(s): Administrative data; assessment data

What to know about measurement: Value-added and other growth models require linking instructors to student outcome data (such as test scores from two or more academic years, so growth can be measured). As of 2019, 15 states use value-added or other growth models in a formal capacity to measure teacher effectiveness in K–12, with another two states using them formatively, and 10 states reporting local control over the decision to use value-added.[835] At the postsecondary level, measurement of college instructor value-added is challenging because instructors often design and administer their own assessments. One way to address this shortcoming is to measure instructor impacts on subsequent grades and student course-taking patterns, though this method would not produce effectiveness measures for instructors who teach advanced-level courses.[836] In places that do

[xxii] This indicator is one of several that, together, signal teaching effectiveness. The full set of teaching effectiveness indicators includes *student perceptions of teaching*, *classroom observations of instructional practice*, and *teachers' contributions to student learning growth*.

not already calculate value-added or similar measures, framework users should consult with experts to implement this indicator, as there are different approaches to computing value-added having different technical and practical considerations. (For a review of research on measuring value-added, see Koedel et al.)[837] These approaches may result in differences in measures of instructors' effectiveness. For example, using student growth percentiles instead of value-added scores would have resulted in 14 percent of teachers in one district being placed in a different performance category.[838]

We caution against using value-added data as the only measure of teaching effectiveness (our recommendations also include measures based on classroom observation and student survey data—see *classroom observations of instructional practice* and *student perceptions of teaching*). When used for high-stakes accountability, measures of teachers' contributions to student learning may have unintended consequences (for example, leading to practices such as "teaching to the test"). These three measures have been shown to be valid and complementary measures of teaching effectiveness.[839] Evaluation systems based on multiple measures may be more reliable than those based on a single measure.

Under the Every Student Succeeds Act (ESSA), some states have moved away from value-added models as an approach to teacher evaluation and toward a measure of student growth based on student learning objectives. This change resulted in part from concerns (including lawsuits and protests) regarding the uses of test scores for teacher evaluation purposes. Student learning objectives are included in teacher evaluation plans in 28 states.[840] Accepted measures of student learning objectives can include state tests, district benchmarks, school-based assessments, and teacher and classroom-based measures. These differences would make it difficult to compare data across contexts on whether students are meeting student learning objectives. In addition, there is limited evidence on the validity or reliability of student learning objectives.[841]

Source frameworks: This indicator, or a version of measuring teacher effectiveness, appeared in five source frameworks reviewed for this report. Our recommendation to measure teacher effectiveness through student growth on standardized assessments draws from the National Research Council's Key National Education Indicators.[842]

Effective program and school leadership

Definition: Schools are led by effective principals and school leaders.

Why it matters: Pre-K and K–12 school leaders play a key role in student learning, school discipline and culture, and teacher professional growth.[843, 844] For instance, a study of principals' value-added to student achievement—one approach to assessing school leader effectiveness—found evidence of meaningful variation across principals. [845] In that study, highly effective principals raised achievement by the equivalent of two to seven months of additional learning in a given school year, whereas ineffective principals lowered achievement by the same amount.[846] Principals also impact the degree to which teachers collaborate and grow professionally,[847] as well as hiring and retention of more effective teachers.[848, 849] According to research by the Consortium on Chicago School Research, effective school leadership is characterized as being inclusive and focused on instruction.[850] For example, effective

principals set high standards for teaching, encourage teachers to take risks and try new approaches, and offer regular feedback on classroom instruction.

Research on principal value-added suggests that principal effectiveness tends to vary more widely in schools that serve a high share of students from low-income households.[851] In addition, multiple studies show that the likelihood of attending a school led by a first-year principal, one with less experience, or one without a master's degree is higher for students from low-income households, students of color, and those with low performance.[852, 853]

Recommended metric(s):

- Percentage of school leaders rated as effective, using an evaluation system that includes multiple measures, such as the Administrator Evaluation component of the Tennessee Educator Acceleration Model (TEAM)[854]

Data source(s): Assessment data; surveys; observations; rubrics

What to know about measurement: There is no clear consensus in the field about the best way to measure principal effectiveness, though emerging evidence suggests that approaches relying on multiple measures hold promise, including schoolwide growth data, scores on an evaluation rubric, and staff perception surveys.[855, 856, 857] Examples of staff surveys that can be used to measure effective school leadership include the Effective Leaders sub-component of the UChicago 5E's survey instrument,[858] Panorama Teacher and Staff Survey,[859] or The New Teacher Project's (TNTP) Instructional Culture Insight Survey.[860] However, no research has emerged at this point to show that staff surveys are valid and reliable measures of school leader effectiveness, and survey measures run the risk of offering a biased or potentially politicized rating of a leader, underscoring the importance of examining multiple measures. We have identified sample tools with an emerging evidence base; however, other instruments may also be appropriate to measure this indicator. We also note that a school's value-added score is not an

New York City's Framework for Great Schools

The New York City Department of Education's Framework for Great Schools draws on research from the Consortium of Chicago School Research, which identified key "essential supports" for school improvement, including effective school leadership, strong family-community ties, supportive environments, collaborative teachers, and rigorous instruction.

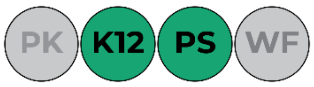
New York City's Department of Education collects data on each of these elements and reports the data in annual School Quality Snapshots available to the public through online dashboards. Schools receive a rating (excellent, good, fair, or needs improvement) for each element based on (1) parent and teacher surveys, and (2) quality reviews conducted by experienced educators who visit and evaluate the school. To evaluate school leadership, for example, reviewers determine how well school resources are aligned to instructional goals, how well the school meets its goals, and how well leaders make decisions. This qualitative assessment is complemented with data from a parent and teacher survey that asks questions about effective school leadership (for example, whether teachers say the principal communicates a clear vision for the school). The two data sources combine into an overall rating of the school's leadership.

Dashboard users can drill down to view the detailed survey responses, scores on the Quality Review, and qualitative data behind these scores. In an article by The Hechinger Report, Daniel Russo, a principal in the Bronx who oversaw the dramatic transformation of one of the city's most troubled schools, attributed this success to the school's concerted application of the framework.

appropriate proxy for measuring the effectiveness of a principal, as it can reflect both the principal's effectiveness and other school-level factors that influence students' growth on learning outcomes.[861, 862]

Source frameworks: This indicator appears in seven source frameworks reviewed for this report. Our recommendation to rely on multiple measures of performance to assess school leadership quality is consistent with the recommendations of several source frameworks, including the Great Public Schools Indicators Framework.[863]

Institutions' contributions to student outcomes



Definition: Schools and colleges contribute to students' short- and long-term outcomes.

Why it matters: School effectiveness measures aim to capture schools' impacts on student achievement on test scores,[864] as well as more long-term outcomes, such as high school graduation, college access and success, and eventual earnings.[865] Relative to status measures such as college enrollment or completion rates, which conflate *who* institutions serve with *how well* they serve them, approaches to measuring institutions' contributions to student outcomes consider students' initial performance levels (for example, using prior test scores) or other background characteristics. These analyses can paint a different picture of institutional effectiveness than status measures. For instance, analyses of nationwide data by the Educational Opportunity Project at Stanford University showed that, although test scores are higher, on average, in more affluent school districts, the relationship between school affluence and student outcomes does not hold when examining student learning growth.[866,867] Measures of institutional effectiveness can thus help E-W systems identify the institutions that exceed (or fail to meet) expected outcomes for students *given their prior performance.*

Evidence of disparate access to effective schools is mixed across studies, which are based on different measures, outcomes, and settings. For example, one large-scale study of schools' contributions to students' performance on the ACT found that schools with greater shares of students from low-income households or Black, Indigenous, or Latino students tended to have lower value-added scores.[868] On the other hand, a study that measured Louisiana high schools' contributions to students' high school graduation, college enrollment and persistence, and earnings found little or no relationship between schools' contributions to these outcomes and the share of students from low-income households in the school. At the postsecondary level, researchers who have measured colleges' contributions to student outcomes have found variation across institutions, but they have not examined how they relate to students' demographic characteristics. [869, 870, 871, 872] However, although college selectivity has little or no relationship to value-added, inputs such as instructional expenditures per student and faculty-to-student ratio are significantly positively related to colleges' value-added. [873]

Recommended metric(s):

- K–12: Schools' contributions to student outcomes, including achievement, attendance, social-emotional learning, college enrollment, and earnings, using value-added models
- Postsecondary: Colleges' contributions to student outcomes, including graduation rates, earnings, and student loan repayment, using value-added models

Data source(s): Administrative data; assessment data; student transcript data; surveys

What to know about measurement: Value-added and other growth models require linking schools or colleges to student outcome data (such as test scores from two or more academic years, so growth can be measured). As of 2021, all states included at least one approach to measuring growth on standardized tests in their school accountability plans under the Every Student Succeeds Act (ESSA). The most popular approach was student growth percentiles (used by 24 states as of 2019); eight states implemented value-added measures.[874, 875] One appeal of value-added models relative to other approaches is that schools' contributions to multiple student outcomes can be examined. Using K–12 records, value-added models have been used to measure schools' contributions to student attendance, course completion rates, social-emotional learning, and high school graduation, in addition to test scores.[876, 877] Recent work also has linked K–12, postsecondary, and wage records to measure schools' contributions to longer-term outcomes.[878] In places that do not already calculate value-added or similar measures, framework users should consult with experts to implement this indicator, as there are different approaches to computing value-added that have different technical and practical considerations. In practice, many states use other approaches to incorporating student growth data as part of their school accountability systems, which vary in validity and comparability as measures of schools' *contributions* to student outcomes. Users should also carefully consider the results of value-added measures so as not to reinforce existing inequalities by "explaining away" inter-group differences that might be addressed by system conditions or interventions.

Measuring "Promotion Power" in Louisiana and Washington, DC

In recent years, the Office of the State Superintendent of Education (OSSE) in the District of Columbia (DC) and the Louisiana Department of Education (LDOE) developed new measures to understand each high school's impact on the higher education and workforce prospects of its students. These measures are known as "promotion power" because they use statistical methods to measure each school's power to improve students' long-term outcomes separately from the characteristics of the students it serves.

DC and LDOE developed promotion power measures on multiple long-term outcomes. Although college or career readiness in high school, high school graduation, and college enrollment were key outcomes for both agencies, LDOE also measured promotion power for two longer-term outcomes: college persistence and earnings at age 26. Both entities relied on administrative data from the lead education agency (OSSE or LDOE) and the National Student Clearinghouse. Louisiana, which examined earnings, also linked individual-level data from the Louisiana Workforce Commission.

Analyses of the promotion power measures in DC and LDOE found that high schools vary widely in their power to promote long-term student outcomes. Although schools effective in promoting one long-term outcome (like high school graduation) were also more likely to be effective at promoting other long-term outcomes (like college enrollment), many schools varied in their effectiveness for different outcomes. LDOE high schools that are especially good at promoting college enrollment and persistence, for example, do not necessarily promote strong earnings for their students at age 26. This finding highlights how assessing school effectiveness on multiple dimensions of long-term success is important to help systems more accurately assess both school effectiveness and equity of access to effective schools.

Source frameworks: This indicator appeared in three source framework reviewed for this report. Our recommendation to use value-added models to measure an institution's contributions to student

growth draws from the National Academies[879] research to define quality in higher education. We also draw from Deutsch et al.'s discussion of promotion power.[880]

Access to college preparatory coursework

Definition: Students have access to the full set of courses needed to meet the requirements for admission at most colleges.

Why it matters: Most four-year colleges and universities require students to have completed a core set of college preparatory high school coursework to be eligible for admission.[881] In many states, however, the requirements for a high school diploma fall short of these admissions criteria.[882] For example, almost half of states require less than college expectations when it comes to foreign language coursework. Moreover, students sometimes lack access to certain required courses in their high schools. In California, for example, the University of California (UC) and California State University systems require students to complete a set of courses in seven areas, from history ("A") to a college preparatory elective ("G"). An analysis from 2017 found that not all high schools offered the full A–G sequence, with small and rural schools, in particular, being much less likely to do so.[883] Uneven access to college preparatory coursework can start as early as middle school, particularly in access to advanced math courses such as Algebra I that enable students to complete higher-level math before they graduate high school.[884, 885] Nationwide, only 59 percent of middle schools offer Algebra I.[886]

Recommended metric(s):

- Percentage of high schools offering each of the following sets of college preparatory courses:
  - Four years of English
  - Four years of math (including at least four of the following: pre-algebra, algebra, geometry, Algebra II or trigonometry, precalculus, calculus, statistics, quantitative reasoning, and data science)
  - Three years of laboratory science (including biology, chemistry, physics)
  - Two years of social science
  - Two years of foreign language
  - One year of visual or performing arts
- Percentage of middle schools offering Algebra I

Data source(s): Administrative data

What to know about measurement: Districts record information about the courses and programs offered in schools as part of their regular operations, and report school-level data to Civil Rights Data Collection (CRDC) on the number of Advanced Placement (AP), science, and math courses offered at each high school. Districts also report data to the CRDC on the number of Algebra I courses offered in middle schools.

Source frameworks: Several frameworks reviewed for this report discussed the importance of academic rigor in high school. Our definition draws from the Center for Collaborative Education's

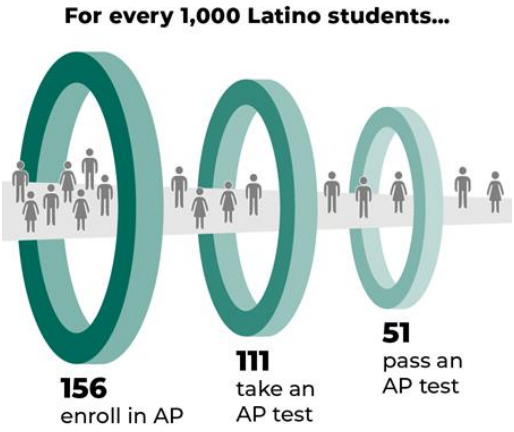
criteria for student-centered learning.[887] Our recommended metric draws on college preparatory course recommendations by the National Association for College Admissions Counseling.[888]

Access to early college coursework

PK K12 PS WF

Definition: Students have access to Advanced Placement (AP), International Baccalaureate (IB), and dual enrollment courses.

Why it matters: Many students lack access to early college coursework in high school, despite its importance for college admissions and success.[889, 890, 891] A nationwide analysis found that Black and Latino students are not equitably represented in advanced courses, and that these disparities relate to whether schools offer these courses and the number of seats available in them.[892] Another nationwide study found that Black and Indigenous students had significantly less access to AP coursework than their peers, based on the number of AP courses offered and the size of the student body in their schools. Inequitable access to early college courses is compounded by inequitable access to the end-of-course tests students need to pass to earn college credit.[893] According to the College Board, a typical AP exam fee in 2022 was $96, or $62 for eligible students from low-income households.[894] Just 29 states provide additional support to cover these costs.[895] For every 1,000 White students in the United States, 185 enroll in an AP course and 139 take an AP test. In contrast, for every 1,000 Black students, 105 take an AP course and 73 take an AP test.[896]



Source: Chatterji et al. (2021).

Recommended metric(s):

- Number of AP, IB, and dual enrollment courses offered, overall and by subject
- Percentage of students in an early college course who take the relevant end-of-course test needed to earn credit (for example, AP or IB test), overall and by subject

Data source(s): Administrative data

What to know about measurement: Districts record information about the courses and programs offered in schools as part of their regular operations, and report school-level data to Civil Rights Data Collection (CRDC) on the number of AP courses offered at each high school. For students who take AP and IB tests, high schools receive reports of their students' exam scores and can use this information to calculate the percentage of students in early college courses who take the tests.[897, 898]

To better assess whether students have equitable access to these opportunities, we recommend measuring the number of courses offered and the share of students taking the tests overall and by subject (rather than measuring only whether a school offers any early college courses). These school-level data should be disaggregated by schools' demographic characteristics and examined alongside

data on course participation captured in early college coursework completion in the Outcomes and Milestones section of this chapter.

Source frameworks: Six source frameworks reviewed for this report, including the Urban Institute's Robust and Equitable Measures to Identify Quality Schools (REMIQS) framework[899] and National Education Association's Great Public Schools Indicators Framework,[900] discussed the importance of early college course access and completion, including access to and enrollment in AP, IB, and dual enrollment courses.

Equitable placement in rigorous coursework

Definition: Students from various demographic subgroups are proportionally represented in rigorous courses and programs.

Why it matters: Even when schools offer rigorous coursework and other programs, students are not always equitably selected or encouraged to participate. For example, even among students with high standardized test scores, Black students are referred less often to gifted programs than other students, particularly when they are taught by non-Black teachers.[901] Concerns about inequitable placement extend into middle school and high school. As another example, although 80 percent of students nationwide have access to Algebra I in middle school—a gateway to higher-level math coursework in high school—just 13 percent of Latino students and 12 percent of Black students take Algebra I as 8th graders.[902] However, when placement policies in one district shifted from using subjective criteria to using student test scores, disparities in participation in Algebra I in 8th grade by income, race, and ethnicity were greatly reduced.[903] Disparities in participation in early college coursework can also reflect inequitable placement. Even in high schools that offer 18 or more Advanced Placement (AP) courses, enrollment in AP courses is significantly lower among Black, Latino, and Indigenous students than their White and Asian peers.[904]

Recommended metric(s): Differences in the participation rates for students from key demographic subgroups in rigorous courses and programs relative to those students' representation in their school population as a whole, including opportunities, such as the following:

- Gifted and talented programs
- Algebra I in middle school
- Higher-level math courses in high school (that is, Algebra II, calculus)
- Early college courses (AP, International Baccalaureate [IB], and dual enrollment)

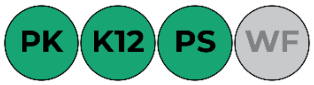
Data source(s): Administrative data; student transcript data

What to know about measurement: Schools regularly record student-level course and program enrollment as part of their regular operations. Additionally, districts report school-level data to Civil Rights Data Collection (CRDC) on multiple measures of student course enrollment, including the number of students enrolled in at least one dual enrollment program, the IB program, at least one AP course (including at least one science, technology, engineering, or mathematics [STEM] course), Algebra I, geometry, and computer science. We encourage framework users to examine data on

equitable participation alongside data on access to college preparatory coursework and access to early college coursework, as the availability of coursework is an important driver of participation, along with inequitable placement.

Source frameworks: Access to or participation in rigorous coursework appeared in three frameworks reviewed for this report. Our recommendation to emphasize equitable access is consistent with work by the National Research Council,[905] which recommends measuring "disparities in access to and enrollment in rigorous coursework."

Access to quality, culturally responsive curricula



Definition: Schools and instructors use a standards-aligned core course curriculum that meets quality standards (as defined by EdReports) and is culturally relevant, centering the lived experiences and heritage of students' ethnic or racial backgrounds.

Why it matters: A high-quality curriculum can shape instruction and student learning. For example, there is evidence that using skill-based curricula in early childhood education is linked to large improvements in children's cognitive abilities,[906] and in K–12, a growing body of experimental research shows that different curricula can lead to better academic achievement outcomes for students.[907] At the postsecondary level, curricula typically are not standardized, though there is some movement toward redesign and standardization of gateway courses to better promote student success.[908] However, there is limited information on what makes curricula effective, largely because curriculum information is not collected systematically. Available evidence suggests that content richness and standards alignment are common qualities of effective curricula, and that curricula prioritizing student engagement may have positive effects on student achievement. In particular, students may benefit from seeing their culture represented positively within the curriculum.[909, 910, 911] Research emphasizes the importance of "culturally relevant"[912] and "culturally sustaining"[913] curricula for students of color.

Recommended metric(s): No specific measures or tools identified

Data source(s): Curriculum materials

What to know about measurement: We were unable to identify standardized approaches to measuring access to quality, culturally responsive curricula, although there are ongoing advances in the field. Of note, EdReports[914] rates K–12 curricula based on coherence, standards alignment, and usability. Also useful are review rubrics, such as those published by Louisiana Department of Education,[915] and Culturally Responsive Curriculum Scorecards were developed recently through a collaboration between researchers, parents, students, and educators in New York City.[916] Generally, there are no applicable rubrics to rate the quality of college curricula, although Courseware in Context provides a framework for assessing the quality of digital courseware in higher education.[917] However, these tools do not assess cultural responsiveness or relevance.

Data on which curricula are in use in pre-K programs, K–12 schools, and postsecondary institutions currently are not collected systematically. Chingos and Whitehurst[918] suggest that foundations could play a role in providing start-up funding to establish systemic data collection mechanisms in K–12 settings, and Polikoff[919] summarizes challenges to collecting and analyzing curriculum adoption data at

scale. We encourage systems to begin systematically tracking which curricula are in use as an important first step toward measuring this indicator.

Source frameworks: Ten source frameworks reviewed for this report include a measure of access to quality, culturally responsive curricula for instruction. Our recommendation to emphasize cultural relevance as a critical component of curriculum quality is consistent with recommendations put forth by StriveTogether,[920] the National Research Council,[921] the Alliance for Resource Equity,[922] and Center on Enhancing Early Learning Outcomes in collaboration with the Council of Chief State School Officers (CCSSO).[923]

Expenditures per student

PK K12 PS WF

Definition: The amount of education and related expenditures per student.

Why it matters: School funding has been shown to contribute to better outcomes for students. Using national data, one study found that reading and vocabulary scores among Head Start children are higher where Head Start spending is higher.[924] In K–12, causal studies consistently find that increases in per-pupil spending lead to higher test scores, high school graduation, college enrollment, and earnings, particularly for children from low-income households.[925, 926, 927, 928] In the postsecondary context, increases in per-student spending result in increased persistence and degree completion in both two- and four-year colleges.[929] Increases in state appropriations for higher education spending also have been shown to result in increased educational attainment and shorter time to degree completion.[930] In addition to instructional expenditures per student, increases in student service expenditures can also lead to increases in persistence and graduation rates, particularly for students from low-income households.[931, 932]

Source: Morgan and Amerikaner (2018).

Yet funding is neither equal nor equitable. The highest-poverty districts in the United States receive approximately $1,000 less per student than the lowest-poverty districts[933]—even states that have implemented progressive funding policies based on student need have not all been successful in ensuring funding for students from low-income households exceeds funding levels for more advantaged students.[934] At the postsecondary level, colleges with more students of color and students from low-income households have lower expenditures per student.[935, 936] Attendance at for-profit colleges, which have lower instructional expenditures per student[937, 938] and spend more on advertising[939] than nonprofit colleges, is higher among students of color and those from low-income households.

Recommended metric(s):

- Pre-K: State expenditures per child enrolled
- K–12:
  - Per pupil expenditures

  - Equity Factor, a measure that indicates variance in per-pupil funding within a state (see this brief by New America for more information)[940]

- Postsecondary: Total instruction and student service expenditures per full-time equivalent (FTE) student based on 12-month enrollment

Data source(s): Administrative data

What to know about measurement: Data on expenditures are widely available. The National Institute for Early Education Research (NIEER) reports annual state spending in public pre-K programs. For elementary and secondary schools, data are reported annually at the state, district, and school levels through the U.S. Department of Education's Office of Elementary and Secondary Education (OESE) Per Pupil Expenditure Transparency website. At the postsecondary level, data on instructional expenditures per student and student service expenditures are available annually through the Integrated Postsecondary Education Data System (IPEDS). Disparities in funding can be assessed vertically at the federal, state, and local levels, as well as horizontally between schools within the same district or postsecondary institutions within the same state.

Source frameworks: This indicator appeared in seven source frameworks reviewed for this report. Our recommendations for measuring elementary and secondary funding draws on work by StriveTogether.[941]

DOMAIN: Social, emotional, and physical well-being

Access to early intervention screening

PK K12 PS WF

Definition: Children receive early intervention screening for any developmental, sensory, and behavioral concerns to determine whether services are needed.

Why it matters: Screening children for developmental, sensory, and behavioral concerns may allow for early intervention, which is one reason why one of the Healthy People 2030 objectives established by the U.S. Department of Health and Human Services is to "increase the proportion of children who receive a developmental screening." Data collected via the National Survey of Children's Health indicate that only 31 percent of children ages 9–35 months received developmental screenings in 2016–2017.[942] Further, White children and children from economically advantaged backgrounds receive early screening and intervention services more often than children of color.[943, 944]

Recommended metric(s):

- Percentage of children with identified concerns who are connected to services
- Percentage of children needing selected special education services in kindergarten who were not identified and connected to services before kindergarten

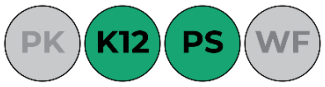
Data source(s): Administrative data; survey data

What to know about measurement: Children may receive screening through different mechanisms, and no single system currently captures the necessary information to measure this indicator. State

Pre-K programs are required to conduct vision, hearing, and developmental screenings, and provide referrals when needed. Head Start also requires the use of screeners. Although not required, pediatricians can also conduct screenings and other developmental assessments during an office visit. At the national and state levels, this information is currently collected and reported annually through the National Survey of Children's Health. Survey items could be adapted by local educational agencies or institutions to better understand the experiences of the individual students they serve.

Source frameworks: This indicator appeared in two source frameworks reviewed for this report. Our recommended measures draw on those proposed in the Center for the Study of Social Policy's Early Childhood System Performance Assessment Toolkit.[945]

School safety[xxiii]



Definition: Students feel physically, mentally, and emotionally safe at school or campus (that is, safe from both physical threats and violence, as well as bullying and cyberbullying).

Why it matters: School safety is a core component of school and campus climate, both of which are linked to higher attendance and academic achievement.[946, 947, 948, 949. 950, 951, 952] Yet research demonstrates disparities in students' feelings of safety according to their race and ethnicity. For example, one study found that students in schools serving predominantly Black and Latino populations report feeling less safe and having less positive peer interactions than those at schools with predominantly White and Asian populations, on average. [953] Even within the same schools and homerooms, Black and Latino students report feeling less safe than their White and Asian peers.[954, 955] According to the National Survey of Student Engagement, 1 in 7 Black students and 1 in 10 Indigenous students feel physically unsafe on college campuses, compared to 1 in 17 Asian students and 1 in 20 White or Latino students.[956]

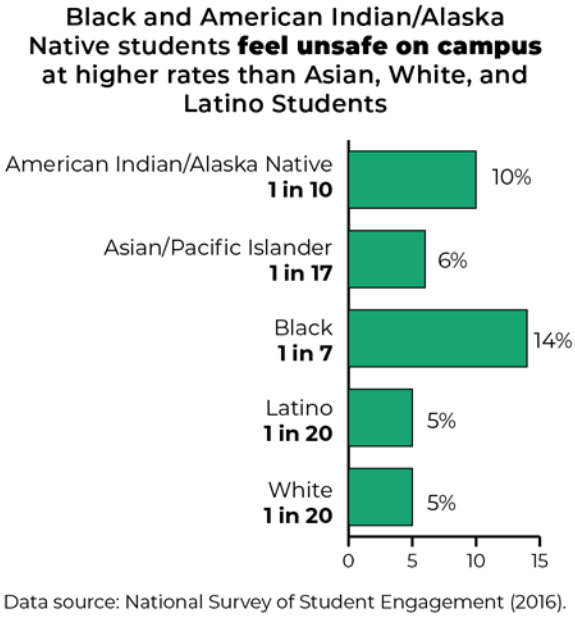
Recommended metric(s):

- K–12**:** Percentage of students reporting high levels of physical, mental, and emotional safety in school climate surveys, such as the U.S. Department of Education ED School Climate Surveys (EDSCLS),[957] the Sense of Safety subscale within the CORE Districts school culture and climate survey,[958] or the School Safety subscale within the Panorama Student Survey[959]
- Postsecondary: Percentage of students reporting physical safety and freedom from harassment and discrimination in campus surveys, such as the National Survey of Student Engagement[960]

Data source(s): Administrative data; surveys

What to know about measurement: Measuring students' feelings about school or campus safety requires administering student surveys, and a growing number of schools and colleges do so. In a 2020 review of states' Every Student Succeeds Act (ESSA) plans, 16 states were administering or piloting school climate or engagement student surveys.[961] At the postsecondary level, 601 colleges and

[xxiii] This indicator is one of several that, together, signal school climate. The full set of school climate indicators includes *school-family engagement*, *equitable discipline practices*, *student perceptions of teaching*, *school safety*, and *inclusive environments*.



universities participated in the National Survey of Student Engagement in 2020.[962] Both school and campus climate surveys typically include questions related to students' feelings of safety. However, different survey instruments may be used. We have identified and suggested tools with an evidence base; however, other instruments may also be appropriate.

The use of different instruments and surveyed grades in K–12 can reduce the comparability of this indicator across contexts. For example, California surveys students in grades 5, 7, 9, and 11, whereas South Carolina surveys students in grades 3–12. More than half of the states using surveys for ESSA administer them to students as early as grade 3, although some researchers caution against surveying young children who may not understand the meaning of the questions. [xxiv, 963] Care should be taken to ensure the instruments used are reliable, valid, and developmentally appropriate.[xxv] Finally, as with all surveys, data users should pay attention to response rates in interpreting and reporting school or campus climate survey data to ensure respondents are representative of the population of students.

At the postsecondary level, campus safety can be measured more feasibly using data on the number of reported on-campus crimes per 1,000 students, which are publicly available through the U.S. Department of Education's Campus Safety and Security Reporting System. [964] However, administrative records often underreport instances of victimization, so anonymous surveys can be a useful complement to measure perceptions of safety and experiences that students may not have reported to the police.

Source frameworks: This indicator appeared in nine source frameworks reviewed for this report. Our emphasis on physical, mental, and emotional safety is consistent with recommendations from the Alliance for Resource Equity,[965] the National Education Association,[966] and the Massachusetts Consortium for Innovative Education Assessment (MCIEA).[967] Although source frameworks focused primarily on school safety in K–12 contexts, we recommend broadening this measure to include postsecondary settings as well.

[xxiv] For example, an analysis of survey data in the CORE Districts found that students in grades 3–5 were more likely to be confused by negatively worded items, leading to lower reliability and higher variance in students' responses. For this reason, CORE Districts survey students only in grades 5–12.

[xxv] Instruments used to measure inclusive environments can also encompass students' feeling of safety in school or campus. For example, the "How I Feel About My School" questionnaire for pre-K students includes a question on how safe a child feels at school. However, after consulting with early learning experts, we determined it was not appropriate to measure children's perceptions of school safety as a separate construct in pre-K. However, data users should examine school safety for pre-K programs located in K-12 school sites based on school climate data.

Inclusive environments[xxvi]

PK K12 PS WF

Definition: Individuals feel they belong and feel connected to their peers in their schools, postsecondary institutions, and workplaces.

Why it matters: When individuals feel they belong, they experience higher levels of motivation, engagement, and tenacity.[968] As a result, a sense of belonging in school, campus, or work contributes to improved achievement as well as health and well-being.[969, 970, 971, 972] Whether individuals feel they belong varies across contexts. A national survey of middle school students found limited differences in feelings of belonging across demographic groups.[973] At the postsecondary level, a national survey found that students of color and first-generation students reported a lower sense of belonging than continuing-generation or White students at four-year (but not two-year) colleges, though the differences were small.[974] In the workplace, women and people of color are more likely to experience bullying and less likely to receive social support from their peers.[975]

Recommended metric(s):

- Pre-K: Percentage of children reporting positive feelings toward their school, as measured by questionnaires such as the Collaborative for Academic, Social, and Emotional Learning's (CASEL) How I Feel About My School questionnaire, or percentage of

National Assessment of Collegiate Campus Climates and the California Community College Equity Leadership Alliance

The Race and Equity Center at the University of Southern California created the California Community College Equity Leadership Alliance to assess and improve campus climates and address systemic racism on community college campuses. The alliance, which includes more than half of California's 115 community colleges, uses the Center's National Assessment of Collegiate Campus Climates (NACC) survey to assess students' perspectives on inclusion, belonging, institutional commitment to diversity, and depth of cross-cultural interactions. The Center is also developing a workplace climate survey for faculty and staff that focuses on topics of equitable advancement opportunities; sense of belonging; workplace environment; and employee encounters with racism, sexism, homophobia, and transphobia.

Participating campuses will administer the student climate survey in the first year, followed by the faculty survey, and then the staff survey. Results of student, faculty, and staff climate surveys will be compiled into a written report with practical recommendations and de-identified responses for data disaggregation. Surveys will be readministered on a three-year cyclical basis to assess improvements and efforts toward addressing systemic racism and campus climate.

The Alliance also supports participating leaders through an annual series of professional trainings focusing on research-based strategies and practical approaches to issues of racial inequity on campuses and in the workplace. The trainings are supplemented with an online repository of resources and tools for Alliance members to continue their learning through equity-related rubrics, readings, and case studies. The Alliance offers an example of how to use campus and workplace climate surveys to drive systemic change.

[xxvi] This indicator is one of several that, together, signal school climate. The full set of school climate indicators includes *school-family engagement*, *equitable discipline practices*, *student perceptions of teaching*, *school safety*, and *inclusive environments*.

classrooms demonstrating equitable sociocultural interactions, as measured by observational assessments, such as Assessing Classroom Sociocultural Equity Scale (ACSES)

- K–12: Percentage of students reporting belonging in school, as measured by surveys such as the Sense of Belonging subscale of the CORE Districts school culture and climate survey,[976] the Classroom Belonging subscale of the Panorama Student Survey,[977] or the Elevate survey's Affirming Identities and Classroom Community scales[978]
- Postsecondary: Percentage of students reporting belonging on campus, as measured by surveys such as the Higher Education Research Institute (HERI) Diverse Learning Environments Survey,[979] the National Institute for Transformation and Equity (NITE) Culturally Engaging Campus Environments (CECE) Survey,[980] or the Ascend survey's Belonging Certainty, Identity Safety, Social Belonging, and Social Connectedness scales[981]
- Workforce: Percentage of employees reporting belonging at work, as measured by surveys such as the Association of American Medical Colleges (AAMC) Diversity Engagement Survey

Data source(s): Surveys

What to know about measurement: Measuring individuals' sense of belonging and their perceptions of the level of inclusiveness of their environments requires administering surveys, and a growing number of schools, colleges, and employers are doing so. We have identified and suggested a sampling of widely used tools with an evidence base; however, other instruments may also be appropriate to measure this indicator. For example, the Inclusion of Other in Self scale, a one-item instrument, is recommended by the Urban Institute's Boosting Upward Mobility framework to measure "belongingness." We have suggested instruments that are more comprehensive, but the Inclusion of Other in Self scale could be used as a viable alternative across age ranges. In practice, a number of survey tools are used by institutions to gather data on school and campus climate and employee engagement.

As noted earlier, data users should determine whether measurement tools are reliable, valid, and developmentally appropriate, and use them accordingly. For example, in early childhood, the How I Feel About my School questionnaire is designed "as an informal measure for individual classroom teachers to invite feedback from students and reflect on areas for growth, and has not been validated as a formal evaluation tool." The ACSES measure is relatively new and has been validated with other widely used observational assessments, including the Classroom Assessment Scoring System (CLASS), but has not been linked to child outcomes. At the postsecondary level, the CECE survey includes a sense of belonging scale, which has been shown to be significantly related to measures of culturally engaging campus environments.[982] Finally, data users should pay attention to response rates in interpreting and reporting the resulting data.

Source frameworks: As noted above, we believe that sense of belonging is linked closely to inclusive environments, and eight source frameworks reviewed for this report included sense of belonging, inclusive environments, or both. Our proposed approach to treat this indicator as a system condition is consistent with the approach taken by the Urban Institute in the Boosting Upward Mobility framework.[983]

Representational racial and ethnic diversity of educators

PK K12 PS WF

Definition: Educators reflect the racial and ethnic diversity of the student body.

Why it matters: Students benefit from being taught by a racially and ethnically diverse teaching staff, with students of color in particular benefiting from having teachers of their own race or ethnicity. Research links student-teacher race match to positive outcomes for students of color, including higher achievement;[984] reduced experiences of exclusionary discipline;[985] increased referrals for gifted and talented programs;[986] decreased likelihood of dropping out of school;[987] increased parental engagement;[988] and better school adjustment.[989] As just one example, when Black boys have a Black teacher, they are 15 to 18 percent less likely to be subjected to exclusionary discipline.[990] However, Black and Latino teachers are underrepresented in the teaching force relative to the population of students. Whereas only 47 percent of U.S. elementary and secondary students in 2017 were White, 79 percent of teachers were White. Meanwhile, only 6 percent of teachers were Black, compared to 15 percent of students, and 9 percent of teachers were Latino, compared to 27 percent of students.[991] At the postsecondary level, Black and Latino instructors are also underrepresented relative to the population of students attending college.[992, 993, 994]

Bright Futures Education Partnership's Systems-Level Indicators

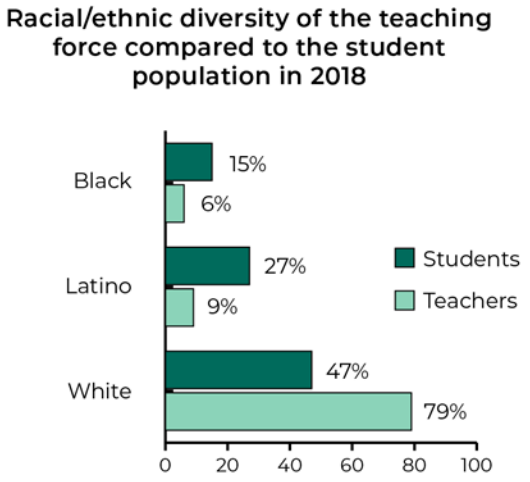
The Bright Futures Education Partnership models are a data-driven approach to addressing racial equity. Located in Monterey County, California, the Bright Futures Education Partnership was founded in 2014 to connect and support community organizations focused on fostering progress in education outcomes.

In 2021, the organization adopted seven systems-level indicators on which it will collect data and report results. They are in addition to 21 indicators that Bright Futures already tracks across seven community goal areas: early care and education; kinder-ready; language and literacy; critical thinking; youth connectedness; college or job training ready; and career pathway. The seven new systems-level indicators focus specifically on identifying systemic racial disparities, and include indicators of school funding, same-race teachers, bilingual teachers, teacher credentials, teacher experience, school discipline, and the digital gap.

Michael Applegate, Bright Future's data and research partnership manager, noted that much of the partnership's work leverages publicly available data. In California, information about teachers' gender, race, education, experience, and credentials can be matched to the demographics of their classrooms. Bright Futures staff can gain access to multiple large-scale data sets, linking to them to conduct their analyses through a partnership with California State University (CSU) Monterey Bay, which is responsible for a large portion of the local teacher pipeline. The organization recently hired an analyst to explore equity questions, such as whether students of color have equal access to fully credentialed and highly experienced teachers.

Recommended metric(s): Educational staff composition by race and ethnicity (%) compared to student composition by race and ethnicity (%)

- Additional possible measure: Same-race student–teacher ratio by race and ethnicity



Data source: National Center for Education Statistics (2020).

Data source(s): Administrative data

What to know about measurement: Administrative data systems regularly record the race and ethnicity of students and staff, though these data might be maintained in separate systems. Staff includes administrators, teachers and faculty, and support staff. For example, institution-level data on educator and student diversity are available publicly on a regular basis through the Common Core of Data for K–12 and Integrated Postsecondary Education Data System (IPEDS) for postsecondary. Although these data are generally comparable, different systems do not always use the same race and ethnicity reporting categories. For example, IPEDS does not collect race and ethnicity for students who are "nonresident aliens," who are placed into a mutually exclusive group.[995]

Source frameworks: This indicator appeared in 12 source frameworks reviewed for this report. Our recommended approach aligns with work by StriveTogether,[996] the National Research Council,[997] and the Alliance for Resource Equity.[998]

School and workplace racial and ethnic diversity

PK K12 PS WF

Definition: Individuals are exposed to racial and ethnic diversity within their schools, postsecondary institutions, and workplaces.

Why it matters: In both schools and the workplace, greater diversity is shown to reduce intergroup prejudice[999] and improve intelligence and innovation.[1000] In early learning settings, racial and ethnic diversity is positively associated with children's language development.[1001] Racially integrated elementary and secondary schools are associated with improved life outcomes for all students, including higher college enrollment and success, higher lifetime earnings, more diverse social circles, and better social skills in adulthood.[1002, 1003] In postsecondary settings, frequent interracial interactions and more diverse campuses are related to positive student outcomes, such as growth in leadership skills, psychological well-being, and intellectual engagement.[1004, 1005, 1006, 1007] Diverse workplaces are related to improved employee interpersonal skills and innovation, financial performance, and less conflict.[1008] However, high levels of racial segregation persist in many settings. For example, in 2018, 13 percent of Black students, 16 percent of Latino students, and 18 percent of White students attended schools where at least 90 percent of their classmates shared their racial and ethnic background.[1009]

Recommended metric(s):

- Pre-K, K-12, and workforce: Student body composition by race and ethnicity (%)
- Workforce: Employee composition by race and ethnicity (%)

Data source(s): Administrative data

What to know about measurement: Student and employee demographics are reported regularly in administrative data systems. Unlike postsecondary institutions and employers, however, pre-K and K–12 institutions have less direct control over the demographics of their populations. Thus, this indicator should be used to identify policy solutions to address ongoing segregation rather than penalize institutions.

Note that we suggest capturing the diversity of school leadership in the *representational racial and ethnic diversity of educators* indicator. For a workforce-level correlate, employee composition data could be disaggregated by management level to assess the extent to which workers of color (or any other demographic group) are represented in management positions.

Source frameworks: This indicator appeared in four source frameworks reviewed for this report. Our recommendations align with Alliance for Resource Equity's[1010] definition for "diverse classrooms and schools." We expanded the definition and metric to include workplace racial and ethnic diversity as well.

School and workplace socioeconomic diversity

Definition: Individuals are exposed to socioeconomic diversity within their schools, postsecondary institutions, and workplaces.

Why it matters: The disparity in average school poverty rates between White and Black students is the single most important predictor of differences between their academic achievement.[1011] Schools generally reflect the socioeconomic composition of the neighborhoods within which they operate; attendance in schools with a high concentration of poverty is higher among children of color than White children.[1012] The relationship between economic segregation and outcomes begins in early childhood, where children's academic achievement and social-emotional development have been linked to the average socioeconomic status of their classroom, regardless of a child's own economic or demographic background.[1013, 1014] The benefits of socioeconomic integration may extend into the workplace.[1015, 1016, 1017]

Recommended metric(s):

- Pre-K, K-12, and postsecondary: Student body composition by income
- Workforce: Employee composition by income

Data source(s): Administrative data

What to know about measurement: In early childhood and K–12, this indicator may be difficult to measure based on family income, as household income is not systematically collected and reported in these sectors.[1018] Eligibility for free or reduced-price lunch eligibility is often used as a proxy for low income, although this metric has several limitations, as discussed in greater detail under the guidance for measuring income status in the chapter on disaggregates. At the postsecondary level, the Free Application for Federal Student Aid (FAFSA) collects information on adjusted gross income, though not all students fill out the FAFSA. Workforce systems capture individuals' earnings.

As noted under the school and workplace racial and ethnic diversity indicator, pre-K and K–12 institutions have less direct control over demographics than postsecondary institutions and workplaces. This indicator should be used to identify policy solutions rather than penalize these institutions.

Source frameworks: This indicator appeared in five source frameworks reviewed for this report, most commonly through measures of economic segregation. Our definition aligns with the Alliance for Resource Equity's Dimensions of Equity,[1019] which acknowledges the benefit of socioeconomic diversity in classrooms and schools. Our measure draws from the Urban Institute's[1020] metric for student poverty concentration. We expanded the definition and metric to include workplace socioeconomic diversity as well.

Access to health, mental health, and social supports

PK K12 PS WF

Definition: Individuals have access to health, mental health, and social services provided by educational institutions and employers.

Source: District Leadership Forum (2020).

Why it matters: Schools can be a critical source of support for students' physical, mental, and social-emotional health. For example, three out of four students who ever access mental health services do so through their school.[1021, 1022] Schools that provide access to nurses, school psychologists, and social workers tend to see improved learning outcomes, school climate, and student well-being.[1023, 1024, 1025] For example, schools with higher nurse-to-student ratios appear to improve attendance by preventing unnecessary release from school.[1026, 1027] Yet health programs and services are distributed inequitably—that is, schools that serve higher shares of students from low-income households and students of color tend to have fewer and lower-quality resources available.[1028] Following the COVID-19 pandemic, the need for mental health and social supports has grown. For example, in recent national surveys, 14 percent of teens and 40 percent of college students reported feeling depression.[1029, 1030] Data from several employer surveys also show that behavioral health is increasingly important to workers in the wake of the pandemic.[1031, 1032, 1033]

Recommended metric(s):

- Pre-K: Percentage of programs offering health, mental health, and social services, or staff or consultants providing infant and early childhood mental health consultation (IECMHC) services
- K–12: Ratio of number of students to number of health, mental health, and social services full-time equivalent (FTE) staff (for example, school nurses, psychologists, and social workers)
- Postsecondary: Ratio of number of students to number of health, mental health, and social services FTE staff (for example, school nurses, psychologists, and social workers)

- Workforce: Percentage of employers offering an employee assistance program or mental health access through health care plans or other services, as measured by employer surveys

Data source(s): Administrative data; survey data

What to know about measurement: Standardized measurement of this indicator is likely to vary across sectors. In the K–12 and postsecondary sectors, the number of FTE staff in various student support roles can be measured consistently using administrative data. For example, the U.S. Department of Education's National Teacher and Principal Survey collects data on the number of FTE nurses, psychologists, and social workers among a sample of schools.[1034] In pre-K, metrics to measure access to services are still evolving, and access to on-site staff may vary according to program size. Some early childhood education programs have early childhood mental health specialists who work with children and teachers; to measure this feature, we propose assessing the availability of early childhood mental health consultation (ECMHC) services.[1035] In workplace settings, we recommend that employers report information on their benefits programs—for example, through the Kaiser Family Foundation Employer Health Benefits Survey,[1036] which asks about mental and behavioral health benefits and wellness programs.

Source frameworks: Nine source frameworks reviewed for this report emphasized the need for access to health and mental health services throughout the E-W continuum. Our metric for pre-K draws from the National for Children in Poverty's State Indicators for Early Childhood.[1037] The recommendation to measure the ratio of students to health professionals in K–12 and postsecondary aligns with work by StriveTogether[1038] and the National Education Association.[1039] We expanded the definition and measures to include employer health and mental health services to align with current workplace best practices.[1040]

DOMAIN: Career readiness and economic success

Access to college and career advising

PK K12 PS WF

Definition: College and career counseling services are available in high schools and college campuses.

Why it matters: Having access to effective college and career advising can help students navigate transitions between high school, college, and the workplace. A small but growing body of evidence shows that counselors vary in their effectiveness at boosting high school students' graduation rates, college attendance, selectivity, and persistence; moreover, students from low-income households benefit most from being assigned to an effective counselor.[1041, 1042] The American School Counselor Association recommends a counselor caseload of 250 students, yet many counselors manage double or triple that recommended caseload, with the national average caseload at 471 students.[1043] Many studies have shown that counselors in schools serving underrepresented students are often unable to advise students effectively because their caseloads are too large.[1044, 1045] One study estimates that adding an additional high school counselor improves four-year college enrollment rates by 10 percentage points.[1046]

In a postsecondary context, comprehensive, integrated support programs (including advising, tutoring, and career services, among other supports) have produced higher academic achievement and degree

attainment for students from low-income households.[1047] Research has also identified specific characteristics of effective advising—specifically, *humanized*, *holistic*, and *proactive* advising—that contribute to the success of students of color at predominantly White institutions.[1048, 1049] Yet use of college career counseling services is lowest among Latino college students nationwide (46 percent), followed by White students (48 percent) and Black and Asian students (53 percent). Students age 26 and older also used career counseling services significantly less than students younger than age 26 (57 versus 39 percent, respectively).[1050]

Recommended metric(s):

- K–12: Ratio of number of students to number of full-time equivalent (FTE) counselors
- Postsecondary: Percentage of students using academic advising and career counseling services

Data source(s): Administrative data (educator administrative data; student administrative data); surveys

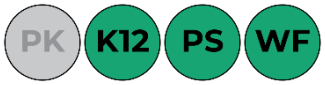
What to know about measurement: The recommended metric for the K–12 sector should be considered a minimum benchmark for measurement, as the ratio of students to FTE counselors does not provide insight into the quality or effectiveness of advising services. For a fuller picture, data users might be interested in additional information, such as the percentage of time that counselors dedicate to advising, how many students within the school they serve, the amount of time that other staff dedicate to advising (such as school-based administrators, third-party nonprofit program staff, and part-time or full-time volunteers), and/or the degree to which counselors or other staff leverage data to understand matriculation patterns of their school's graduates and help students make informed decisions based on the likelihood of completion (a practice that research links to the effectiveness of advising services).[1051]

Currently, the field lacks feasible ways to measure the quality and effectiveness of K–12 advising services at scale, but the number of FTE staff in various student support roles can be measured consistently using administrative data. For example, the U.S. Department of Education's National Teacher and Principal Survey collects data on the number of FTE counselors among a sample of schools. Therefore, we suggest tracking the ratio of students to FTE counselors *at minimum*, and strongly recommend that K–12 systems assess the quality of advising services by disaggregating data on key indicators of successful student transitions, such as *early college coursework completion*, SAT/ACT *participation*, *FAFSA completion*, *selection of a well-matched postsecondary institution*, *senior summer on track*, *postsecondary enrollment directly after high school graduation*, and/or *successful career transition after high school*.

At the postsecondary level, data on student utilization of college career counseling services may not be systematically collected everywhere. However, items from the Strada-Gallup College Experiences Survey[1052] could be used to measure utilization of academic advising and career services among college students. Similar to the K–12 sector, we recommend that postsecondary systems also disaggregate data on key indicators of successful student transitions through postsecondary education, such as *first-year credit accumulation*, *first-year program concentration*, and *gateway course completion* to understand whether advising services are effective and for whom. Also see the chapter on evidence-based practices for summaries of effective advising approaches.

Source frameworks: This indicator appeared in four source frameworks reviewed for this report, such as the Urban Institute's Robust and Equitable Measures to Identify Quality Schools (REMIQS) framework.[1053] Our recommendation to expand this indicator to include access to advising at the postsecondary level aligns with recommendations from the P-16 framework.[1054]

Access to in-demand CTE pathways



Definition: Career and technical education (CTE) pathway offerings are aligned to in-demand occupations, as defined by regional labor market data.

Why it matters: Recent studies of CTE offerings indicate that CTE programs are frequently misaligned with projected job openings in local regions. For example, one study of CTE programs in high schools in West Virginia found that only about half of the state's CTE programs were aligned to at least one occupation in high demand among employers in the region.[1055]An earlier study in Tennessee found that only 18 percent of graduates concentrated in program areas aligned to high-demand occupations.[1056] Research shows that the benefits of CTE vary widely across fields, with certain high-demand fields such as health yielding greater economic returns to participants.[1057]

Recommended metric(s):

- K–12: Number and percentage of CTE program offerings considered "in demand"
- Postsecondary: Number and percentage of CTE program offerings considered "in demand"

Data source(s): Administrative data

What to know about measurement: High schools and community colleges record program offerings as part of their regular operations, but to identify whether these offerings are aligned to occupations in demand by employers in the region, they must link such programs to labor market data. The meaning of what counts as an in-demand occupation or CTE pathway can vary

Nebraska's High Skill, High Wage, and High Demand Occupations data

The Strengthening Career and Technical Education for the 21st Century Act (known as Perkins V) went into effect in July 2019, introducing a new requirement: states and local education agencies would need to use data to assess and demonstrate alignment between their program offerings and labor market needs.

As described in this brief by Advance CTE, states have operationalized this requirement in different ways, developing their own definitions for what occupations count as high skill, high wage, or in demand based on labor market data and making that data more or less available to the public. In Nebraska, the state's H3 website provides detailed information on occupations that are high skill, high wage, and high demand (H3) at state or regional levels. For example, across the state, the number one H3 occupation based on the number of annual openings, net change in employment, and growth rate is currently heavy and tractor-trailer truck driver.

Users can easily explore H3 occupations by career cluster, accessing data on average wages; number of annual openings; and required education, job training, and work experience. Data are updated weekly to reflect new or rapidly growing industries. As part of its Perkins V state plan, Nebraska requires that all secondary and postsecondary CTE programs use the data tool to demonstrate alignment to H3 occupations.

across contexts.[1058] However, CTE programs can be classified as in demand if they are related to an occupation that meets one or more of the following criteria established by the U.S. Department of Labor's Occupational Information Network (O*NET): projected to have rapid growth or a large number of openings in the student's state or region based on short-term occupational projections data, or considered to be a new and emerging occupation. These criteria have been established by O*NET for "Bright Outlook" occupations.[1059]

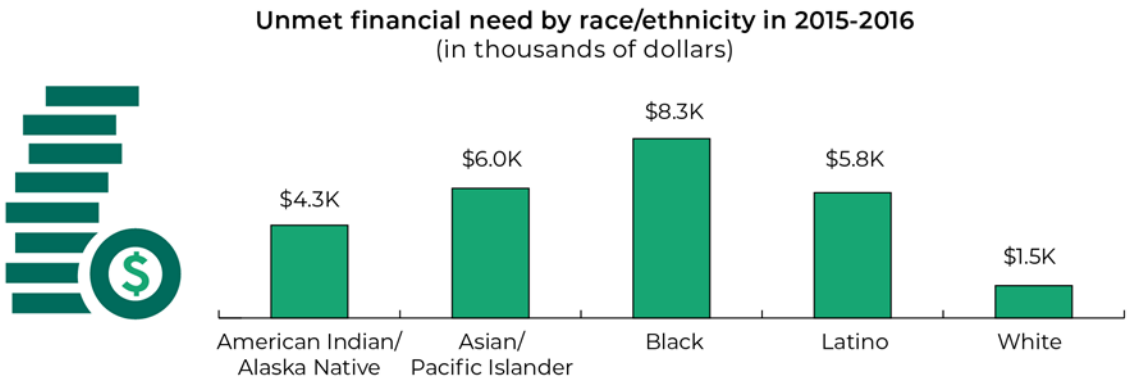
Source frameworks: This indicator appeared in four source frameworks reviewed for this report. Our emphasis on in-demand, quality career pathways aligns with work by the Alliance for Quality Career Pathways, a project of the Center for Law and Social Policy (CLASP).[1060] Definitions of in-demand vary state to state, therefore our suggested metric relies on regional labor market data.

Unmet financial need

PK K12 **PS** WF

Definition: The cost of college attendance students must pay out of pocket or finance through loans.

Why it matters: Higher levels of unmet financial need are likely to lead to more student loan debt or require students to work while enrolled in college, thus affecting their progression through college. In fact, students with more unmet need are less likely to graduate.[1061] At least in some states, it is the students with the lowest incomes who tend to have the highest levels of unmet financial need.[1062] In addition, Black students are less likely to receive nonfederal grant aid and receive lower average amounts than their peers.[1063] The Postsecondary Value Commission shows that Black students are, on average, burdened with approximately $8,300 in unmet financial need, whereas the average unmet need of White students is approximately $1,500 per year of attendance.



Source: Postsecondary Value Commission (2022).

Recommended metric(s): Average net price (cost of attendance minus grants, scholarships, or tuition waivers from all sources) minus average expected family contribution (EFC), as calculated by Free Application for Federal Student Aid (FAFSA)

Data source(s): Administrative data

What to know about measurement: Unmet financial need provides a more accurate representation of the out-of-pocket expenses a student is expected to pay than net attendance price, because unmet financial need considers each student's EFC, as calculated by students' FAFSA. (Note that as of the 2024-2025 school term, the EFC will be known as the Student Aid Index [SAI]). Although EFC data are tracked in administrative data systems and each college has this information available for the purposes of awarding federal financial aid, they are not reported publicly annually. Information on race and ethnicity is not collected on the FAFSA form currently, limiting regular disaggregation of unmet financial aid by race and ethnicity unless the data are linked to institutional or state records.

Source frameworks: This indicator appeared in five source frameworks reviewed for this report. Our proposed definition and measure align with work by the Institute for Higher Education Policy.[1064]

Cumulative student debt

Definition: The total amount of student loans individuals take out while enrolled in college.

Why it matters: Higher student loan debt is associated with decreased rates of home ownership[1065] and worse mental health outcomes.[1066, 1067] Compared to their peers, Black students take out loans more often than other racial and ethnic groups,[1068] and have more debt on average.[1069] Though the amount of debt students accumulate during college is affected by student-level factors such as their expected family contribution (EFC), system-level factors such as the tuition and fees charged by institutions and the amount of grant aid made available to students are the largest contributors to rising student debt.[1070, 1071] Several factors, including the sector of the institution the student attended, the student's grade point average (GPA) in college, whether the student attained a degree, and their labor market outcomes, also predict the probability of loan default. In particular, students attending for-profit institutions, who tend to be Black at disproportionately high rates, are at especially high risk for loan default.[1072]

Recommended metric(s): Median student debt

Data source(s): Administrative data

What to know about measurement: The College Scorecard[1073] publicly reports institution-level median student loan debt, drawing on individual-level data in the National Student Loan Data System (NSLDS). However, because information on race and ethnicity is not yet collected on the Free Application for Federal Student Aid (FAFSA) form, regular disaggregation of student debt by race and ethnicity requires NSLDS data to be linked to institutional or state records.

Source frameworks: This indicator appeared in two source frameworks reviewed for this report. Our proposed definition and measure align with work by the Institute for Higher Education Policy.[1074]

Expenditures on workforce development programs

Definition: The amount of government funding dedicated to workforce development programs, including apprenticeships and job training programs, in a state.

Why it matters: Workforce development programs, such as apprenticeships and job training programs, benefit both job seekers and employers. For instance, apprenticeship programs offer valuable training and skills development for participants while providing employers with a reliable talent pipeline.[1075] However, workers of color and women historically have received lower-quality training and had insufficient connections to the labor market.[1076] Information on the level of government expenditures is critical to assessing whether states can provide high-quality workforce development programs for those who need it. The amount of state funding allocated to workforce development more than doubled between 2011 and 2020, though federal spending to support employment and training declined during this time.[1077]

Recommended metric(s): The amount of funding dedicated to workforce development programs as a percentage of total educational funding in a state

Data source(s): Administrative data

What to know about measurement: There is no central source of data for federal expenditures on workforce development. The Urban Institute provides a list of federal workforce funding streams,[1078] including Workforce Innovation and Opportunity Act (WIOA)—which distributes funding for six core workforce programs, including training, employment, basic skills, and rehabilitation services—and Perkins V, which funds high school and college career and technical education (CTE) programs. State-level data on federal funding can be obtained from the corresponding federal agencies. For example, the National Center for Education Statistics (NCES) reports state-level allocations of federal Perkins V funds for CTE. [1079]

At the state level, funding streams vary. However, as part of its State Economic Development Expenditures Database, the Council for Community and Economic Research collects data annually on state investments in workforce preparation and development, which it defines as "the amount states spent on education, training, and recruitment of workers with programs concentrating on improving the skills base and job placement of a state and/or community's labor base" (this includes training, apprenticeships, and "other" workforce development programs).[1080] States may provide workforce development funding through multiple agencies, including the state department of labor and/or economic development, state education agency, state higher education office, and community and/or technical college system. [1081]

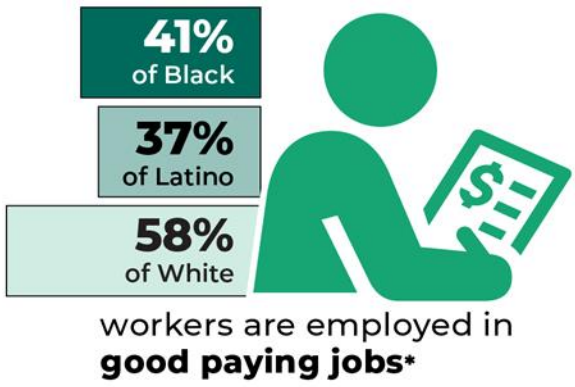
Source frameworks: This indicator appeared in three source frameworks reviewed for this report, including the Center for Law and Social Policy (CLASP) Framework for Career Pathways Innovation,[1082] which recommends measuring the "funding level for career pathways or bridge programs."

Access to jobs paying a living wage

PK K12 PS **WF**

Definition: Jobs that pay enough to meet basic family needs are available in a community.

Why it matters: A minimum wage is typically insufficient for individuals and families to meet basic needs, much less achieve economic mobility and security. According to calculations by researchers at Massachusetts Institute of Technology (MIT), under the current federal minimum wage ($7.25 per hour at the time of publication), two working adults would each need to work approximately 75 hours per week to meet the basic needs of a typical family of four.[1083] Although a growing number of states and municipalities are adopting minimum wages above the federal standard, earning more than minimum wage typically is required to establish economic resilience and build savings. In 2016, 58 percent of White workers were employed in a job that paid at least $35,000 ($17 per hour for full-time jobs) for workers between the ages of 25 and 44, and at least $45,000 ($22 per hour) for workers between the ages of 45 and 64.[1084] This share was 41 percent for Black workers and 37 percent for Latino workers nationwide.



* Defined as >$35K for ages 25-44 and >$45K for ages 45-64.
Source: Carnevale et al. (2019).

Recommended metric(s): Percentage of jobs in a county or metropolitan statistical area (MSA) for which the ratio of average pay to the location-adjusted cost of living is greater than one

Data source(s): Administrative data

What to know about measurement: This indicator requires a calculation based on the local cost of living and average wages in a local area. The Bureau of Labor Statistics publishes quarterly wage data at county, MSA, and state levels through the Quarterly Census of Employment and Wages. Cost of living data by county and MSA are published annually through MIT's Living Wage Calculator.

Source frameworks: This indicator appeared in five source frameworks reviewed for this report. Our proposed measure builds on work by the Urban Institute,[1085] which also includes a measure of access to jobs paying a living wage, defined as "ratio of pay on the average job to the cost of living."

Access to ongoing career skills development

PK K12 PS **WF**

Definition: Workers are employed in jobs that provide on-the-job training or a professional learning and development path.

Why it matters: Opportunities for "reskilling" and "upskilling" can help workers obtain new skills to meet evolving labor market demands. An analysis by the National Skills Coalition suggests that 53 percent of all U.S. jobs require "middle-level" skills, whereas only 43 percent of U.S. workers are trained at the middle skill level.[1086] On-the-job training may contribute as much to workers' earnings as formal schooling, and a decline in employer-provided training may be a contributing factor to rising inequality in the United States.[1087, 1088] Continuous professional development can help employers develop and retain skilled workers while helping employees develop skills that allow them to succeed at work and earn progressively higher wages.

Recommended metric(s): Percentage of employees who have access to on-the-job training or a professional learning and development plan directly from their employer

Data source(s): Surveys

What to know about measurement: This indicator is likely to require surveying employees or employers. The International Social Survey Programme (ISSP), a cross-national survey collaboration, collects data on whether respondents have had the opportunity to improve their job skills during the past 12 months, as well as on other non-economic job characteristics as part of its Work Orientations module. (However, the ISSP Work Orientations module series is administered at inconsistent intervals—the most recent data available are from 2015.) Alternatively, employers participating in the Workforce Innovation and Opportunity Act (WIOA) are required to report whether program participants achieve "measurable skills gains" within a program year, defined as whether participants are "in an education or training program that leads to a recognized postsecondary credential or employment and who are achieving measurable skill gains, defined as documented academic, technical, occupational, or other forms of progress, towards such a credential or employment."[1089] Although this measure applies only to WIOA provisions, a similar measure could be adapted for other surveys of employers.

Source frameworks: This indicator appeared in three frameworks reviewed for this report. Our proposed measure aligns with recommendations put forth by the National Research Council,[1090] which suggests using employer surveys to collect data on types of on-the-job training provided by employers.

E-W system conditions endnotes

[640] Duncan, G. J., & Magnuson, K. (2013). Investing in preschool programs. *Journal of Economic Perspectives, 27*(2), 109–132. https://doi.org/10.1257/jep.27.2.109

[641] Heckman, J. J. (2006). Skill formation and the economics of investing in disadvantaged children. *Science, 312*(5782), 1900–1902. https://doi.org/10.1126/sciences.1138898

[642] Bartik, T. J., & Hershbein, B. (2017). *Pre-k in the public schools: Evidence from within U.S. states*. W.E. Upjohn Institute for Employment Research. https://research.upjohn.org/up_workingpapers/285/

[643] Latham, S., Corcoran, S. P., Sattin-Bajaj, C., & Jennings, J. L. (2020). Racial disparities in pre-K quality: Evidence from New York City's universal pre-K program. *Educational Researcher*. https://doi.org/10.3102/0013189X211028214

[644] Barnett, W. S., Jung, K., Friedman-Krauss, A., Frede, E. C., Nores, M., Hustedt, J. T., Hoews, C., & Daniel-Echols, M. (2016). How much can high-quality universal pre-k reduce achievement gaps? *AERA Open, 4*(2). https://doi.org/10.1177%2F2332858418766291

[645]Friedman-Krauss, A. H., Barnett, W. S., Garver, K. A., Hodges, K. S., Weisenfeld, G. G., & Gardiner, B. A. (2020). *The state of preschool 2020*. The National Institute for Early Education Research. https://nieer.org/wp-content/uploads/2021/04/YB2020_Full_Report.pdf

[646] See Latham et al. (2020).

[647] Build Initiative & Child Trends. (2020). *Quality compendium*. https://qualitycompendium.org/

[648] See Build Initiative & Child Trends (2020).

[649] Squires, J. (2014). *The second "I" in QRIS.* National Institute for Early Education Research. https://nieer.org/2014/11/24/the-second-i-in-qris

[650] CEELO & CCSSO. (2017). *Birth to grade 3 indicator framework: Opportunities to integrate early childhood in ESSA toolkit*. https://ccsso.org/resource-library/birth-grade-3-indicator-framework-opportunities-integrate-early-childhood-essa

[651] Atteberry, A., Bassok, D., & Wong, V. C. (2019). The effects of full-day pre-kindergarten: Experimental evidence of impacts on children's school readiness. *Educational Evaluation and Policy Analysis, 41*(4), 537–562. https://doi.org/10.3102%2F0162373719872197

[652] Robin, K. B., Frede, E. C., & Barnett, W. S. (2006). *Is more better? The effects of full-day vs. half-day preschool on early school achievement.* The National Institute for Early Education Research. https://nieer.org/wp-content/uploads/2016/08/IsMoreBetter.pdf

[653] Ehrlich, S. B., Allensworth, E., & Tansey, J. (2022). *Meeting families' needs: Attendance rates in full-day vs. half-day pre-K.* University of Chicago Consortium on School Research. https://consortium.uchicago.edu/publications/meeting-families-needs

[654] Malik, R. (2018). *The effects of universal preschool in Washington, D.C. Children's learning and mothers' earnings.* Center for American Progress. https://www.americanprogress.org/article/effects-universal-preschool-washington-d-c/

[655] National Center for Education Statistics. (2018). *Table 202.20. Percentage of 3-, 4- and 5-year-old children enrolled in preprimary programs, by level of program, attendance status, and selected child and family characteristics: 2018*. Digest of Education Statistics. Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/programs/digest/d19/tables/dt19_202.20.asp

[656] Office of Civil Rights. (2016). *2013-2014 Civil Rights Data Collection: A first look*. U.S. Department of Education. https://www2.ed.gov/about/offices/list/ocr/docs/crdc-2013-14.html

[657] Holt, A. (2014). *Making the hours count.* New America. https://www.newamerica.org/education-policy/policy-papers/making-the-hours-count/

[658] Bill & Melinda Gates Foundation. (2020). *P-16 Framework*. https://usprogram.gatesfoundation.org/who-we-are/p16-framework

[659] Adams, G., & Rohacek, M. (2002). More than a work support?: Issues around integrating child development goals into the child care subsidy system. *Early Childhood Research Quarterly, 17*(4), 418–440. https://doi.org/10.1016/S0885-2006(02)00184-9

[660] Weber, R. B., Grobe, D., & Davis, E. E. (2014). Does policy matter? The effect of increasing child care subsidy policy generosity on program outcomes. *Children and Youth Services Review, 44*, 135–144. https://doi.org/10.1016/j.childyouth.2014.06.010

[661] Blau, D., & Tekin, E. (2007). The determinants and consequences of child care subsidies for single mothers in the USA. *Journal of Population Economics*, *20*(4), 719–741. https://www.jstor.org/stable/40344406

[662] Fuller, B., Kagan, S. L., Caspary, G. L., & Gauthier, C. A. (2002). Welfare reform and child care options for low-income families. *The Future of Children*, 97–119. https://www.jstor.org/stable/1602769

[663] Johnson, A. D., & Ryan, R. M. (2015). The role of child-care subsidies in the lives of low-income children. *Child Development Perspectives*, *9*(4), 227–232. https://doi.org/10.1111/cdep.12139

[664] McCartney, K., Dearing, E., Taylor, B. A., & Bub, K. L. (2007). Quality child care supports the achievement of low-income children: Direct and indirect pathways through caregiving and the home environment. *Journal of applied developmental psychology*, *28*(5-6), 411–426. https://doi.org/10.1016/j.appdev.2007.06.010

[665] The NICHD Early Child Care Research Network. (2005). *Child care and child development: Results from the NICHD study of early child care and youth development.* The Guilford Press. https://psycnet.apa.org/record/2005-07172-000

[666] Forry, N., Daneri, P., & Howarth, G. (2014). *Childcare subsidy literature review*. Office of Planning, Research, and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services. https://www.acf.hhs.gov/opre/report/child-care-subsidy-literature-review

[667] Shlay, A. B., Weinraub, M., Harmon, M., & Tran, H. (2004). Barriers to subsidies: Why low-income families do not use child care subsidies. *Social Science Research, 33*(1), 134–157. https://doi.org/10.1016/S0049-089X(03)00042-5

[668] Office of Child Care. (2022). *Data & funding.* Office of the Administration for Children & Families, U.S. Department of Health & Human Services. https://www.acf.hhs.gov/occ/data-0

[669] Krafft, C., Davis, E. E., & Forry, N. D. (2015). *Continuity of child care subsidy receipt: Why definitions of spells and gaps matter.* Child Trends. https://www.childtrends.org/publications/continuity-of-child-care-subsidy-receipt-why-definitions-of-spells-and-gaps-matter

[670] Rhode Island KIDS COUNT. (2005). *Getting ready: National School Readiness Indicators.*https://www.rikidscount.org/Portals/0/Uploads/Documents/Early%20Learning/Getting%20Ready/Executive%20Summary.pdf

[671] Henderson, A. T., & Mapp, K. L. (2002). *A new wave of evidence: The impact of school, family, and community connections on student achievement*. Southwest Educational Development Lab. https://eric.ed.gov/?id=ED474521

[672] Bryk, A. S., Sebring, P. B., Allensworth, E., Luppescu, S., & Easton, J. Q. (2010). *Organizing schools for improvement: Lessons from Chicago*. University of Chicago Press. https://consortium.uchicago.edu/sites/default/files/2019-02/organizing-schools-improvement-prologue_0.pdf

[673] Berkowitz, R., Astor, R. A., Pineda, D., Tunac DePedro, K., Weiss,E. L., & Benbenishty, R. (2017). Parental involvement and Perceptions of school climate in California. *Urban Education*, *56*(3), 393–423. https://journals.sagepub.com/doi/full/10.1177/0042085916685764

[674] Cooper, C. W. (2009). *Educational leaders as cultural workers: Engaging families and school communities through transformative leadership*. In S. Horsford (Ed.), New perspectives in educational leadership: Exploring social, political and community contexts and meaning (pp. 173–195). Peter Lang. https://www.peterlang.com/document/1050911

[675] Lareau, A., & Horvat, E. M. (1999). Moments of social inclusion and exclusion: Race, class and cultural capital in family-school relationships. *Sociology of Education, 72*(1), 37–53. https://doi.org/10.2307/2673185

[676] Badequano-Lopez, P., Alexander, R. A., Hernandez, S. J. (2013). Equity issues in parental and community involvement in schools: What teacher educators need to know. *Review of Research in Education, 37*(1), 149–182. https://eric.ed.gov/?id=EJ1004561

[677] Yull, D., Wilson, M., Murray, C., & Parham, L. (2018). Reversing the dehumanization of families of color in schools: Community-based research in a race-conscious parent engagement program. *School Community Journal, 28*(1), 319–347. https://files.eric.ed.gov/fulltext/EJ1184919.pdf

[678] Office of Planning, Research, & Evaluation. (2015). *Family and provider/teacher relationship quality (FPTRQ) provider/teacher measure.* Administration of Children & Families. https://www.acf.hhs.gov/opre/report/family-and-provider/teacher-relationship-quality-fptrq-provider/teacher-measure

[679] Panorama Education. (2022). *Family-school relationships survey*. Panorama Education. https://www.panoramaed.com/family-school-relationships-survey

[680] CORE Districts. (2021a). *Social-emotional learning, well-being, & school culture.* CORE survey data: Hearing from our students, staff, and families. https://coredistricts.org/our-improvement-data/social-emotional-learning-well-being-and-school-culture/

[681] Jordan, P. W., & Hamilton, L. S. (2020). *Walking a fine line: School climate surveys in state ESSA plans*. FutureEd. https://www.future-ed.org/school-climate-surveys-in-state-essa-plans/

[682] California Department of Education. (2021). *LCFF Priority 6 statement of model practices*. California Department of Education. https://www.cde.ca.gov/eo/in/lcff-pri6-practices.asp#:~:text=Strive%20for%20a%2070%25%20minimum,school%20safety%20and%20student%20connectedness.

[683] Georgia Department of Education. (2019). *2019 school climate Star ratings data calculation guide for principals and district users*. Georgia Department of Education. https://www.gadoe.org/wholechild/Pages/School-Climate-Star-Rating.aspx

[684] The Research Alliance for New York City Schools. (2022). *Understanding school survey response rates*. Research Alliance for New York City Schools https://steinhardt.nyu.edu/research-alliance/research/spotlight-nyc-schools/understanding-school-survey-response-rates

[685] Chen, I. (2022). *The top 5 ways to raise survey response rates (Q & A Ep.2)*. Panorama Education. https://www.panoramaed.com/blog/top-5-ways-raise-survey-response-rates

[686] StriveTogether. (2021). *A guide to racial and ethnic equity systems indicators.* https://www.strivetogether.org/wp-content/uploads/2021/09/A-guide-to-racial-and-ethnic-equity-systems-indicators.pdf

[687] CORE Districts. (2017). *Improvement measures.* https://coredistricts.org/our-improvement-data/improvement-measures/

[688] National Research Council. (2012). *Key national education indicators: Workshop summary.* The National Academies. https://doi.org/10.17226/13453

[689] Skiba, R. J., Chung, C-G., Trachok, M., Baker, T. L., Sheya, A., & Hughes, R. L. (2014). Parsing disciplinary disproportionality: Contributions of infraction, student, and school characteristics to out-of-school suspension and expulsion. *American Educational Research Journal,* 51(4), 640-670. https://doi.org/10.3102/0002831214541670

[690] Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science, 24*(2), 97–140.https://www.tandfonline.com/doi/full/10.1080/10888691.2018.1537791

[691] Welsh, R.O., & Little, S. (2018). The school discipline dilemma: A comprehensive review of disparities and alternatives approaches. *Review of Educational Research*. https://doi.org/10.3102/0034654318791582

[692] Losen, D. J., & Martinez, T. E. (2013). *Out of school and off track: The overuse of suspensions in American middle and high schools.* The Civil Rights Project/ Proyecto Derechos Civiles. https://eric.ed.gov/?id=ED541735

[693] See Welsh & Little (2018).

[694] Payne, A. A., & Welch, K. (2013). Restorative justice in schools: The influence of race on restorative discipline. *Youth & Society, 47*(4), 539–564. https://doi.org/10.1177/0044118X12473125

[695] Arundel, K. (2022). *The struggle over defining, reporting restraint and seclusion in schools.* K–12 Dive. https://www.k12dive.com/news/the-struggle-over-defining-reporting-restraint-and-seclusion-in-schools/618570/

[696] Bollmer, J. M, Bethel, J. W., Munk, T. E., Bitterman, A. R. (2014). *Methods for assessing racial/ethnic disproportionality in special education: A technical assistance guide (revised).* IDEA Data Center. https://ideadata.org/sites/default/files/media/documents/2017-09/idc_ta_guide_for_508-010716.pdf

[697] CORE Districts. (2017). *Improvement measures.* https://coredistricts.org/our-improvement-data/improvement-measures/

[698] National Research Council. (2012). *Key national education indicators: Workshop summary.* The National Academies. https://doi.org/10.17226/13453

[699] Cooper, H., Patall, E., Batts Allen, A., & Dent, A. l. (2010). Effects of full-day kindergarten on academic achievement and social development. *Review of Educational Research, 80*(1), 34-70. https://doi.org/10.3102/0034654309359185

[700] Hahn, R. A., Rammohan, V., Truman, B. I., Milstein, B., Johnson, R. L., Muntaner, C., Jones, C. P., Fullilove, M. T., Chattopadhyay, S. K., Hunt, P. C., Abraido-Lanza, A. F., & the Community Preventive Services Task Force. (2014). Effects of full-day kindergarten on the long-term health prospects of children in low-income and racial/ethnic-minority populations: A community guide systematic review. *American Journal of Preventive Medicine, 46,* 312–323. https://doi.org/10.1016/j.amepre.2012.12.003

[701] Gibbs, C. (2017). *Does full-day kindergarten reduce achievement gaps?* University of Notre Dame. https://www.irp.wisc.edu/publications/focus/pdfs/foc332d3.pdf

[702] Education Commission of the States. (2020). *State kindergarten-through-third-grade policies. Does the state require the district to offer kindergarten and if so, full or half day? What exemptions exist for districts?* https://reports.ecs.org/comparisons/state-k-3-policies-07

[703] National Center for Education Statistics. (2021a). *Digest of education statistics, 2019, 55th edition*. Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2021009

[704] National Center for Education Statistics. (2004). *Full-day and half-day kindergarten in the United States: Findings from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99.* Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2004078

[705] See Education Commission of the States (2020).

[706] Institute of Education Sciences. (2022). *Information on the Common Core of Data (CCD)*. U.S. Department of Education, National Center for Education Statistics, Institute of Education Sciences. https://nces.ed.gov/ccd/files.asp#Fiscal:2,LevelId:2,SchoolYearId:34,Page:1

[707] California Department of Education. (2022). *Kindergarten in California.* https://www.cde.ca.gov/ci/gs/em/kinderinfo.asp

[708] Araujo, M. C., Carneiro, P., Cruz-Aguayo, Y., & Schady, N. (2016). Teacher quality and learning outcomes in kindergarten. *The Quarterly Journal of Economics, 131*(3), 1415–1453. https://doi.org/10.1093/qje/qjw016

[709] Chetty, R., Friedman, J. N., Hilger, N., Saez, E., Schanzenbach, D. W., & Yagan, D. (2011). How does your kindergarten classroom affect your earnings? Evidence from Project STAR. *The Quarterly Journal of Economics, 126*(4), 1593–1660. https://doi.org/10.1093/qje/qjr041

[710] CEELO & CCSSO. (2017). *Birth to grade 3 indicator framework: Opportunities to integrate early childhood in ESSA toolkit*. https://ccsso.org/resource-library/birth-grade-3-indicator-framework-opportunities-integrate-early-childhood-essa

[711] Olsen, L. (2010). *Reparable harm: Fulfilling the unkept promise of educational opportunity for California's long term English learners.* California Together. https://web.stanford.edu/~hakuta/Courses/Ed330X%20Website/Olsen_ReparableHarm2ndedition.pdf

[712] Kim, J. (2011). *Relationships among and between ELL status, demographic characteristics, enrollment history, and school persistence* (CRESST Report 810). National Center for Research on Evaluation, Standards, and Student Testing. https://eric.ed.gov/?id=ED527529

[713] Kim, J., & Herman, J. L. (2010). *When to exit ELL students: Monitoring success and failure in mainstream classrooms after ELLs' reclassification* (CRESST Report 779). National Center for Research on Evaluation, Standards, and Student Testing. https://eric.ed.gov/?id=ED520430

[714] Chen-Gaddini, M., & Burr, E. (2016). *Long-term English learner students: Spotlight on an overlooked population.* Regional Education Laboratories, West, Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/edlabs/regions/west/Publications/Details/236

[715] Olsen, L. (2014). *Meeting at the unique needs of long-term English Language learners. A guide for educators.* National Education Association. http://www.langdevopps.com/wp-content/uploads/2018/09/NEA_Meeting_the_Unique_Needs_of_LTELs.pdf

[716] Callahan, R. M. (2005). Tracking and high school English learners: Limiting opportunity to learn. *American Educational Research Journal, 42*(2), 305–328. https://doi.org/10.3102/00028312042002305

[717] Haas, E., Huang, M., & Tran, L. (2014). *The characteristics of long-term English language learner students and struggling reclassified fluent English proficient students in Arizona.* Regional Education Laboratories, West. Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/edlabs/regions/west/Publications/Details/61

[718] Ed Trust. (2016). *Setting new accountability for English-learner outcomes in ESSA plans.* https://studentscantwait.edtrust.org/resource/setting-new-accountability-english-learner-outcomes-essa-plans/

[719] Cimpian, J. R., Thompson, K. D., & Makowski, M. B. (2017). Evaluating English learner reclassification policy effects across districts. *American Educational Research Journal, 54*(S1), 255S-278S. https://doi.org/10.3102/0002831216635796

[720] CORE Districts. (2017). *Improvement measures.* https://coredistricts.org/our-improvement-data/improvement-measures/

[721] Kini, T. (2022). *Tackling teacher shortages: What can states and districts do?* Learning Policy Institute. https://learningpolicyinstitute.org/blog/teacher-shortage-what-can-states-and-districts-do

[722] Manning, M., Garvis, S., Fleming, C., &. Wong, G. T. W. (2017). *The relationship between teacher qualification and the quality of the early childhood education and care environment.* Campbell Collaboration. https://eric.ed.gov/?id=ED573516

[723] Early, D. M., Maxwell, K. L., Burchinal, M., Alva, S., Bender, R. H., Bryant, D., Cai, K., Clifford, R. M., Ebanks, C., Griffin, J. A., Henry, G. T., Howes, C., Iriando-Perez, J., Jeon, H. J., Mashburn, A. J., Peisner-Feinberg, E., Pianta, R. C., Vandergrift, N., & Zill, N. (2007). Teachers' education, classroom quality, and young children's academic skills: Results from seven studies of preschool programs. *Child Development, 78*(2), 558-580. https://doi.org/10.1111/j.1467-8624.2007.01014.x

[724] Clotfelter, C. T., Ladd, H. F., & Vigdor, J. (2007). Teacher credentials and student achievement: Longitudinal analysis with student fixed effects. *Economics of Education Review, 26*(6), 673-682. https://doi.org/10.1016/j.econedurev.2007.10.002

[725] See Early et al. (2007).

[726] Goldhaber, D. D., & Brewer, D. J. (2000). Does teacher certification matter? High school teacher certification status and student achievement. *Educational Evaluation and Policy Analysis, 22*(2), 129–145. https://doi.org/10.3102/01623737022002129

[727] Rahman, T., Fox, M. A., Ikoma, S., & Gray, L. (2017). *Certification status and experience of U.S. public school teachers: Variations across student subgroups* (NCES 2017-056). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2017056

[728] Boyd, D., Lankford, H., Loeb, R., & Wyckoff, J. (2008). *The narrowing gap in New York City teacher qualifications and its implications for student achievement in high-poverty schools.* National Bureau of Economic Research. https://www.nber.org/papers/w14021

[729] See Clotfelter et al. (2007).

[730] Cardichon, J., Darling-Hammond, L., Yang M., Scott, C., Shields, P. M., & Burns, D. (2020, February). *Inequitable opportunity to learn: Student access to certified and experienced teachers.* Learning Policy Institute. https://eric.ed.gov/?id=ED603398

[731] Build Initiative & Child Trends. (2020). *Quality compendium*. https://qualitycompendium.org/

[732] National Institute of Early Education Research. (2018). *Implementing 15 essential elements for high-quality pre-k: an updated scan of state policies*. https://nieer.org/policy-issue/implementing-15-essential-elements-for-high-quality-a-state-and-local-policy-scan

[733] Rhode Island KIDS COUNT. (2005). *Getting ready: National School Readiness Indicators.* https://www.rikidscount.org/Portals/0/Uploads/Documents/Early%20Learning/Getting%20Ready/Executive%20Summary.pdf

[734] StriveTogether. (2021). *A guide to racial and ethnic equity systems indicators.* https://www.strivetogether.org/wp-content/uploads/2021/09/A-guide-to-racial-and-ethnic-equity-systems-indicators.pdf

[735] Harris, D. N, & Sass, T. R. (2001). Teacher training, teacher quality and student achievement. *Journal of Public Economics, 95*(7-8), 798–812. https://doi.org/10.1016/j.jpubeco.2010.11.009

[736] Rockoff, J. E. (2004). The impact of individual teachers on student achievement evidence from panel data. *The American Economic Review, 94*(2), 247–252. https://www.jstor.org/stable/3592891

[737] Kraft, M. A., & Papay, J. P. (2014). Can professional environments in schools promote teacher development? Explaining heterogeneity in returns to teaching experience. *Educational Evaluation and Policy Analysis, 36*(4), 476–500. https://doi.org/10.3102/0162373713519496

[738] Clotfelter, C. T., Ladd, H. F., & Vigdor, J. (2007). Teacher credentials and student achievement: Longitudinal analysis with student fixed effects. *Economics of Education Review, 26*(6), 673-682. https://doi.org/10.1016/j.econedurev.2007.10.002

[739] See Kraft & Papay (2014).

[740] Herzfeldt-Kamprath, R., & Ullrich, R. (2016). *Examining teacher effectiveness between preschool and third grade*. Center for American Progress. https://www.americanprogress.org/article/examining-teacher-effectiveness-between-preschool-and-third-grade/

[741] Rahman, T., Fox, M. A., Ikoma, S., & Gray, L. (2017). *Certification status and experience of U.S. public school teachers: Variations across student subgroups* (NCES 2017-056). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2017056

[742] Cardichon, J., Darling-Hammond, L., Yang M., Scott, C., Shields, P. M., & Burns, D. (2020, February). *Inequitable opportunity to learn: Student access to certified and experienced teachers.* Learning Policy Institute. https://eric.ed.gov/?id=ED603398

[743] Build Initiative & Child Trends. (2020). *Quality compendium.* https://qualitycompendium.org/

[744] National Academies of Sciences, Engineering, and Medicine. (2020). *Building educational equity indicator systems: A guidebook for states and school districts.* The National Academies Press. https://nap.nationalacademies.org/read/25833/chapter/2

[745] See Kraft & Papay (2014).

[746] Dillon, E., & Malick, S. (2020). *Teacher turnover and access to effective teachers in the school district of Philadelphia.* Regional Educational Laboratory, Mid-Atlantic. Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/rel/Project/4592#:~:text=The%20study%20also%20found%20that,45%20percent%20left%20the%20district.

[747] Tran, H., & Winsler, A. (2011). Teacher and center stability and school readiness among low-income, ethnically diverse children in subsidized, center-based child care. *Children and Youth Services Review, 33*(11), 2241–2252. https://doi.org/10.1016/j.childyouth.2011.07.008

[748] Bassok, D., Markowitz, A. J. Bellows, L., & Sadowski, K. (2021). New evidence on teacher turnover in early childhood. *Educational Evaluation and Policy Analysis, 43*(1), 172-180. https://doi.org/10.3102/0162373720985340

[749] Ronfeldt, M., Loeb, S., & Wyckoff, J. (2013). How teacher turnover harms student achievement. *American Educational Research Journal, 50*(1), 4-36. https://doi.org/10.3102/0002831212463813

[750] Goldring, R., and Taie, S. (2018). *Principal Attrition and Mobility: Results From the 2016–17 Principal Followup Survey First Look (NCES 2018-066).* U.S. Department of Education. Washington, DC: National Center for Education Statistics. https://nces.ed.gov/pubsearch

[751] Taie, S., & Goldring, R. (2017). *Characteristics of Public Elementary and Secondary School Principals in the United States: Results From the 2015–16 National Teacher and Principal Survey First Look (NCES 2017-070).* U.S. Department of Education. Washington, DC: National Center for Education Statistics. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2017070

[752] Finster, M. (2015). *Diagnosing causes of teacher retention, mobility, and turnover: Guidelines for TIF grantees*. Teacher Incentive Fund, U.S. Department of Education. https://eric.ed.gov/?id=ED577277

[753] National Council on Teacher Quality. (2021, December). *State of the states: State reporting of teacher supply and demand data.* National Council on Teacher Quality. https://www.nctq.org/publications/State-of-the-States-2021:-State-Reporting-of-Teacher-Supply-and-Demand-Data#data

[754] Anderson, T., Blount, D., Lindsay, C., Blom, E., Gebrekristos, S., & Alba, F. (2019). *Robust and equitable measures to identify quality schools (REMIQS).* The Urban Institute. https://www.urban.org/sites/default/files/2019/04/15/remiqs-detailed-model-final.pdf

[755] National Education Association (NEA). (2021). *Great public schools indicators framework.* https://www.nea.org/student-success/great-public-schools/what-students-deserve

[756] Aaronson, D., Barrow, L., & Sander, W. (2007). Teachers and student achievement in the Chicago public high schools. *Journal of Labor Economics, 25*(1), 95-135. https://doi.org/10.1086/508733

[757] McCaffrey, D. F., Sass, T. R., Lockwood, J. R., & Mihaly, K. (2009). The intertemporal variability of teacher effect testimates. *Education Finance and Policy, 4*(4), 572-606. https://doi.org/10.1162/edfp.2009.4.4.572

[758] Nye, B., Konstantopoulos, S., & Hedges, L. V. (2004). How large are teacher effects? *Educational Evaluation and Policy Analysis, 26*(3), 237-257. https://doi.org/10.3102/01623737026003237

[759] Rivkin, S. G., Hanushek, E. A., & Kain, J. F. (2005). Teachers, schools, and academic achievement, *Econometrica, 73*(2), 417-458. https://www.jstor.org/stable/3598793

[760] Rockoff, J. E. (2004). The impact of individual teachers on student achievement: Evidence from panel data. *American Economic Review, 94*(2), 247-252. https://doi.org/10.1257/0002828041302244

[761] Sanders, W. L., & Rivers, J. C. (1996). *Cumulative and residual effects of teachers on future student academic achievement (Research Progress Report).* University of Tennessee Value-Added Research and Assessment Center. https://www.heartland.org/publications-resources/publications/cumulative-and-residual-effects-of-teachers-on-future-student-academic-achievement

[762] Blazar, D., & Kraft, M. A. (2017). Teacher and teaching effects on students' attitudes and behaviors. *Educational Evaluation and Policy Analysis, 39*(1), 146-170. https://doi.org/10.3102/0162373716670260

[763] Jackson, K. C. (2018). What do test scores miss? The importance of teacher effects on non-test score outcomes. *Journal of Political Economy, 126*(5). https://doi.org/10.1086/699018

[764] Burchinal, M. (2017). Measuring early care and education quality. *Child Development Perspectives, 12*(1), 3–9. https://doi.org/10.1111/cdep.12260

[765] Masburn, A. J., Pianta, R. C., Hamre, B. K., Downer, J. T., Barbarin, O. A., Bryant, D., Burhinal, M., Early, D. M., & Howes, C. (2008). Measures of classroom quality in prekindergarten and children's development of academic, language, and social skills. *Child Development*, 79(3), 732–749. https://doi.org/10.1111/j.1467-8624.2008.01154.x

[766] Vitiello, V. E., Bassok, D., Hamre, B. K., Player, D., & Williford, A. P. (2018). Measuring the quality of teacher-child interactions at scale: Comparing research-based and state observation approaches. *Early Childhood Research Quarterly, 44*, 161–169. https://doi.org/10.1016/j.ecresq.2018.03.003

[767] Allen, J., Gregory, A., Mikami, A., Lun, J., Hamre, B., & Pianta, R. (2013). Observations of effective teacher-student interactions in secondary school classrooms: Predicting student achievement with the classroom assessment scoring system—Secondary. *School Psychology Review, 42*(1), 76–98. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5602545/

[768] Curby, T., Cameron, C. E., & Grimm, K. (2009). Teacher-child interactions and children's achievement trajectories across kindergarten and first grade. *Journal of Educational Psychology, 101*(4), 912–925. https://doi.org/10.1037/a0016647

[769] Pakarinen, E., Aunola, K., Kiuru, N., & Lerkkanen, M. K. (2014). The cross-lagged associations between classroom interactions and children's achievement behaviors. *Contemporary Educational Psychology, 39*(3), 248–261. https://doi.org/10.1016/j.cedpsych.2014.06.001

[770] Lowder, L., Atiqullah, M., Colebeck, D., Das, S., Karim, M., Khalid, A., Singh, R., & Utschig, T. (2017). Peer observation: Improvement of teaching effectiveness through class participation at a polytechnic university. *Journal of STEM Education, 18*(4). https://www.learntechlib.org/p/181986/

[771] Boyd, D., Lankford, H., Loeb, R., & Wyckoff, J. (2008). *The narrowing gap in New York City teacher qualifications and its implications for student achievement in high-poverty schools.* National Bureau of Economic Research. https://www.nber.org/papers/w14021

[772] Clotfelter, C. T., Ladd, H. F., & Vigdor, J. (2007). Teacher credentials and student achievement: Longitudinal analysis with student fixed effects. *Economics of Education Review, 26*(6), 673-682. https://doi.org/10.1016/j.econedurev.2007.10.002

[773] Dillon, E., & Malick, S. (2020). *Teacher turnover and access to effective teachers in the school district of Philadelphia.* Regional Educational Laboratory, Mid-Atlantic. Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/rel/Project/4592#:~:text=The%20study%20also%20found%20that,45%20percent%20left%20the%20district.

[774] Pianta, R., La Paro, K. M., & Hamre, B. K. (2008). *Classroom assessment scoring system: Pre-K version.* Paul H. Brookes Publishing Company. https://www.researchconnections.org/childcare/resources/4237

[775] Harms, T., Clifford, R., & Cryer, D. (2015). *Early Childhood Environment Rating Scale (3rd ed.).* Teachers College Press. https://fpg.unc.edu/publications/early-childhood-environment-rating-scale-third-edition-ecers-3

[776] Curenton, S. M., Iruka, I. U., Humphries, M., Jensen, B., Durden, T., Rochester, S. E., Sims, J., Whittaker, J. V., & Kinzie, M. B. (2020). Validity for the Assessing Classroom Sociocultural Equity Scale (ACSES) in early childhood classrooms. *Early Education and Development, 31*(2), 284–303. https://doi.org/10.1080/10409289.2019.1611331

[777] Danielson, C. (2012). Observing classroom practice. *Teacher Evaluation: What's Fair? What's Effective? 70*(3), 32-37. https://www.ascd.org/el/articles/observing-classroom-practice

[778] Danielson, C., & McGreal, T. L. (2000). *Teacher evaluation to enhance professional practice.* Educational Testing Service. https://eric.ed.gov/?id=ED446099

[779] Marzano, R. J., & Toth, M. D. (2013). *Teacher evaluation that makes a difference: A new model for teacher growth and student achievement.* ACSD. https://www.ascd.org/books/teacher-evaluation-that-makes-a-difference?variant=113002E4

[780] Chism, N. V. N. (2007). *Peer review of teaching: A sourcebook, 2nd edition.* Wiley. https://www.wiley.com/en-us/Peer+Review+of+Teaching%3A+A+Sourcebook%2C+2nd+Edition-p-9781933371214

[781] Bandy, J. (2015). *Peer review of teaching.* Center for Teaching, Vanderbilt University. https://cft.vanderbilt.edu/guides-sub-pages/peer-review-of-teaching/

[782] Iowa State University. (2022). *Peer observation of teaching: Best practices.* https://www.celt.iastate.edu/teaching/document-your-teaching/peer-observation-of-teaching-best-practices/

[783] University of South Carolina. (n.d.). *Center for teaching excellence.* https://sc.edu/about/offices_and_divisions/cte/teaching_resources/peer_observation.php

[784] Build Initiative & Child Trends. (2020). *Quality compendium.* https://qualitycompendium.org/

[785] Head Start Early Childhood Learning & Knowledge Center. (2021). *Use of classroom assessment scoring system (CLASS) in Head Start.* https://eclkc.ohs.acf.hhs.gov/designation-renewal-system/article/use-classroom-assessment-scoring-system-class-head-start

[786] Alan Fletcher, J. (2018). *Peer observation of teaching: A practical tool in higher education.* https://doi.org/10.13140/RG.2.2.19455.82084

[787] Campbell, S. (2020). Ratings in black and white: A quantcrit examination of race and gender in teacher evaluation reform. *Race and Ethnicity and Education.* https://doi.org/10.1080/13613324.2020.1842345

[788] Campbell, S. L., & Ronfeldt, M. (2018). Observational evaluation of teachers: Measuring more than we bargained for? *American Educational Research Journal,* 55(6), 1233–1267. https://doi.org/10.3102/0002831218776216

[789] Steinberg, M. P., & Garrett, R. (2016). Classroom composition and measured teacher performance: What do teacher observation scores really measure? *Educational Evaluation and Policy* Analysis, *38*(2), 293–317. https://doi.org/10.3102/0162373715616249

[790]Whitehurst, G. J. (Russ), Chingos, M. M., & Lindquist, K. M. (2014, May). *Evaluating teachers with classroom observations: Lessons learned in four districts.* Brown Center on Education Policy at the Brookings Institution. https://eric.ed.gov/?id=ED553815

[791] CEELO & CCSSO. (2017). *Birth to grade 3 indicator framework: Opportunities to integrate early childhood in ESSA toolkit*. https://ccsso.org/resource-library/birth-grade-3-indicator-framework-opportunities-integrate-early-childhood-essa

[792] Center for Collaborative Education. (2020). *Building for equity: School self-assessment tool.* https://www.cce.org/uploads/files/02-CCE-BuildingforEquityTools_School-Self-Assessment-Tool.pdf

[793] National Education Association (NEA). (2021). *Great public schools indicators framework.* https://www.nea.org/student-success/great-public-schools/what-students-deserve

[794] National Research Council. (2012). *Key national education indicators: Workshop summary.* The National Academies. https://doi.org/10.17226/13453

[795] See CEELO & CCSO (2017).

[796] Hornstein, H. A., & Edmond Law, H. F. (2017). Student evaluations of teaching are an inadequate assessment tool for evaluating faculty performance. *Cogent Education, 4*(1). https://www.tandfonline.com/doi/full/10.1080/2331186X.2017.1304016

[797] Kreitzer, R. J., & Sweet-Cushman, J. (2021). Evaluating student evaluations of teaching: A review of measurement and equity bias in SETs and recommendations for ethical reform. *Journal of Academic Ethics, 20*, 73–84. https://link.springer.com/article/10.1007/s10805-021-09400-w

[798] English, D., Burniske, J., Meibaum, D., & Lachlan-Haché, L. (2015). *Uncommon measures: Student surveys and their use in measuring teaching effectiveness.* American Institutes for Research. https://www.air.org/resource/uncommon-measures-student-surveys-and-their-use-measuring-teaching-effectiveness

[799] Measures for Effective Teaching (MET) Project. (2012). *Why ask students about teaching?* MET Project, Bill & Melinda Gates Foundation. https://eric.ed.gov/?id=ED566384

[800] Jordan, P. W., & Hamilton, L. S. (2020). *Walking a fine line: School climate surveys in state ESSA plans.* FutureEd, Georgetown University. https://www.future-ed.org/school-climate-surveys-in-state-essa-plans/

[801] CalSCHLS. (2022). *School climate*. https://calschls.org/reports-data/query-calschls/?ind=142

[802] Panorama Education. (2015). *Panorama student survey.* https://www.panoramaed.com/panorama-student-survey

[803] Tripod Education Partners. (2016). *Tripod's 7Cs framework of effective teaching.* https://tripoded.com/teacher-toolkit/

[804] UChicago Impact. (2020). *5Essentials.* University of Chicago, Urban Education Institute. https://uchicagoimpact.org/our-offerings/5essentials

[805] PERTS (2022). *Elevate: Measures Summary*. https://docs.google.com/document/d/1vd1WC4GlqqE_AsshNFo3V-qkjzLit-nHz8L5AKMncAg/edit

[806] National Survey of Student Engagement. (2022) *Evidence-based improvement in higher education.* Indiana University. https://nsse.indiana.edu/

[807] PERTS (2021). *Ascend: Measures Summary*. https://docs.google.com/document/d/1zHlJjWDZopaAnmPpKtFgz3-JXjIwONhcgflDroAzh_c/edit#heading=h.glbllmpxzs6z

[808] Close, K., Amrein-Beardsley, A., & Colins, C. (2020). Putting teacher evaluation systems on the map: An overview of state's teacher evaluation systems post–Every Student Succeeds Act. *Education Policy Analysis Archives, 28*(58), 1–31. https://eric.ed.gov/?id=EJ1250211

[809] Jordan, P. W., & Hamilton, L. S. (2020). *Walking a fine line: School climate surveys in state ESSA plans.* FutureEd, Georgetown University. https://www.future-ed.org/school-climate-surveys-in-state-essa-plans/

[810] Emery, C. R., Kramer, T. R., & Tian, R. G. (2003). Return to academic standards: a critique of student evaluations of teaching effectiveness. *Quality Assurance in Education, 11*(1), 37-46. https://doi.org/10.1108/09684880310462074

[811] National Survey of Student Engagement. (2019). *Engagement insights: Survey findings on the quality of undergraduate education.* https://eric.ed.gov/?id=ED604974

[812] Goe, L., Bell, C., & Little, O. (2008). Approaches to evaluating teacher effectiveness: A research synthesis. Washington, DC: National Comprehensive Center for Teacher Quality. Retrieved from http://www.gtlcenter.org/sites/default/files/docs/EvaluatingTeachEffectiveness.pdf

[813] Little, O., Goe, L., & Bell, C. (2009). A practical guide to evaluating teacher effectiveness. Washington, DC: National Comprehensive Center for Teacher Quality. Retrieved from http://www.tqsource.org/publications/practicalGuide.pdf

[814] Peterson, K. D., Wahlquist, C., & Bone, K. (2000). Student surveys for school teacher evaluation. Journal of Personnel Evaluation in Education, 14(2), 135–153.

[815] Bill & Melinda Gates Foundation. (2020). *P-16 Framework*. https://usprogram.gatesfoundation.org/who-we-are/p16-framework

[816] Aaronson, D., Barrow, L., & Sander, W. (2007). Teachers and student achievement in the Chicago public high schools. *Journal of Labor Economics, 25*(1), 95-135. https://doi.org/10.1086/508733

[817] McCaffrey, D. F., Sass, T. R., Lockwood, J. R., & Mihaly, K. (2009). The intertemporal variability of teacher effect estimates. *Education Finance and Policy, 4*(4), 572-606. https://doi.org/10.1162/edfp.2009.4.4.572

[818] Nye, B., Konstantopoulos, S., & Hedges, L. V. (2004). How large are teacher effects? *Educational Evaluation and Policy Analysis, 26*(3), 237-257. https://doi.org/10.3102/01623737026003237

[819] Rivkin, S. G., Hanushek, E. A., & Kain, J. F. (2005). Teachers, schools, and academic achievement, *Econometrica, 73*(2), 417-458. https://www.jstor.org/stable/3598793

[820] Rockoff, J. E. (2004). The impact of individual teachers on student achievement: Evidence from panel data. *American Economic Review, 94*(2), 247-252. https://doi.org/10.1257/0002828041302244

[821] Sanders, W. L., & Rivers, J. C. (1996). *Cumulative and residual effects of teachers on future student academic achievement (Research Progress Report).* University of Tennessee Value-Added Research and Assessment Center. https://www.heartland.org/publications-resources/publications/cumulative-and-residual-effects-of-teachers-on-future-student-academic-achievement

[822] Blazar, D., & Kraft, M. A. (2017). Teacher and teaching effects on students' attitudes and behaviors. *Educational Evaluation and Policy Analysis, 39*(1), 146-170. https://doi.org/10.3102/0162373716670260

[823] Jackson, K. C. (2018). What do test scores miss? The importance of teacher effects on non-test score outcomes. *Journal of Political Economy, 126*(5). https://doi.org/10.1086/699018

[824] Chetty, R., Friedman, J. N., & Rockoff, J. E. (2014). Measuring the impacts of teachers II: Teacher value-added and student outcomes in adulthood. *American Economic Review, 104*(9), 2633-2679. https://doi.org/10.1257/aer.104.9.2633

[825] Isenberg, E., Max, J., Gleason, P., & Deutsch, J. (2021). Do low-income students have equal access to effective teachers? *Educational Evaluation and Policy Analysis.* https://doi.org/10.3102/01623737211040511

[826] Sass, T., Hannaway, J., Xu, Z., Figlio, D., & Feng, L. (2012). Value added of teachers in high-poverty schools and lower poverty schools. *Journal of Urban Economics, 72*, 104–122. https://doi.org/10.1016/j.jue.2012.04.004

[827] Mansfield, R. (2015). Teacher quality and student inequality. *Journal of Labor Economics, 33*(3), 751–788. http://dx.doi.org/10.1086/679683

[828] Goldhaber, D., Lavery, L., & Theobald, R. (2015). Uneven playing field? Assessing the teacher quality gap between advantaged and disadvantaged students. *Educational Researcher, 44*(5), 293–307. https://doi.org/10.3102/0013189X15592622

[829] Goldhaber, D., Quince, V., & Theobald, R. (2016a). *Has it always been this way? Tracing the evolution of teacher quality gaps in U.S. public schools (CALDER Working Paper No. 171).* National Center for Analysis of Longitudinal Data in Education Research. https://doi.org/10.3102/0002831217733445

[830] Goldhaber, D., Quince, V., & Theobald, R. (2016b). *Reconciling different estimates of teacher quality based on value added (CALDER Brief 14).* National Center for Analysis of Longitudinal Data in Education Research. https://caldercenter.org/publications/reconciling-different-estimates-teacher-quality-gaps-based-value-added

[831] Glazerman, S., & Max, J. (2011). *Do low-income students have equal access to the highest-performing teachers?* (NCEE Evaluation Brief 2011-4016). National Center for Education Evaluation and Regional Assistance. https://eric.ed.gov/?id=ED517966

[832] Carrell, S. E., & West, J. E. (2010). Does professor quality matter? Evidence from random assignment of students to professors. *Journal of Political Economy, 118*(3). https://doi.org/10.1086/653808

[833] Figlio, D. N. Schapiro, M. O., & Soter, K. B. (2015). Are tenure track professors better teachers? *The Review of Economics and Statistics, 97*(4), 715-724. https://doi.org/10.1162/REST_a_00529

[834] Xiaotao Ran, F., & Xu, D. (2018). Does contractual form matter? The impact of different types of non-tenure track faculty in college students' academic outcomes. *Journal of Human Resources, 56*, 878-921. https://doi.org/10.3368/jhr.54.4.0117.8505R

[835] Close, K., Amrein-Beardsley, A., & Collins, C. (2019). *Mapping America's teacher evaluation plans under ESSA.* Phi Delta Kappan. https://kappanonline.org/mapping-teacher-evaluation-plans-essa-close-amrein-beardsley-collins/

[836] Figlio, D., & Schapiro, M. (2021). Staffing the higher education classroom. *Journal of Economic Perspectives, 35*(1), 143-162. https://doi.org/10.1257/jep.35.1.143

[837] Koedel, C., Mihaly, K., Rockoff, J. E. (2015). Value-added modeling: A review. *Economics of Education Review, 47*, issue C, 180–195. https://doi.org/10.1016/j.econedurev.2015.01.006

[838] Walsh, E., & Isenberg, E. (2015). How does value added compare to student growth percentiles? *Statistics and Public Policy, 2*(1), 1-13. https://doi.org/10.1080/2330443X.2015.1034390

[839] Chaplin, D., Gill, B., Thompkins, A., & Miller, H. (2014). *Professional practice, student surveys, and value-added: Multiple measures of teacher effectiveness in the Pittsburgh public schools.* Regional Educational Laboratory Mid-Atlantic. Institute of Education Sciences, U.S. Department of Education. https://eric.ed.gov/?id=ED545232

[840] Close, K., Amrein-Beardsley, A., & Collins, C. (2019). Mapping America's teacher evaluation plans under ESSA. *Phi Delta Kappan*. https://doi.org/10.1177/0031721719879150

[841] Gill, B., Bruch, J., & Booker, K. (2013). *Using alternative student growth measures for evaluating teacher performance: What the literatura says.* Regional Educational Laboratory Mid-Atlantic, Institute of Education Sciences, U.S. Department of Education.. https://ies.ed.gov/ncee/rel/Project/369

[842] National Research Council. (2012). *Key national education indicators: Workshop summary.* The National Academies. https://doi.org/10.17226/13453

[843] Walsh, E., & Dotter, D. (2020). The impacto n student achievement of replacing principals in District of Columbia public schools. *Education Finance and Policy, 15*(3), 518-542. https://doi.org/10.1162/edfp_a_00279

[844] Branch, G. F., Hanushek, E. A., & Rivkin, S. G. (2012). *Estimating the effect of leaders on public sector productivity: The case of school principals.* National Bureau of Economic Research. https://www.nber.org/papers/w17803

[845] See Branch et al. (2012).

[846] See Branch et al. (2012).

[847] Goddard, R., Goddard, Y., Kim, E. S., & Miller, R. (2015). A theoretical and empirical analysis of the roles of instructional leadership, teacher collaboration, and collective efficacy beliefs in support of student learning. *American Journal of Education, 121*(4), 501–530. https://doi.org/10.1086/681925

[848] Boyd, D., Grossman, P., Ing, M., Lankford, H., Loeb, S., & Wyckoff, J. (2011). The influence of school administrators on teacher retention decisions. *American Educational Research Journal*. https://doi.org/10.3102/0002831210380788

[849] Beteille, T., Kalogrides, D., & Loeb, S. (2009). *Effective schools: Managing the recruitment, development, and retention of high-quality teachers. CALDER working paper no.37.* National Center for Analysis and Longitudinal Data in Education Research (CALDER), The Urban Institute. https://eric.ed.gov/?id=ED509688

[850] Bender Sebring, P., Allensworth, E., Byrk, A. S., Easton, J. Q., & Luppescu, S. (2006). The essential supports for school improvement. Consortium on Chicago School Research at the University of Chicago. https://consortium.uchicago.edu/publications/essential-supports-school-improvement

[851] See Branch et al. (2012).

[852] Loeb, S., Kalogrides, D., & Horng, E. L. (2010). Principal preferences and the uneven distribution of principals across schools. *Educational Evaluation and Policy Analysis, 32*(2), 205–229. https://doi.org/10.3102/0162373710369833

[853] Grissom, J. A., Bartanen, B., & Mitani, H. (2019). Principal sorting and the distribution of principal quality. *AERA Open.* https://doi.org/10.1177/2332858419850094

[854] Tennessee Department of Education. (2021). *Administrator Evaluation.* TEAM: Tennessee Education Acceleration Model. https://team-tn.org/administrator-evaluation/

[855] Grissom, J. A., Blissett, R. S. L., & Mitani, H. (2018). Evaluating school principals: Supervisor ratings of principal practice and principal job performance. *Educational Evaluation and Policy Analysis.* https://doi.org/10.3102/0162373718783883

[856] Nelson, J. L., Grissom, J. A., & Cameron, M. L. (2021). Performance, process, and interpersonal relationships: Explaining principals' perceptions of principal evaluation. *Educational Administration Quarterly.* https://doi.org/10.1177/0013161X211009295

[857] Kozakowski, W., Gill, B., & Shiferaw, M. (2021). *Exploring the potential role of staff surveys in school leader evaluation. REL 2021-117.* Regional Educational Laboratory, Mid-Atlantic, Institute of Education Sciences, U.S. Department of Education. https://eric.ed.gov/?id=ED614069

[858] University of Chicago Impact. (2022). *5Essentials.* https://uchicagoimpact.org/our-offerings/5essentials

[859] Panorama Education. (n.d.). *Panorama teacher and staff survey.* https://www.panoramaed.com/panorama-teacher-survey

[860] The New Teacher Project. (n.d.). *Instructional culture insight.* https://tntp.org/teacher-talent-toolbox/insight-survey

[861] Grissom, J. A., Kalogrides, D., & Loeb, S. (2015). Using student test scores to measure principal performance. *Educational evaluation and policy analysis, 37*(1), 3-28. https://doi.org/10.3102/0162373714523831

[862] Chiang, H., Lipscomb, S., & Gill, B. (2016). Is school value added indicative of principal quality? *Education Finance and Policy, 11*(3), 283-309. https://doi.org/10.1162/EDFP_a_00184

[863] National Education Association (NEA). (2021). *Great public schools indicators framework.* https://www.nea.org/student-success/great-public-schools/what-students-deserve

[864] Koedel, C., Mihaly, K., Rockoff, J. E. (2015). Value-added modeling: A review. *Economics of Education Review, 47*, issue C, 180-195. https://doi.org/10.1016/j.econedurev.2015.01.006

[865] Deutsch, J., Johnson, M., & Gill, B. (2020). *The promotion power impacts of Louisiana high schools.* Mathematica Policy Research. https://eric.ed.gov/?id=ED607741

[866] Reardon, S. F. (2019). *Affluent schools are not always the best schools.* The Educational Opportunity Project, Stanford University. https://edopportunity.org/discoveries/affluent-schools-are-not-always-best/

[867] Gross, M., Shiferaw, M., Deutsch, J., & Gill, B. (2021). *Using promotion power to identify the effectiveness of public high schools in the District of Columbia.* Regional Educational Laboratory Program, Mid-Atlantic. Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/rel/Project/5684

[868] Bassiri, D. (2015). *Statistical properties of school value-added scores based on assessments of college readiness.* ACT, Inc. https://eric.ed.gov/?id=ED563776

[869] Blom, E., Rainer, M., & Chingos, M. (2020). *Comparing colleges' graduation rates: The importance of adjusting for student characteristics.* Urban Institute. https://www.urban.org/research/publication/comparing-colleges-graduation-rates

[870] Cunha, J. M., & Miller, T. (2014). Measuring value-added in higher education: Possibilities and limitations in the use of administrative data. *Economics of Education Review, 42*, 64-77. https://doi.org/10.1016/j.econedurev.2014.06.001

[871] Mountjoy, J., & Hickman, B. R. (2021). *The returns to college(s): Relative value-added and match effects in higher education.* National Bureau of Economic Research. https://www.nber.org/papers/w29276

[872] Rothwell, J., & Kulkarni, S. (2015). *Beyond college rankings: A value-added approach to assessing two-and four-year schools.* Brookings Institute. https://www.brookings.edu/research/beyond-college-rankings-a-value-added-approach-to-assessing-two-and-four-year-schools/

[873] See Mountjoy & Hickman (2021).

[874] Education Commission of the States. (2021). *50-state comparison: States' school accountability systems 2021: Rating systems.* https://reports.ecs.org/comparisons/states-school-accountability-systems-2021-01

[875] Klein, A. (2019). *How are states measuring student growth under ESSA?* Education Week. https://www.edweek.org/education/how-are-states-measuring-student-growth-under-essa/2019/01

[876] Gonzalez, N., Johnson, M., & Gill, B. (2016). *Value-added models for the Pittsburgh public schools, 2014-15 school year.* Mathematica. https://www.mathematica.org/publications/valueadded-models-for-the-pittsburgh-public-schools-201415-school-year

[877] Jackson, K. C., Porter, S., Easton, J. Q., Blanchard, A., & Kiguel, S. (2020). *Linking social-emotional learning to long-term success: Student survey responses show effects in high school and beyond.* University of Chicago Consortium on School Research. https://consortium.uchicago.edu/publications/linking-social-emotional-learning-to-long-term-success

[878] Deutsch, J., Johnson, M., & Gill, B. (2020). *The promotion power impacts of Louisiana high schools.* Mathematica Policy Research. https://eric.ed.gov/?id=ED607741

[879] National Academies of Sciences, Engineering, and Medicine. (2016). Appendix C: Defining and measuring institutional quality in higher education. *Quality in the Undergraduate Experience: What is it? How is it Measured? Who Decides? Summary of a Workshop.* The National Academies Press. https://doi.org/10.17226/23514

[880] See Deutsch et al. (2020).

[881] National Association for College Admission Counseling. (2022). *High school classes required for college.* https://www.nacacfairs.org/learn/prep/high-school-classes-required-for-college-admission/

[882] Jimenez, L., & Sargrad, S. (2018). *Are high school diplomas really a ticket to college and work? An audit of state high school graduation requirements.* Center for American Progress. https://www.americanprogress.org/article/high-school-diplomas/

[883] Gao, N., Lopes, L., & Lee, G. (2017). *California's high school graduation requirements.* Public Policy Institute of California. https://www.ppic.org/publication/californias-high-school-graduation-requirements/

[884] Leung-Gagne, M., Cardichon, J., Scott, C., & Darling-Hammond, L. (2021). *Inequitable opportunity to learn: Access to advanced Mathematics and science courses.* Learning Policy Institute. https://learningpolicyinstitute.org/product/crdc-course-access-report

[885] Irizarry, Y. (2021). On track or derailed? Race, advanced math, and the transition to high school. *Socios: Sociological Research for a Dynamic World, 7*. https://doi.org/10.1177/2378023120980293

[886] U.S. Department of Education. (2018). *A leak in the STEM pipeline: Taking Algebra early.* https://www2.ed.gov/datastory/stem/algebra/index.html

[887] Center for Collaborative Education. (2020). *Building for equity: School self-assessment tool.* https://www.cce.org/uploads/files/02-CCE-BuildingforEquityTools_School-Self-Assessment-Tool.pdf

[888] National Association for College Admission Counseling (NACAC). (2022). *High school classes required for college.* https://www.nacacfairs.org/learn/prep/high-school-classes-required-for-college-admission/

[889] Horn, L. J., & Kojaku, L. K. (2001). *High school academic curriculum and the persistence path through college: Persistence and transfer behavior of undergraduates 3 years after entering 4 year institutions*. National Center for Education Statistics, Institute of Education Sciences. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2001163

[890] Warburton, E. C., Bugarin, R., Nuñez, A. M., & Carroll, C. D. (2001). *Bridging the gap: Academic preparation and postsecondary success of first-generation students*. National Center for Education Statistics, U.S. Department of Education. https://nces.ed.gov/pubs2001/2001153.pdf

[891] Allen, D., & Dadgar, M. (2012). Does dual enrollment increase students' success in college? Evidence from a quasi-experimental analysis of dual enrollment in New York City. *New Directions for Higher Education, 2012*(158), 11–19. https://eric.ed.gov/?id=EJ971010

[892] Patrick, K., Socol, A., & Morgan, I. (2020). *Inequities in advanced coursework: What's driving them and what leaders can do.* Education Trust. https://eric.ed.gov/?id=ED603195

[893] Chatterji, R., Quirk, A., & Campbell, N. (2021). *Closing advanced coursework equity gaps for all students.* Center for American Progress. https://www.americanprogress.org/article/closing-advanced-coursework-equity-gaps-students/

[894] College Board. (2022a). *Exam fees*. https://apstudents.collegeboard.org/exam-policies-guidelines/exam-fees#:~:text=If%20you%20have%20significant%20financial,fee%20reduction%20per%20AP%20Exam

[895] Education Commission of the States. (2022). *Advanced placement: Subsidies for testing fees.* https://ecs.secure.force.com/mbdata/MBQuestRT?Rep=AP0516

[896] See Chatterji et al. (2021).

[897] College Board. (2022b). *Who receives my scores?* https://apstudents.collegeboard.org/faqs/who-receives-my-scores

[898] International Baccalaureate. (2021). *Getting results.* https://www.ibo.org/programmes/diploma-programme/assessment-and-exams/getting-results/

[899] Anderson, T., Blount, D., Lindsay, C., Blom, E., Gebrekristos, S., & Alba, F. (2019). *Robust and equitable measures to identify quality schools (REMIQS).* The Urban Institute. https://www.urban.org/sites/default/files/2019/04/15/remiqs-detailed-model-final.pdf

[900] National Education Association (NEA). (2021). *Great public schools indicators framework.* https://www.nea.org/student-success/great-public-schools/what-students-deserve

[901] Grissom, J. A., & Redding, C. (2016). Discretion and disproportionality. *AERA Open, 2*(1), 1–25. https://doi.org/10.1177/2332858415622175

[902] U.S. Department of Education. (2018). *A leak in the STEM pipeline: Taking Algebra early.* https://www2.ed.gov/datastory/stem/algebra/index.html

[903] Dougherty, S. M., Goodman, J. S., Hill, D. V., Litke, E. G., & Page, L. C. (2015). Middle school math acceleration and equitable access to eighth-grade algebra: Evidence form the wake county public school system. *Educational Evaluation and Policy Analysis, 37*(1S), 80S-101S. https://doi.org/10.3102/0162373715576076

[904] Chatterji, R., Quirk, A., & Campbell, N. (2021). *Closing advanced coursework equity gaps for all students.* Center for American Progress. https://www.americanprogress.org/article/closing-advanced-coursework-equity-gaps-students/

[905] National Research Council. (2012). *Key national education indicators: Workshop summary.* The National Academies. https://doi.org/10.17226/13453

[906] Sun Joo, Y., Magnuson, K., Duncan, G. J., Schindler, H. S., Yoshikawa, H., & Ziol-Guest, K. M. (2019). What works in early childhood education programs?: A meta-analysis of preschool enhancement programs. *Early Education and Development, 31*(1), 1-26. https://doi.org/10.1080/10409289.2019.1624146

[907] Education First. (2019). *Bill & Melinda Gates foundation curriculum evidence synthesis.*

[908] Vaishnav, A., & Cristol, K. (2015). *Brief 5: Aligning gateway college courses.* EducationFirst. https://education-first.com/library/publication/K–12higher-education-alignment-an-action-agenda-for-increasing-student-success-6/

[909] Chingos, M. M., & Whitehurst, G. J. R. (2012). *Choosing blindly: Instructional materials, teacher effectiveness, and the common core.* Brookings Institute. https://www.brookings.edu/research/choosing-blindly-instructional-materials-teacher-effectiveness-and-the-common-core/

[910] Koedel, C., Li, D., Polikoff, M. S., Hardaway, T., & Wrabel, S. L. (2017). Mathematics curriculum effects on student achievement in California. *AERA Open, 3*(1), 1–22. http://doi.org/10.1177/2332858417690511

[911] See Education First (2019).

[912] Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal, 32*(3), 465–491. http://dx.doi.org/10.3102/00028312032003465

[913] Paris, D. (2012). Culturally sustaining pedagogy: A needed change in stance, terminology, and practice. *Educational Researcher, 41*(3), 93–97. http://doi.org/10.3102/0013189X12441244

[914] EdReports. (2022). *Our process.* https://www.edreports.org/about/process#intro

[915] Partelow, L., & Shapiro, S. (2018). *Curriculum reform in the nation's largest school districts.* Center for American Progress. https://www.americanprogress.org/article/curriculum-reform-nations-largest-school-districts/

[916] The Education Justice Research and Organizing Collaborative (EJ-ROC). (2019). *Culturally responsive curriculum scorecards.* New York University. https://steinhardt.nyu.edu/metrocenter/ejroc/culturally-responsive-curriculum-scorecards

[917] Courseware in Context. (2018). *How to use the CWiC framework: Product primer.* http://coursewareincontext.org/cwic-wp/wp-content/uploads/2016/06/TYT073_CWiC_Upd2_Primer_Rd2.pdf

[918] See Chingos & Whitehurst (2012).

[919] Polikoff, M. (2018). *The challenges of curriculum materials as a reform lever. Evidence Speaks Reports Volume 2 no. 58.* Center on Children and Families, Brookings Institute https://eric.ed.gov/?id=ED586322

[920] StriveTogether. (2021). *A guide to racial and ethnic equity systems indicators.* https://www.strivetogether.org/wp-content/uploads/2021/09/A-guide-to-racial-and-ethnic-equity-systems-indicators.pdf

[921] National Research Council. (2012). *Key national education indicators: Workshop summary.* The National Academies. https://doi.org/10.17226/13453

[922] Alliance for Resource Equity. (2022). *Dimensions of equity*. Education Resource Strategies and EdTrust. https://www.educationresourceequity.org/dimensions

[923] CEELO & CCSSO. (2017). *Birth to grade 3 indicator framework: Opportunities to integrate early childhood in ESSA toolkit*. https://ccsso.org/resource-library/birth-grade-3-indicator-framework-opportunities-integrate-early-childhood-essa

[924] Currie, J., & Neidell, M. (2007). Getting inside the "Black Box" of head start quality: What matters and what doesn't. *Economics of Education Review, 26*(1), 83–99. https://doi.org/10.1016/j.econedurev.2005.03.004

[925] Jackson, K. C., & Mackevicius, C. (2021). *The distribution of school spending impacts.* National Bureau of Economic Research. https://www.nber.org/papers/w28517

[926] Jackson, K. C., Johnson, R. C., & Persico, C. (2016). The effects of school spending on educational and economic outcomes: Evidence from school finance reforms. *The Quarterly Journal of Economics, 131*(1), 157-218. https://doi.org/10.1093/qje/qjv036

[927] Jackson, K. C., Wigger, C., & Xiong, H. (2021). Do school spending cuts matter? Evidence from the great recession. *American Economic Journal: Economic Policy, 13*(2), 304-335. https://doi.org/10.1257/pol.20180674

[928] Lafortune, J., Rothstein, J., & Whitmore Schanzenbach, D. (2018). School finance reform and the distribution of student achievement. *American Economic Journal: Applied Economics, 10*(2), 1-26. https://doi.org/10.1257/app.20160567

[929] Deming, D. J., & Walters, C. R. (2017). *The impact of price cap and spending cuts on U.S. postsecondary attainment*. National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w23736/w23736.pdf

[930] Chakrabarti, R., Gorton, N., & Lovenheim, M. F. (2020). *State investment in higher education: Effects on human capital formation, student debt, and long-term financial outcomes of students.* Federal Reserve Bank of New York. https://www.newyorkfed.org/research/staff_reports/sr941

[931] Webber, D. A., & Ehrenberg, R. G. (2010). Do expenditures other than instructional expenditures affect graduation and persistence rates in American higher education? *Economics of Education Review, 29*(6), 947-958. https://doi.org/10.1016/j.econedurev.2010.04.006

[932] Webber, D. (2012). Expenditures and postsecondary graduation: An investigation using individual-level data from the state of Ohio. *Economics of Education Review, 31*(5), 615–618. https://doi.org/10.1016/j.econedurev.2012.02.003

[933] Morgan, I., & Amerikaner, A. (2018). *Funding gaps 2018: An analysis of school funding equity across the U.S. and within each state.* Education Trust. https://eric.ed.gov/?id=ED587198

[934] Chingos, M. M., & Blagg, K. (2017). *Do poor kids get their fair share of school funding?* Urban Institute. https://www.urban.org/sites/default/files/publication/90586/school_funding_brief.pdf

[935] Postsecondary Value Commission (PVC). (2021). *Equitable value: Promoting economic mobility and social justice through postsecondary education.* Institute for Higher Education Policy. https://postsecondaryvalue.org/reports/

[936] Garcia, S. (2018). *Gaps in college spending shortchange students of color.* Center for American Progress. https://www.americanprogress.org/article/gaps-college-spending-shortchange-students-color/

[937] National Center for Education Statistics. (2021b). *Postsecondary institution expenses.* Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/programs/coe/indicator/cue

[938] Cellini, S. R. (2012). For-profit higher education: An assessment of costs and benefits. *National Tax Journal, 65*(1), 153–180. https://doi.org/10.17310/ntj.2012.1.06https://doi.org/10.17310/ntj.2012.1.06

[939] Cellini, S. R., & Chaudhary, L. (2020). *Commercials for college? Advertising in higher education.* Brookings Institute. https://www.brookings.edu/research/commercials-for-college-advertising-in-higher-education/

[940] New America. (n.d.). *Education policy. School funding equity factor.* https://www.newamerica.org/education-policy/topics/school-funding-and-resources/school-funding/federal-funding/title-i/school-funding-equity-factor/

[941] StriveTogether. (2021). *A guide to racial and ethnic equity systems indicators.* https://www.strivetogether.org/wp-content/uploads/2021/09/A-guide-to-racial-and-ethnic-equity-systems-indicators.pdf

[942] Office of Disease Prevention and Health Promotion. (2017). *Increase the proportion of children who receive a developmental screening—MICH-17.* U.S. Healthy People. Department of Health and Human Services. https://health.gov/healthypeople

[943] Mandell, D. S., Wiggins, L. D., Arnstein Carpenter, L., Daniels, J., DiGuiseppi, C., Durkin, M. S., Giarelli, E., Morrier, M. J., Nicholas, J. S., Pinto-Martin, J. A., Shattuck, P. T., Thomas, K. C., Yeargin-Allsopp, M., & Kirby, R. S. (2011). Racial/ethnic disparities in the identification of children with autism spectrum disorders. *American Journal of Public Health, 3*, 493–498. https://doi.org/10.2105/AJPH.2007.131243

[944] Aylward, B. S., Gal-Szabo, D., & Taraman, S. (2021). Racial, ethnic, and sociodemographic disparities in diagnosis of children with autism spectrum disorder. *Journal of Developmental and Behavioral Pediatrics, 42*(8), 682–689. https://doi.org/10.1097/DBP.0000000000000996

[945] Center for the Study of Social Policy. (2021). *Early childhood system performance toolkit*. https://cssp.org/resource/early-childhood-system-performance-assessment-toolkit/

[946] Bryk, A. S., Sebring, P. B., Allensworth, E., Luppescu, S., & Easton, J. Q. (2010). *Organizing schools for improvement: Lessons from Chicago*. University of Chicago Press. https://consortium.uchicago.edu/sites/default/files/2019-02/organizing-schools-improvement-prologue_0.pdf

[947] Milam, M. J., Furr-Holden, C. D. M., & Leaf, P. J. (2010). Perceived school and neighborhood safety, neighborhood violence and academic achievement in urban school children. *Urban Review, 42*(5), 458–467. https://doi.org/10.1007/s11256-010-0165-7

[948] Thapa, A., Cohen, J., Guffey, S., & Higgins-D'Alessandro, A. (2013). A review of school climate research. *Review of Educational Research, 83*(3), 357–385. https://doi.org/10.3102/0034654313483907

[949] Gietz, C., & McIntosh, K. (2014). Relations between student perceptions of their school environment and academic achievement. *Canadian Journal of School Psychology, 29*(3), 161–176. https://doi.org/10.1177/0829573514540415

[950] Demiroz, S. (2020). The relationship between secondary schools students' perceptions of school climate, their school belonging, and their academic achievement. *Education Reform Journal, 5*(2). https://files.eric.ed.gov/fulltext/EJ1282668.pdf

[951] Daily, S., Mann, M. J., Kristjansson, A. L., Smith, M. L., & Zullig, K. J. (2019). School climate and academic achievement in middle and high school students. *Journal of School Health, 89*(3), 173–180. https://doi.org/10.1111/josh.12726

[952] Jones, T. M. (2018). *Understanding race differences in academic outcomes, school climate and social emotional learning to promote racial equity and policy reform* [Doctoral dissertation, University of Washington]. University of Washington University Libraries. https://digital.lib.washington.edu/researchworks/bitstream/handle/1773/42913/Jones_washington_0250E_19259.pdf?sequence=1&isAllowed=y

[953] Steinberg, M. P., Allensworth, E., & Johnson, D. W. (2011). *Student and teacher safety in Chicago public schools. The roles of community context and school social organization.* Consortium on Chicago School Research. https://eric.ed.gov/?id=ED519414

[954] Voight, A., Hanson, T., O'Malley, M., & Adekanye, L. (2015). The racial school climate gap: Within-school disparities in students' experiences of school safety, support, and connectedness. *American Journal of Community Psychology, 56*(3-4), 252–267. https://doi.org/10.1007/s10464-015-9751-x

[955] Lacoe, J. R. (2015). Unequally safe: The race gap in school safety. *Youth Violence and Juvenile Justice*, *13*(2), 143–168. https://doi.org/10.1177/1541204014532659

[956] Center for Postsecondary Research. (2016). *Engagement insights: Survey findings on the quality of undergraduate education—Annual results 2016, National Survey of Student Engagement.* University of Indiana School of Education, Center for Postsecondary Research. https://doi.org/10.5967/61q3-fc75

[957] National Center on Safe Supportive Learning Environments. (2022). *ED school climate surveys (EDSCLS).* https://safesupportivelearning.ed.gov/edscls

[958] CORE Districts. (2021a). *Social-emotional learning, well-being, & school culture.* CORE survey data: Hearing from our students, staff, and families. https://coredistricts.org/our-improvement-data/social-emotional-learning-well-being-and-school-culture/

[959] Panorama Education. (2015). *Panorama student survey.* https://www.panoramaed.com/panorama-student-survey

[960] National Survey of Student Engagement. (2022) *Evidence-based improvement in higher education.* Indiana University. https://nsse.indiana.edu/

[961] Jordan, P. W., & Hamilton, L. S. (2020). *Walking a fine line: School climate surveys in state ESSA plans.* FutureEd, Georgetown University. https://www.future-ed.org/school-climate-surveys-in-state-essa-plans/

[962] National Survey of Student Engagement. (2021). *What does NSSE do?* https://nsse.indiana.edu/nsse/about-nsse/index.html

[963] Bolt, D. M., Wang, Y. C., Meyer, R. H., & Pier, L. (2019). An IRT mixture model for rating scale confusion associated with negatively worded items in measures of social-emotional learning. *Applied Measurement in Education, 33*(4), 331–348. https://doi.org/10.1080/08957347.2020.1789140

[964] Office of Postsecondary Education. (n.d.). *The tools you need for campus safety and security analysis.* Campus Safety and Security, U.S. Department of Education. https://ope.ed.gov/campussafety/#/

[965] Alliance for Resource Equity. *Dimensions of equity.* https://www.educationresourceequity.org/dimensions

[966] National Education Association (NEA). (2021). *Great public schools indicators framework.* https://www.nea.org/student-success/great-public-schools/what-students-deserve

[967] MCIEA. (2019). *School quality measures.* https://www.mciea.org/school-quality-measures.html

[968] Dweck, C. S., Walton, G. M., & Cohen, G. L. (2014). *Academic tenacity: Mindsets and skills that promote long-term learning.* Bill & Melinda Gates Foundation. https://eric.ed.gov/?id=ED576649

[969] Allen, K. A., & Bowles, T. (2012). Belonging as a guiding principle in the education of adolescents. *Australian Journal of Educational & Developmental Psychology, 12*, 108–119. https://files.eric.ed.gov/fulltext/EJ1002251.pdf

[970] Hausmann, L. R. M., Ye, F., Ward Schofield, J., & Woods, R. (2019). Sense of belonging and persistence in White and African American first-year students. *Research in Higher Education, 50*, 649–669. https://doi.org/10.1007/s11162-009-9137-8

[971] Museus, S. D., Yi, V., & Saelua, N. (2017). The impact of culturally engaging campus environments on sense of belonging. *The Review of Higher Education, 40*(2), 187–215. https://doi.org/10.1353/rhe.2017.0001

[972] Cockshaw, W. D., Schochet, I. M., & Obst, P. L. (2014). Depression and belongingness in general and workplace contexts: A cross-lagged longitudinal investigation. *Journal of Social and Clinical Psychology, 33*(5), 448–462. https://doi.org/10.1521/jscp.2014.33.5.448

[973] Everfi. (2017). *The importance of belonging: A nationwide look at adolescent students' sense of belonging.*

https://2gag5314usvg3k1yhz13gzy4-wpengine.netdna-ssl.com/wp-content/uploads/2018/04/Belonging_11_17.pdf

[974] Gopalan, M., & Brady, S. T. (2019). College students' sense of belonging: A national perspective. *Educational Researcher, 49*(2), 134–137. https://doi.org/10.3102/0013189X19897622

[975] Attell, B. K., Kummerow Brown, K., & Treiber, L. A. (2017). Workplace bullying, perceived job stressors, and psychological distress: Gender and race differences in the stress process. *Social Science Research, 65*, 210–221. https://doi.org/10.1016/j.ssresearch.2017.02.001

[976] CORE Districts. (2021a). *Social-emotional learning, well-being, & school culture.* CORE survey data: Hearing from our students, staff, and families. https://coredistricts.org/our-improvement-data/social-emotional-learning-well-being-and-school-culture/

[977] Panorama Education. (2015). *Panorama student survey.* https://www.panoramaed.com/panorama-student-survey

[978] PERTS (2022). *Elevate: Measures Summary*. https://docs.google.com/document/d/1vd1WC4GlqqE_AsshNFo3V-qkjzLit-nHz8L5AKMncAg/edit

[979] Higher Education Research Institute (HERI). (2021). *Diverse learning environments survey.* https://heri.ucla.edu/diverse-learning-environments-survey/

[980] National Institute for Transformation and Equity. (2017). *The culturally engaging campus environments (CECE) model.* https://nite-education.org/the-cece-model/#:~:text=The%20CECE%20model%20posits%20that,of%20persistence%20(Figure%202)

[981] PERTS (2021). *Ascend: Measures Summary.* https://docs.google.com/document/d/1zHlJjWDZopaAnmPpKtFgz3-JXjIwONhcgflDroAzh_c/edit#heading=h.glbllmpxzs6z

[982] See Museus et al. (2017).

[983] Turner, M. A., Acs, G., Brown, S., Solari, C. D., & Fudge, K. (2020). *Boosting upward mobility: Metrics to inform local action summary.* Urban Institute. https://www.urban.org/research/publication/boosting-upward-mobility-metrics-inform-local-action-summary

[984] Dee, T. S. (2004). Teachers, race, and student achievement in a randomized experiment. *The Review of Economics and Statistics, 86*(1), 195–210. http://www.jstor.org/stable/3211667

[985] Lindsay, C. A., & Hart, C. M. D. (2017a). Exposure to same-race teachers and student disciplinary outcomes for black students in North Carolina. *Educational Evaluation and Policy Analysis, 39*(3), 485–510. https://doi.org/10.3102/0162373717693109

[986] Grissom, J. A., & Redding, C. (2016). Discretion and disproportionality. *AERA Open, 2*(1), 1–25. https://doi.org/10.1177/2332858415622175

[987] Gershenson, S., Hart, C. M. D., Hyman, J., Lindsay, C., & Papageorge, N. W. (2018). *The long-run impacts of same-race teachers* (EdWorkingPaper 19-43). Annenberg Institute at Brown University. https://doi.org/10.26300/9419-nw68

[988] Markowitz, A. J., Bassok, D., & Grissom, J. A. (2020). Teacher-child racial/ethnic match and parental engagement with head start. *American Educational Research Journal, 57*(5), 2132–2174. https://doi.org/10.3102/0002831219899356

[989] Downer, J. T., Goble, P., Myers, S. S., & Pianta, R. C. (2016). Teacher-child racial/ethnic match within pre-kindergarten classrooms and children's early school adjustment. *Early Childhood Research Quarterly, 37*, 26–38. https://doi.org/10.1016/j.ecresq.2016.02.007

[990] Lindsay, C. A., & Hart, C. M. (2017b). Teacher race and school discipline. *Education Next, 17*(1). https://www.educationnext.org/teacher-race-and-school-discipline-suspensions-research/

[991] National Center for Education Statistics. (2020). *Race and ethnicity of public-school teachers and their students.* Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/pubs2020/2020103/index.asp

[992] Davis, L., & Fry, R. (2019). *College faculty have become more racially and ethnically diverse, but remain far less so than students*. Pew Research Center. https://www.pewresearch.org/fact-tank/2019/07/31/us-college-faculty-student-diversity/

[993] Li, D., & Koedel, C. (2017). Representation and salary gaps by race-ethnicity and gender at selective public universities. *Educational Researcher, 46*(7), 343–354. https://doi.org/10.3102%2F0013189X17726535

[994] Espinosa, L. L., Turk, J. M., Taylor, M., & Chessman, H. M. (2019). *Race and ethnicity in higher education: A status report.* American Council on Education. https://www.equityinhighered.org/resources/report-downloads/

[995] National Center for Education Statistics. (n.d.). *Definitions for new race and ethnicity categories.* Integrated Postsecondary Education Data System (IPEDS), U.S. Department of Education. https://nces.ed.gov/ipeds/report-your-data/race-ethnicity-definitions

[996] StriveTogether. (2021). *A guide to racial and ethnic equity systems indicators.* https://www.strivetogether.org/wp-content/uploads/2021/09/A-guide-to-racial-and-ethnic-equity-systems-indicators.pdf

[997] National Research Council. (2012). *Key national education indicators: Workshop summary.* The National Academies. https://doi.org/10.17226/13453

[998] Alliance for Resource Equity. *Dimensions of equity.* https://www.educationresourceequity.org/dimensions

[999] Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology, 90*(5), 751–783. http://dx.doi.org/10.1037/0022-3514.90.5.751

[1000] Rock, D., & Grant, H. (2016). Why diverse teams are smarter. *Harvard Business Review*. https://hbr.org/2016/11/why-diverse-teams-are-smarter

[1001] Reid, J. L. (2016). Racial/ethnic diversity and language development in the preschool classroom. *School integration matters: Research-based strategies to advance equity*, 39-55. https://www.pennstatelawreview.org/print-issues/the-racial-and-ethnic-composition-of-prekindergarten-classrooms-and-childrens-language-development/

[1002] Siegel-Hawley, G. (2012). *How non-minority students also benefit from racially diverse schools. Research brief no. 8.* National Coalition on School Diversity. https://eric.ed.gov/?id=ED571621

[1003] Stuart Wells, A., Fox, L., & Cordova-Cobo, D. (2016). *How racially diverse schools and classrooms can benefit all students*. The Century Foundation. https://tcf.org/content/report/how-racially-diverse-schools-and-classrooms-can-benefit-all-students/

[1004] Bowman, N. (2013). How much diversity is enough? The curvilinear relationship between college diversity interactions and first-year student outcomes. *Research in Higher Education, 54*, 874–894. https://doi.org/10.1007/s11162-013-9300-0

[1005] Bowman, N. A., & Park, J. J. (2015). Not all diversity interactions are created equal: Cross-racial interaction, close interracial friendship, and college student outcomes. *Research in Higher Education, 56*, 601–621. https://doi.org/10.1007/s11162-015-9365-z

[1006] Maruyama, G., Moreno, J. F., Gudeman, R. H., & Marin, P. (2000). *Does diversity make a difference? Three research studies on diversity in college classrooms*. American Council on Education. https://eric.ed.gov/?id=ED444409

[1007] Milem, J. F. (2003). The educational benefits of diversity: Evidence from multiple sectors. In M. Chang, D. Witt-Sandis, J. Jones, & K. Hakuta (Eds.), *The dynamics of race in higher education.* http://web.stanford.edu/~hakuta/www/policy/racial_dynamics/Chapter5.pdf

[1008] Gomez, L. E., & Bernet, P. (2019). Diversity improves performance and outcomes. *Association, 111*(4), 383–392. https://doi.org/10.1016/j.jnma.2019.01.006

[1009] Schaeffer, K. (2021). *U.S. public school students often go to schools where at least half of their peers are the same race or ethnicity*. Pew Research Center. https://www.pewresearch.org/fact-tank/2021/12/15/u-s-public-school-students-often-go-to-schools-where-at-least-half-of-their-peers-are-the-same-race-or-ethnicity/

[1010] Alliance for Resource Equity. (2022). *Dimensions of equity.* Education Resource Strategies and EdTrust. https://www.educationresourceequity.org/dimensions

[1011] Reardon, S. F. (2016). School segregation and racial academic achievement gaps. *The Russell Sage Foundation Journal of the Social Sciences, 2*(5), 34-57. https://doi.org/10.7758/RSF.2016.2.5.03

[1012] Orfield, G., Kucsera, J., & Siegel-Hawley, G. (2012). *E pleribus...separation : Deepening double segregation for minority students.* Civil Rights Project/ Proyecto Derechos Civiles https://eric.ed.gov/?id=ED535442

[1013] Bagby, J. H., Rudd, L. C., & Woods, M. (2007). The effects of socioeconomic diversity on the language, cognitive and social-emotional development of children from low-income backgrounds. *Early Childhood Development and Care, 175,* 395-405. https://doi.org/10.1080/03004430420002707 68

[1014] Reid, J. L., & Ready, D. D. (2013). High-Quality preschool: The socioeconomic composition of preschool classrooms and children's learning. *Early Education and Development, 24*(8), 1082-1111. https://doi.org/10.1080/10409289.2012.757519

[1015] Krausa, M. W., Torreza, B., Park, J. W., & Ghayebi, F. (2019). Evidence for the reproduction of social class in brief speech. *Proceedings of the National Academy of Sciences (PNAS), 116*(46), 1–6. https://www.pnas.org/doi/epdf/10.1073/pnas.1900500116

[1016] Rivera, L. A., & Tilcsik, A. (2016). Class advantage, commitment penalty: The gendered effect of social class signals in an elite labor market. *American Sociological Review, 81*(6), 1097–1131. https://doi.org/10.1177/0003122416668154

[1017] Martin, S., & Cote, S. (2018). Social class transitioners: Their experiences and organizational importance. *Academy of Management Review, 44*(3), 1–70. https://doi.org/10.5465/amr.2017.0065

[1018] Reardon, S., & Owens, A. (2014). 60 Years after Brown: Trends and consequences of school segregation. *Annual Review of Sociology, 40*, 199–219. https://doi.org/10.1146/annurev-soc-071913-043152

[1019] Alliance for Resource Equity. (2022). *Dimensions of equity.* Education Resource Strategies and EdTrust. https://www.educationresourceequity.org/dimensions

[1020] Turner, M. A., Acs, G., Brown, S., Solari, C. D., & Fudge, K. (2020). *Boosting upward mobility: Metrics to inform local action summary.* Urban Institute. https://www.urban.org/research/publication/boosting-upward-mobility-metrics-inform-local-action-summary

[1021] Rones, M., & Hoagwood, K. (2000). School-based mental health services: A research review. *Clinical Child and Family Psychology Review, 3*, 223–241. https://doi.org/10.1023/A:1026425104386

[1022] District Leadership Forum. (2020). *Are districts the nation's adolescent mental health care providers?* Education Advisory Board. https://eab.com/research/district-leadership/whitepaper/are-districts-the-nations-adolescent-mental-health-care-providers/

[1023] Guttu, M., Keehner Engelke, M., & Swanson, M. (2009). Does the school nurse-to-student ratio make a difference? *Journal of School Health, 74*(1), 6–9. https://doi.org/10.1111/j.1746-1561.2004.tb06593.x

[1024] National Association of School Psychologists (NASP). (2021). *Shortages in school psychology: Challenges to meeting the growing needs of U.S. students and schools.* https://www.nasponline.org/resources-and-publications/resources-and-podcasts/school-psychology/shortages-in-school-psychology-resource-guide

[1025] Franklin, C., Kim, J. S., & Tripodi, S. J. (2009). A meta-analysis of published school social work practice studies: 1980-2007. *Research on Social Work Practice, 19*(6), 667–677. https://doi.org/10.1177/1049731508330224

[1026] Wyman, L. L. (2005). Comparing the number of ill or injured students who are released early from school by nursing and nonnursing personnel. *The Journal of School Nursing, 21*(6), 350–355. https://doi.org/10.1177/10598405050210060901

[1027] Pennington, N., & Delaney, E. (2008). The number of students sent home by school nurses compared to unlicensed personnel. *Journal of School Nursing, 24*(5), 290–297. https://doi.org/10.1177/1059840508322382

[1028] Basch, C. E. (2011). Healthier students are better learners: A missing link in school reforms to close the achievement gap. *Journal of School Health, 81*(10), 593–598. https://doi.org/10.1111/j.1746-1561.2011.00632.x

[1029] Sparks, S. D. (2021). *Data: What we know about student mental health and the pandemic*. Education Week. https://www.edweek.org/leadership/data-what-we-know-about-student-mental-health-and-the-pandemic/2021/03

[1030] Eisenberg, D., Lipson, S. K., Heinze, J., & Zhou, S. (2020). *The healthy minds study: Fall 2020 data report.* The Healthy Minds Network. https://healthymindsnetwork.org/research/data-for-researchers/

[1031] Kelly, B. (2019). *More employers are addressing mental health: Report*. Crain's Chicago Business. https://www.chicagobusiness.com/health-care/more-employers-are-addressing-mental-health-report

[1032] Miller, S. (2022). *Employers identify workforce mental health priorities for 2022*. SHRM. https://www.shrm.org/resourcesandtools/hr-topics/benefits/pages/employers-identify-workforce-mental-health-priorities-for-2022.aspx

[1033] Coe, E., Cordina, J., Enomoto, K., Mandel, A., & Stueland, J. (2021). *National surveys reveal disconnect between employees and employers around mental health need.* McKinsey & Company. https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/national-surveys-reveal-disconnect-between-employees-and-employers-around-mental-health-need

[1034] National Center for Education Statistics. (2022). *National teacher and principal survey.* Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/surveys/ntps/

[1035] Hepburn, K. S., Kaufmann, R. K., Perry, D. F., Allen, M. D., & Brennan, E. M. (2007). *Early childhood mental health consultation: An evaluation tool kit*. Portland State University. http://archives.pdx.edu/ds/psu/9588

[1036] Kaiser Family Foundation (KFF). (2021). *2021 Employee benefits survey.* https://www.kff.org/health-costs/report/2021-employer-health-benefits-survey/

[1037] National Center for Children in Poverty. (2008). *State indicators for early childhood.* Project Thrive, Columbia University. https://academiccommons.columbia.edu/doi/10.7916/D8ZP4FT8/download

[1038] StriveTogether. (2021). *A guide to racial and ethnic equity systems indicators.* https://www.strivetogether.org/wp-content/uploads/2021/09/A-guide-to-racial-and-ethnic-equity-systems-indicators.pdf

[1039] National Education Association (NEA). (2021). *Great public schools indicators framework.* https://www.nea.org/student-success/great-public-schools/what-students-deserve

[1040] See Kelly (2019).

[1041] Mulhern, C. (2020a). Better school counselors, better outcomes: Quality varies, and can matter as much as with teachers. *Education Next, 20*(3), 52+. https://link.gale.com/apps/doc/A628405050/AONE?u=anon~8362a20&sid=googleScholar&xid=ad4c69b3

[1042] Mulhern, C. (2020b). *Beyond teachers: Estimating individual guidance counselors' effects on educational attainment.* Harvard University. http://papers.cmulhern.com/Counselors_Mulhern.pdf

[1043] Woods, C. S., & Domina, T. (2014). The school counselor caseload and the high school-to-college pipeline. *Teachers College Record, 116*(10), 1–30. https://doi.org/10.1177/016146811411601006

[1044] See Woods & Domina (2014).

[1045] Perna, L. W., Rowan-Kenyon, H. T., Thomas, S. L., Bell, A., Anderson, R., & Li, C. (2008). The role of college counseling in shaping college opportunity: Variations across high schools. *The Review of Higher Education, 31*(2), 131–159. http://dx.doi.org/10.1353/rhe.2007.0073

[1046] Hurwitz, M., & Howell, J. (2014). Estimating causal impacts of school counselors with regression discontinuity designs. *Journal of Counseling & Development, 92*(3), 316–327. https://doi.org/10.1002/j.1556-6676.2014.00159.x

[1047] Bailey, T., Bashford, J., Boatman, A., Squires, J., & Weiss, M. (2016). *Strategies for postsecondary students in developmental education—A practice guide for college and university administrators, advisors, and faculty.* What Works Clearinghouse, Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/PracticeGuide/23

[1048] Museus, S. D., & Ravello, J. N. (2010). Characteristics of academic advising that contribute to racial and ethnic minority student success in predominantly White institutions. *NACADA Journal, 30*(1), 47–58. https://eric.ed.gov/?id=EJ886809

[1049]Museus, S. D. (2021). Revisiting the role of academic advising in equitably serving diverse college students. *NACADA Journal, 4*(1), 46–32. https://doi.org/10.12930/NACADA-21-06https://doi.org/10.12930/NACADA-21-06

[1050] Mau, W. C., & Fernandes, A. (2001). Characteristics and satisfaction of students who used career counseling services. *Journal of College Student Development, 42*(6), 581–588. http://hdl.handle.net/10057/16358

[1051] Vela Institute & National College Attainment Network. (2022). *Using data in postsecondary advising to "lift" completion likelihood.* https://cdn.ymaws.com/www.ncan.org/resource/resmgr/publications/Using_Data_to_Lift_Completio.pdf

[1052] Gallup. (2017). *Strada-Gallup 2017 college student survey*. https://news.gallup.com/reports/225161/2017-strada-gallup-college-student-survey.aspx

[1053] Anderson, T., Blount, D., Lindsay, C., Blom, E., Gebrekristos, S., & Alba, F. (2019). *Robust and equitable measures to identify quality schools (REMIQS).* The Urban Institute. https://www.urban.org/sites/default/files/2019/04/15/remiqs-detailed-model-final.pdf

[1054] Bill & Melinda Gates Foundation. (2020). *P-16 Framework*. https://usprogram.gatesfoundation.org/who-we-are/p16-framework

[1055] Harris, J. C., Warner, M. T., Wilkerson, S. B., & Yee, K. (2020). *Assessing the alignment between West Virginia's high school career and technical education programs and the labor market (REL 2020-019).* Regional Educational Laboratory Appalachia. Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/rel/Products/Resource/1323

[1056] Mokher, C. G. (2011). *Aligning career and technical education with high-wage and high-demand occupations in Tennessee. Summary issues & answers* (REL 2011- No. 111). Regional Educational Laboratory Appalachia. Institute of Education Sciences, U.S. Department of Education. https://eric.ed.gov/?id=ED522341

[1057] Stevens, A. H. (2019). *What works in career and technical education (CTE)? A review of evidence and suggested policy directions.* Aspen Institute, Economic Strategy Group. https://www.aspeninstitute.org/longform/expanding-economic-opportunity-for-more-americans/what-works-in-career-and-technical-education-cte-a-review-of-evidence-and-suggested-policy-directions/

[1058] See Mokher (2011).

[1059] O*NET Online. (n.d.). *Bright outlook occupations.* https://www.onetonline.org/find/bright

[1060] Center for Postsecondary and Economic Success at CLASP. (2013). *A framework for measuring career pathways innovation: A working paper.* Alliance for Quality Career Pathways.

[1061] Fletcher, C. (2021). *State of student aid and higher education in Texas*. Trellis Company. https://www.trelliscompany.org/state-of-student-aid-2020/

[1062] See Fletcher (2021).

[1063] National Center for Education Statistics. (2019). *Trends in undergraduate nonfederal grant and scholarship aid by demographic and enrollment characteristics: Selected years 2003-04 to 2015-16.* Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2019486

[1064] Janice, A., & Voight, M. (2016). *Toward convergence: A technical guide for the postsecondary metrics framework*. Institute for Higher Education Policy. https://www.ihep.org/publication/toward-convergence-a-technical-guide-for-the-postsecondary-metrics-framework/

[1065] Mezza, A., Ringo, D., Sherlund, S., & Sommer, K. (2020). Student loans and homeownership. *Journal of Labor Economics, 38*(1), 215–260. https://www.journals.uchicago.edu/doi/full/10.1086/704609

[1066] Walsemann, K. M., Gee, G. C., & Gentile, D. (2015). Sick of our loans: Student borrowing and the mental health of young adults in the United States. *Social Science & Medicine, 124,* 85–93. https://doi.org/10.1016/j.socscimed.2014.11.027

[1067] Kim, J., & Chatterjee, S. (2019). Student loans, health, and life satisfaction of US households: Evidence from a panel study. *Journal of Family and Economic Issues, 40,* 36–50. https://doi.org/10.1007/s10834-018-9594-3

[1068] Espinosa, L. L., Turk, J. M., Taylor, M., & Chessman, H. M. (2019). *Race and ethnicity in higher education: A status report.* American Council on Education. https://www.equityinhighered.org/resources/report-downloads/

[1069] Scott-Clayton, J., & Li, J. (2016). *Black-white disparity in student loan debt more than triples after graduation.* Brookings Institute. https://www.brookings.edu/research/black-white-disparity-in-student-loan-debt-more-than-triples-after-graduation/

[1070] Bleemer, Z., Brown, M., Lee, D., Strair, K., & van der Klaauw, W. (2017). *Echoes of rising tuition in students' borrowing, educational attainment, and homeownership in post-recession America.* Federal Reserve Bank of NY Staff Report No. 820. https://www.newyorkfed.org/research/staff_reports/sr820

[1071] Monks, J. (2014). The role of institutional and state aid policies in average student debt. *The ANNALS of the American Academy of Political and Social Science.* https://doi.org/10.1177/0002716214539093

[1072] Scott-Clayton, J. (2018). What accounts for gaps in student loan default, and what happens after. *Economic Studies at Brookings.* Evidence Speaks Reports, 2(57). https://www.brookings.edu/wp-content/uploads/2018/06/Report_Final.pdf

[1073] U.S. Department of Education. (2021). *Technical documentation: College scorecard data by field of study.* https://collegescorecard.ed.gov/data/documentation/

[1074] Janice, A., & Voight, M. (2016). *Toward convergence: A technical guide for the postsecondary metrics framework*. Institute for Higher Education Policy. https://www.ihep.org/publication/toward-convergence-a-technical-guide-for-the-postsecondary-metrics-framework/

[1075] Elliott, D., Campbell, A., & Marotta, J. (2021). *Public sector apprenticeship: Improving work for governments and residents*. Urban Institute. https://www.urban.org/research/publication/public-sector-apprenticeship-improving-work-governments-and-residents

[1076] Lam, L. (2019). *A design for workforce equity: Workforce redesign for quality training and employment: A framing paper.* Center for American Progress. https://www.americanprogress.org/article/design-workforce-equity/

[1077] Stenstrom, J. (2019). *State investment in workforce development on the rise.* The Council for Community and Economic Research. https://www.c2er.org/2019/10/state-investment-in-workforce-development-on-the-rise/

[1078] Urban Institute. (2022). *Federal sources of workforce funding.* Local Workforce System Guide. https://workforce.urban.org/strategy/federal-sources-workforce-funding

[1079] National Center for Education Statistics. (2020). *About CTE Statistics*. Career and Technical Education (CTE) Statistics. https://nces.ed.gov/surveys/ctes/about.asp#:~:text=States%20and%20localities%20typically%20do,not%20have%20CTE%20funding%20information.

[1080] Council for Community and Economic Research. (2015). *State Economic Development Program Expenditures Database: Glossary of terms.* http://www.stateexpenditures.org/about/Definition_of_ED_Functions.pdf

[1081] Education Commission of the States. (2021). *Education and workforce development connections 2021: Workforce funding.* https://reports.ecs.org/comparisons/education-and-workforce-development-connections-2021-03

[1082] Center for Postsecondary and Economic Success at CLASP. (2013). *A framework for measuring career pathways innovation: A working paper.* Alliance for Quality Career Pathways.

[1083] Nadeau, C. A. (2020). *New living wage data for now available on the tool.* Living Wage Calculator. https://livingwage.mit.edu/articles/61-new-living-wage-data-for-now-available-on-the-tool

[1084] Carnevale, A. P., Strohl, J., Gulish, A., Van Der Werf, M., & Campbell, K. P. (2019). *The unequal race for good jobs: How Whites made outsized gains in education and good jobs compared to Blacks and Latinos*. Center on Education and the Workforce, Georgetown University. https://eric.ed.gov/?id=ED600048

[1085] Turner, M. A., Acs, G., Brown, S., Solari, C. D., & Fudge, K. (2020). *Boosting upward mobility: Metrics to inform local action summary.* Urban Institute. https://www.urban.org/research/publication/boosting-upward-mobility-metrics-inform-local-action-summary

[1086] Bergson-Shilcock, A. (2019). *Better together: How adult education/CTE collaborations benefit workers and business*. National Skills Coalition. https://eric.ed.gov/?id=ED607396

[1087] Acemoglu, D., & Pischke, J. -S. (1999). Beyond Becker: Training in imperfect labour markets. *The Economic Journal, 109*, F112–F142. http://www.jstor.org/stable/2565588

[1088] Haelermans, C., & Borghans, L. (2011). *Wage effects of on-the-job training: A meta-analysis*. Institute for the Study of Labor. http://dx.doi.org/10.2139/ssrn.1958732

[1089] U.S. Department of Labor. (2017). *Measurable skill gains.* WIOIA Performance Indicators and Measures. https://www.dol.gov/agencies/eta/performance/performance-indicators

[1090] National Research Council. (2012). *Key national education indicators: Workshop summary.* The National Academies. https://doi.org/10.17226/13453

D. Adjacent system conditions

Adjacent system conditions include experiences, situations, and circumstances outside of E-W systems that help or hinder positive E-W outcomes. Exhibit II.6 presents a summary view of the adjacent system conditions indicators, which span all domains and sectors.

Exhibit II.6. Adjacent system conditions indicators

	Pre-K	K–12	Postsecondary	Workforce
Adjacent system conditions	Childhood experiences			
	Access to full-day pre-K			
	Health insurance coverage			
	Food security			
	Access to affordable housing			
	Access to technology			
	Access to transportation			
	Exposure to neighborhood crime			
	Neighborhood economic diversity			
	Neighborhood racial diversity			
	Neighborhood juvenile arrests			

Childhood experiences

PK K12 PS WF

Definition: Individuals have not experienced repeated traumatic events within home environments.

Why it matters: Childhood experiences such as maltreatment, interparental violence, family disruption, poverty, and stress all have a negative impact on children's development and lifelong outcomes.[1091, 1092] The Adverse Childhood Experiences (ACEs) scale is a widely used, evidence-based tool that measures exposure to 10 potentially traumatic events that have been linked to short- and long-term well-being. High scores on the ACEs scale are positively related to chronic disease; suicide attempts; obesity; and leading causes of death, such as heart disease, stroke, and cancer.[1093] High scores are also negatively related to educational attainment, employment, and income,[1094, 1095] and research shows that the percentage of single-family households in an area is negatively correlated with upward mobility.[1096] Nationally, 61 percent of Black children and 51 percent of Latino children have experienced at least one ACE, compared with 40 percent of White children and 23 percent of Asian children.[1097] On average, Black and Latino children, and children from low-income households, are also exposed to a higher number of adversities than their peers.[1098, 1099, 1100] Overall, 1 in 10 children in the United States have experienced three or more ACEs.[1101]

Building Strong Brains Tennessee

Building Strong Brains Tennessee is a statewide public-private awareness initiative on adverse childhood experiences (ACEs). The initiative is led by the executive, legislative, and judicial branches of Tennessee, and motivated by research from the sciences of brain development and communication.

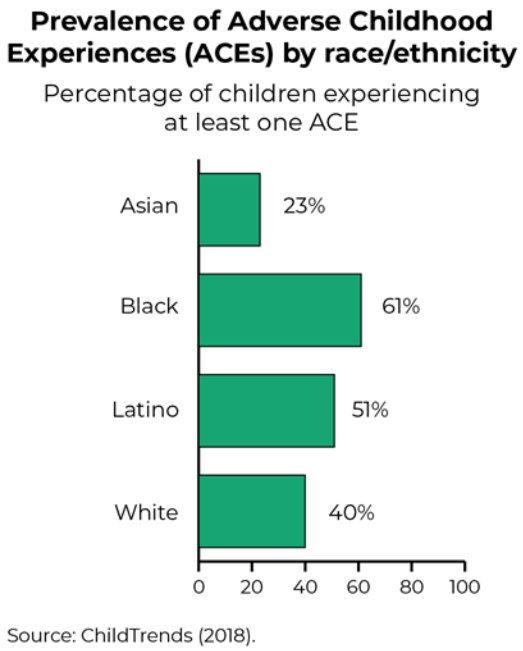
In the executive branch, multiple state agencies have adopted trauma-informed policies and practices. In the judicial branch, juvenile court judges in the state, their magistrates, and staff all receive training on ACEs and the initiative's principles and practices. In the legislative branch, four laws were enacted as of 2017 that focus on different elements of ACEs, including establishing Safe Baby Courts, developing ACEs training for the state's Department of Education, trauma-informed discipline policies in schools, and requiring ACEs training for parents who are divorcing.

The initiative also aims to raise public knowledge about ACEs and inform public policy in the state to support their prevention and reduce community conditions that contribute to them, as well as support local and state projects on how to measure the impact of ACEs on children. The initiative annually funds projects that focus on preventing and mitigating ACEs and their impacts.

Recommended metric(s): Percentage of individuals with fewer than three ACEs

Data source(s): Survey data

What to know about measurement: Because of the sensitive nature of ACEs, data are collected only at scale through anonymous surveys, such as the Center for Disease Control and Prevention's national Behavioral Risk Factor Surveillance System (BRFSS).[1102] Several states include ACEs questions in statewide youth risk behavior surveys. (For example, the Connecticut and Georgia Youth Risk Behavior Surveys each include questions related to ACEs.) All these surveys are anonymous and based on a random sample of respondents. For example, Connecticut and Georgia randomly select classrooms in public middle and high schools to field the surveys.



Source: ChildTrends (2018).

Individual ACEs screenings are often administered in clinical settings. Although school systems can administer these screenings, screeners should have training in mandated reporting requirements and expertise in trauma-informed care. Screeners should also have well-developed referral networks to help students connect with behavioral or trauma supports.[1103, 1104] Some ACEs might be more difficult for respondents to disclose, leading to their underestimation.[1105, 1106] Some research has found that respondents prefer reporting the number of ACEs rather than the specific experiences[1107] and that this may be an appropriate format for collecting sensitive information at the individual level. [1108, 1109, 1110]

Several alternatives to the ACEs survey exist that could be used to measure experiences within the home, such as the Family Support and Strain Scale (see Stanford University's SPARQtools).[1111] Other alternatives are a measure of Family Structure and Stability (see Turner et al.)[1112] or the Conflict Tactics Scale to measure emotional and physical abuse.[1113] However, we recommend the ACEs scale because of its strong research base, which provides evidence for the scale's predictive power; also, resources are widely available to support ACEs prevention and interventions.

Source frameworks: This indicator appeared in five source frameworks reviewed for this report. Our proposed definition and measure align with the Urban Institute's Boosting Upward Mobility framework, which uses the ACEs scale to measure exposure to trauma.[1114]

Health insurance coverage

PK K12 PS WF

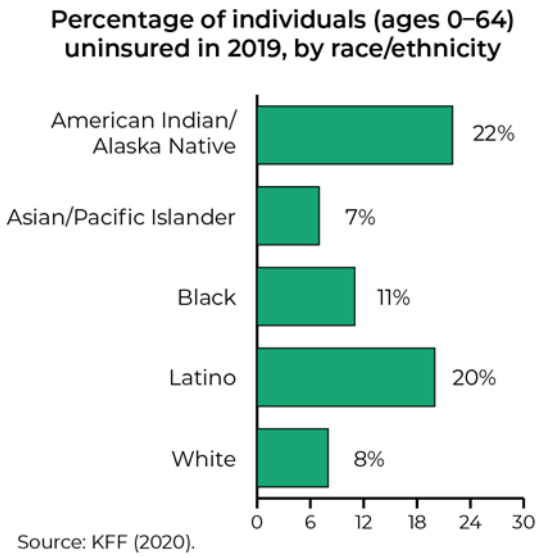
Definition: Individuals have health insurance coverage for preventative and emergency care.

Why it matters: Uninsured children have limited contact with health care services and more serious health problems, and forgo or do not receive essential health care or use more expensive medical services more often than those with insurance.[1115, 1116] These issues influence attendance, concentration, and participation in school, as well as future educational and labor market outcomes.[1117, 1118] Health insurance coverage is also important for adults and is tied to improved health care quality and access, as well as satisfaction with one's health.[1119] Although programs like the Children's Health Insurance Program (CHIP) and Medicaid can help families with low incomes obtain low- or no-cost health insurance coverage, not all eligible individuals enroll, due to both real and perceived procedural barriers.[1120,1121] In fact, more than one-quarter of uninsured people in 2020 were eligible for Medicaid or CHIP, and nearly two-thirds of these eligible uninsured individuals were people of color. [1122]

Although insurance coverage has increased over time, and disparities in coverage fell after the Affordable Care Act went into effect, the likelihood of insurance coverage among Indigenous and Latino children and adults remains significantly lower than other groups.[1123] In 2019, 22 percent of American Indian and Alaska Native adults and 20 percent of Latino adults were uninsured, compared to 11 percent of Black adults, 8 percent of White adults, and 7 percent of Asian adults.[1124] Coverage rates are higher among children than adults, but disparities are similar. In 2018, American Indian and Alaska Native children were three times more likely to be uninsured than Asian, Black, and White children (13 versus 4 percent), and Latino children were twice as likely to be uninsured than their Asian, Black, and White peers (8 versus 4 percent).[1125]

Recommended metric(s):

- Percentage of individuals with health insurance
- Percentage of eligible individuals (children or adults) enrolled in Medicaid or CHIP



Data source(s): Administrative data; survey data

What to know about measurement: The first recommended metric captures participation in any insurance program, including those offered by the government (such as CHIP and Medicaid), employers, or community clinics, as well as those that individuals purchase (for example, through Health Insurance Marketplaces). Multiple surveys measure health insurance coverage and can be adapted for use by educational institutions or employers. At the national level, they include the Current Population Survey,[1126] Medical Expenditure Panel Survey,[1127] National Health Interview Survey,[1128] and Survey of Income and Program Participation.[1129] We also recommend that E-W systems capture participation in CHIP and Medicaid among eligible individuals, either as part of a survey (as above) or by linking administrative records from state systems. This information can be used to support families with low incomes in enrolling in these programs.

Source frameworks: This indicator appeared in five source frameworks reviewed for this report, several of which recommended measuring whether individuals are insured (or uninsured). Our proposed approach to measuring the percentage of eligible individuals enrolled in Medicaid or CHIP aligns with the National Education Association's Great Public Schools indicator framework,[1130] which recommends measuring the percentage of eligible children enrolled in CHIP or Medicaid.

Food security

PK K12 PS WF

Definition: Individuals have access to enough affordable, nutritious food.

Why it matters: Food security and access to healthy food are related to improved health, emotional well-being, and social functioning.[1131] Conversely, food insecurity is correlated with a host of negative outcomes, including deficits in children's development[1132] and college students' lower academic

success.[1133, 1134] Yet marginalized populations are more likely to experience food insecurity. For example, food insecurity in Black and Latino households is twice the rate as that in White households.[1135] Families with lower incomes are also more likely to be food insecure[1136] and have access to less nutritious food.[1137] Although participation in the federal Supplemental Nutrition Assistance Program (SNAP)[1138] reduces the prevalence of very low food insecurity by about one-third, not all eligible individuals enroll in this program. Participation in SNAP is particularly low among college students: less than one-third of eligible college students enroll in SNAP, compared to 85 percent of all eligible individuals.[1139]

Recommended metric(s):

- Percentage of individuals with high or marginal food security, as measured by the U.S. Department of Agriculture's (USDA) Food Security Survey Module[1140]
- Percentage of eligible individuals participating in SNAP
- Percentage of individuals living in a census track with low access to healthy food, as defined by the USDA's Food Access Research Atlas[1141]

Data source(s): Survey data; administrative data

What to know about measurement: The USDA has developed survey modules to measure food security that can be used across settings. Varying survey lengths (in 18-, 10-, and 6-item modules) are available, with versions for children and youth, as well as translations into Spanish and Chinese. Starting in 2022, the National Postsecondary Student Aid Survey by the National Center for Education Statistics (NCES) will ask about food security among college students using the USDA items.

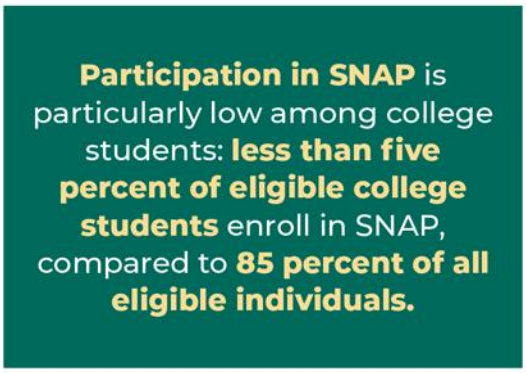
In addition to measuring food security through the USDA survey, we recommend that E-W systems track participation in SNAP among eligible individuals. This information can be used to support families with low incomes in enrolling in these programs. However, we caution that participation in nutrition assistance programs such as Free and Reduced-Price Meals (FARMS) and SNAP are considered weak measures of food security.[1142] For example, more than 1 in 10 households receiving SNAP benefits still experience very low levels of food security.[1143]

California's Student Expenses and Resource Survey

The California Student Aid Commission periodically surveys college students in the state to learn about their experiences with college affordability.

Because the Free Application for Federal Student Aid (FAFSA) currently does not ask students to report their race/ethnicity, the Student Expenses and Resource Survey (SEARS) provides a key opportunity to understand how students' financial needs, including their ability to pay for expenses beyond tuition (such as housing, food, and transportation) vary across racial and ethnic groups. In 2019, survey data revealed that more than one-third of college students in California experienced food and housing insecurity. Students of color reported the highest levels of both food and housing insecurity, regardless of whether they were receiving financial aid through scholarships or grants. For example, about half of Black college students with scholarships or grants reported experiencing food insecurity (54 percent) and housing insecurity (47 percent), the highest rates among any group.

SEARS data inform the Commission's estimates of the true annual cost of college for students, which in turn guides how the state determines eligibility for need-based financial aid awards. The data are also shared with institutions to inform the estimated costs of attendance they publish, as well as their plans for institutional policies and programs to help meet their students' needs.



Source: Allison (2018).

Finally, we recommend measuring neighborhood access to nutritious food sources through the Food Access Research Atlas, which accounts for the presence and distance of healthy food sources in an area, family income, vehicle availability, and transportation.

Source frameworks: This indicator appears in three source frameworks reviewed for this report. Our proposed measure builds on a measure of food security proposed by StriveTogether,[1144] which includes the "proportion of households experiencing food insecurity" and "proportion of eligible students participating in the School Breakfast Program."

Access to affordable housing

PK K12 PS WF

Definition: There is sufficient availability of affordable housing for the number of families with low incomes in an area (city or county).

Why it matters: A lack of affordable housing leaves families with less money for food, clothing, medicine, and transportation. Aside from causing material hardship, this lack has consequences for individuals' mental and physical health; for example, tenants who fall behind on their rent are more likely to experience depression,[1145] and children who live in unstable or poor housing conditions are more likely to experience developmental delays.[1146] Lack of affordable housing may be linked to higher rates of eviction, with families having low incomes, women, and people of color being most likely to be evicted from their homes.[1147]

Recommended metric(s):

- Ratio of (1) the number of affordable housing units to (2) the number of households with low and very low incomes in an area (city or county). Housing units are defined as affordable if the monthly costs do not exceed 30 percent of a household's income. Households with low incomes are defined as those earning below 80 percent of area median income (AMI), and very low-income households are defined as those earning below 50 percent of AMI.
- Percentage of eligible households receiving federal rental assistance

Data source(s): Administrative data

What to know about measurement: The first recommended metric can be calculated at the city and county level using public data from the American Community Survey (ACS)[1148] and the U.S. Department of Housing and Urban Development; however, a framework user would need to calculate the ratio. An advantage of this metric is that it captures the supply of affordable housing relative to demand for it, and therefore reflects whether there are shortages of such housing for those who need it. However, we note that the available data do not consider the features or quality of available affordable housing; for example, many large families have difficulty finding affordable housing with enough bedrooms. We also

note that this metric does not capture *an individual*'s ability to pay for housing. An alternative metric would be to measure the percentage of households that spend more than 30 percent of their income on housing costs. At an aggregate level, this percentage can be calculated using ACS data.

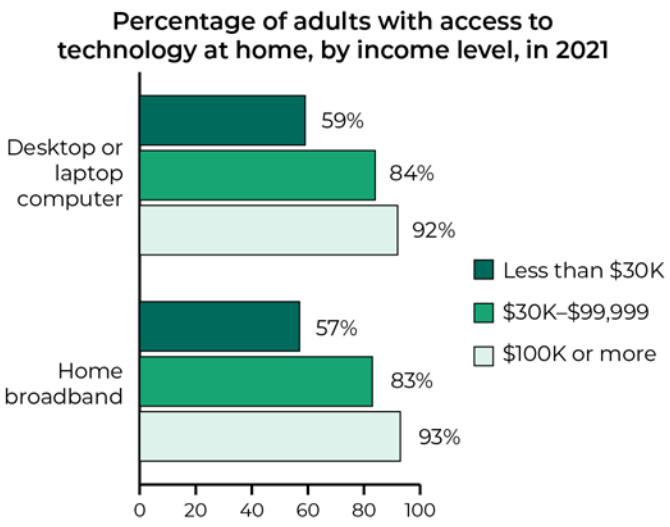
As a second metric, we recommend systems track the percentage of eligible families receiving federal rental assistance, which includes programs administered by the U.S. Department of Housing and Urban Development, such as public housing, Section 8 Housing Choice Vouchers, and Section 8 Project-Based Rental Assistance, among others. This information can be used to support low-income families in enrolling in these programs. National and state-level data are available from the Center on Budget and Policy Priorities, but may require administering a survey to obtain information at the individual level.[1149]

Source frameworks: This indicator appears in four source frameworks reviewed for this report. Our proposed measure draws on the Affordable Housing metric in the Urban Institute's Boosting Upward Mobility framework.[1150]

Access to technology

PK K12 PS WF

Definition: Individuals have access to a reliable Internet connection and a personal desktop or laptop computer.



Data source: Pew Research Center (2021).

Why it matters: Access to technology is increasingly critical for participation in education and workforce systems. Although device ownership and connectivity have increased in recent years, research shows that both racial and socioeconomic digital divides persist.[1151] For example, 80 percent of White adults in the U.S. reported owning a desktop or laptop computer in 2021, compared to 69 percent of Black adults and 67 percent of Latino adults.[1152] Fifty-seven percent of adults from low-income households had access to home broadband in 2021, compared to 93 percent of adults with high incomes. [1153] Access to a personal computer with a high-quality Internet connection (rather than just a mobile device) is especially critical for conducting complex tasks, such as schoolwork and job applications.[1154] During the COVID-19 pandemic, 36 percent of parents from low-income households whose children's schools were closed reported that it was somewhat or very likely that their children would not be able to complete their schoolwork because of lack of access to a computer at home, compared to 4 percent of parents with high incomes.[1155]

Recommended metric(s): Percentage of individuals who have both (1) access to at least one desktop or laptop computer owned by someone in the home and (2) reliable broadband Internet

Data source(s): Survey data

What to know about measurement: The American Community Survey (ACS)[1156] asks three questions that cover type of computer device used, availability of Internet access, and type of Internet access (the survey does *not* capture whether the device is owned by someone in the home). ACS data can be viewed at the state, county, zip code, and/or school district levels. Alternatively, E-W systems could capture data on this indicator through surveys by adapting questions from the ACS for local use. Although schools and workplaces increasingly provide devices for temporary or conditional use, our definition suggests the device should ideally be owned by someone in the home to ensure consistent, reliable access. We also note that the Civil Rights Data Collection (CRDC) initiative collects information on whether schools allow students to "take home school-issued devices that can be used to access the Internet for student learning." However, it does not assess whether students have access to a reliable Internet connection at home.[1157]

Source frameworks: This indicator appeared in five source frameworks reviewed for this report. The StriveTogether Guide to Racial and Ethnic Equity Systems Indicators cites the importance of both access to devices (including mobile, desktop, or laptop) and reliable broadband Internet. As noted above, we suggest refining the measure to specifically track access to a *computer* to support users' ability to perform complex tasks.

Access to transportation

Definition: Individuals have access to low-cost and timely transportation to commute to school or work.

Why it matters: Unequal access to transportation contributes to racial and socioeconomic disparities in employment and earnings;[1158] also, neighborhoods where residents have longer commute times have lower levels of upward economic mobility.[1159] Workers of color are more likely to lack a vehicle and commute by public transit, and they are overrepresented among workers with one-way commutes of 60 minutes or more.[1160] For example, White workers are twice as likely as Asian and Latino workers to have a car at home, and three times more likely than Black workers. Unequal access to transportation also affects students. Nationwide, Black students spend more time traveling to school, on average, compared to other racial and ethnic groups, and are more likely to use public transportation to get to school: 40 percent of Black students take public transportation to school, compared to 32 percent of White students and 23 percent of Latino students.[1161] At the postsecondary level, transportation costs represent about 17 percent of the costs of attending college[1162] and have been linked to disparities in college completion.[1163]

Recommended metric(s):

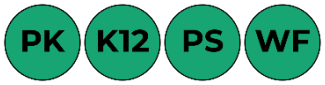
- Average commute time to work, school, or college
- The Low Transportation Cost Index, from the U.S. Department of Housing and Urban Development[1164]

Data source(s): Survey data; administrative data

What to know about measurement: We recommend measuring average commute time and transportation costs, as both reflect individuals' access to transportation in a locality. The American Community Survey (ACS) asks the number of minutes it usually takes a person to get from home to work and reports these data annually by region.[1165] A similar survey question could be adapted locally by schools and colleges. Data on local costs are available through the U.S. Department of Housing and Urban Development's Low Transportation Cost Index, which estimates the average transportation cost for a three-person, single-parent family earning 50 percent of the median income for renters in a region. Institutions that provide subsidized public transportation passes (which includes some K–12 districts and postsecondary institutions) should also track the share of eligible students receiving these benefits.

Source frameworks: This indicator appeared in four source frameworks reviewed for this report. Our proposed measures align with the Urban Institute's recommendation in the Boosting Upward Mobility framework to measure the Low Transportation Cost Index, [1166] as well as recommendations from StriveTogether[1167] to measure average commute time to work or school.

Exposure to neighborhood crime



Definition: The rate of violent and property crimes in a city or county.

Why it matters: Neighborhood rates of violent crime are negatively associated with rates of upward economic mobility.[1168] At the individual level, exposure to neighborhood crime leads to lower academic performance[1169, 1170] and higher levels of stress and trauma.[1171, 1172] In addition, adolescents exposed to violence in their communities are more likely to engage in externalizing behaviors, including engaging in violent crimes themselves.[1173, 1174, 1175] Black and Latino individuals are more likely to be exposed to neighborhood violence than other racial and ethnic groups.[1176, 1177, 1178]

Recommended metric(s): Rate of violent felonies and property felonies by city or county (number of incidents per 100,000 residents)

Data source(s): Administrative data

What to know about measurement: Law enforcement agencies across the country submit data on both violent crimes and property crimes to the Federal Bureau of Investigation's (FBI) Uniform Crime Reporting (UCR) program via the National Incident-Based Reporting System (NIBRS).[1179] Data are released publicly on a quarterly basis through the FBI UCR Crime Data Explorer (CDE). UCR data are available at the city and county level for most jurisdictions in the United States. It is worth noting that many crimes are underreported to police; thus, these data may not capture all instances of violence experienced in a neighborhood. In particular, domestic violence and sexual violence are among the most underreported violent crimes.[1180, 1181]

Source frameworks: This indicator appeared in four source frameworks reviewed for this report. Our proposed definition and measure align with the Urban Institute's Boosting Upward Mobility framework.[1182]

Neighborhood economic diversity

PK K12 PS WF

Definition: The concentration of poverty within a city or county

Why it matters: Students and families in lower-income neighborhoods tend to have less access to educational resources, support networks, and job opportunities that promote economic mobility.[1183, 1184] The size of the middle class in an area is highly correlated with levels of upward mobility,[1185] and moving to a lower-poverty area before age 13 improves the likelihood of students eventually attending college and earning more in adulthood.[1186] Yet economic segregation varies by race—for example, 80 percent of Black people from low-income households and 75 percent of Latino people from low-income households live in communities the federal government considers to be "low income," based on the concentration of poverty in the neighborhood. In contrast, about half of White people from low-income households live in a low-income community.[1187]

Recommended metric(s): Percentage of city or county residents experiencing poverty who live in a high-poverty neighborhood (defined as a neighborhood in which more than 40 percent of residents experience poverty)

Data source(s): Survey data

What to know about measurement: The data required to compute the proposed metric are available annually from the American Community Survey.[1188] An alternative metric is the share of middle-class households in a locality, defined as the percentage of families between the 25th and 75th percentiles of income.

Source frameworks: This indicator appeared in five source frameworks reviewed for this report. Our proposed metric aligns with the Urban Institute's Boosting Upward Mobility Framework's indicator of economic inclusion.[1189]

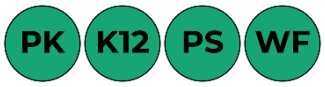
ImpactTulsa's Child Equity Index

ImpactTulsa is a collective impact organization in the StriveTogether Cradle to Career Network that works with local partners in the Tulsa, Oklahoma area to advance more equitable outcomes.

The Child Equity Index, a data tool developed by ImpactTulsa in partnership with Tulsa Public Schools, aims to help partners better understand the landscape of opportunity and systemic inequities in the Tulsa area. The index uses more than 40 indicators to measure environmental conditions across six domains of influence: (1) student-level factors, (2) neighborhood health, (3) neighborhood socioeconomic status, (4) neighborhood safety, (5) neighborhood pride and custodianship, and (6) neighborhood access. The index uses student addresses to attach "place-based" measures to neighborhood environments, defined using census tract and zip code geographic boundaries. The index also uses a Neighborhood Model to measure the relationship between environmental conditions and students' academic outcomes.

Findings from the Child Equity Index have sparked conversation about systemic inequities in Tulsa and have translated into action for students and families. For example, when Internet access maps by census tract revealed inequities in access for low-income communities and communities of color, local school districts adjusted their remote learning strategies, and their partners launched a City of Tulsa Internet Access Taskforce.

Neighborhood racial diversity



Definition: The share of an individual's neighbors who are people of other races and ethnicities.

Why it matters: Neighborhoods with higher levels of racial segregation tend to have lower levels of upward economic mobility.[1190] Furthermore, disparities in the academic achievement of students of color and those from low-income households, and White and more affluent students are more pronounced in more racially and economically segregated schools and neighborhoods.[1191, 1192, 1193]

Despite progress in racial integration over time, many neighborhoods remain segregated. In the period 2014–2018, the average White resident in a metropolitan area lived in a neighborhood where 71 percent of residents were also White, though only 55 percent of the population in metropolitan areas was White.[1194] Similarly, the average Black and Latino person lived in neighborhoods where most residents were people of color. Increased contact between racial groups is consistently linked with lower levels of prejudice.[1195]

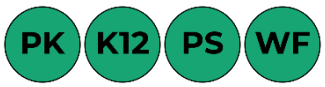
Recommended metric(s): Percentage of an individual's neighbors who are members of other racial or ethnic groups, calculated as a Neighborhood Exposure Index

Data source(s): Survey data

What to know about measurement: The data required to compute this metric are available annually from the American Community Survey (ACS).[1196] We note that racial and ethnic diversity within schools and institutions should also be measured, as described in the school and workplace diversity indicator under E-W system conditions.

Source frameworks: This indicator appeared in four source frameworks reviewed for this report. Our proposed approach to measuring racial diversity aligns with the work by the Urban Institute[1197] and StriveTogether.[1198]

Neighborhood juvenile arrests



Definition: The rate of juveniles arrested in a city or county.

Why it matters: Juvenile arrest is linked with an increased likelihood of high school dropout and adult incarceration.[1199] Although juvenile arrest rates dropped by almost 70 percent between 1999 and 2019, arrest rates among Black youth were still 2.4 times higher than among White youth.[1200] At a systems level, juvenile arrests can provide an indicator of overly punitive policing.[1201] Aggressive neighborhood policing tactics have been shown to reduce test scores for Black boys, even when police contact is indirect.[1202] Black people are five times more likely to report being unfairly stopped by police because of their race or ethnicity than White people, with 59 percent of Black men reporting this experience.[1203]

Recommended metric(s): Rate of juvenile arrests by city or county (number of arrests per 100,000 residents)

Data source(s): Administrative data

What to know about measurement: Juvenile arrest data from the Federal Bureau of Investigation's (FBI) Uniform Crime Reporting (UCR) program[1204] are publicly available and regularly reported. Examining juvenile arrest rates by type of offense (for example, drug abuse violation, curfew and loitering, disorderly conduct, etc.) can also help data users better understand community dynamics and inequities in policing. To assess inequities in the juvenile justice system, data users may also consider examining data on post-arrest handling of juvenile cases. (For example, users could examine whether youth are referred to juvenile court after arrest or diverted from formal court processing. Alternatively, they can look at whether youth are adjudicated delinquent and, if so, the type of dispositions they receive.)

Source frameworks: This indicator appeared in three source frameworks reviewed for this report. Our proposed definition and measure align with the Urban Institute's Boosting Upward Mobility framework, which suggests using this metric as a proxy for overly punitive policing.[1205]

Adjacent system conditions endnotes

[1091] Appleyard, K., Egeland, B., van Dulmen, M. H., & Sroufe, L. A. (2005). When more is not better: The role of cumulative risk in child behavior outcomes. *Journal of Child Psychology and Psychiatry, 46*(3), 235–245. https://doi.org/10.1111/j.1469-7610.2004.00351.x

[1092] Evans, G. W., Li, D., & Whipple, S. S. (2013). Cumulative risk and child development. *Psychological Bulletin, 139*(6), 1342–1396. https://doi.org/10.1037/a0031808

[1093] Felitti, V. J, Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The adverse childhood experiences (ACE) study. *American Journal of Preventive Medicine, 14*(4), 245–258. https://doi.org/10.1016/S0749-3797(98)00017-8

[1094] Center for Disease Control and Prevention. (2019). *Adverse Childhood Experiences (ACEs).* https://www.cdc.gov/vitalsigns/aces/index.html

[1095] Metzler, M., Merrick, M. T., Klevens, J., Ports, K. A., & Ford, D. C. (2017). Adverse childhood experiences and life opportunities: Shifting the narrative. *Children and Youth Services Review*, *72*, 141–149. https://www.sciencedirect.com/science/article/pii/S0190740916303449

[1096] Chetty, R., Hendren, N., Kline, P., & Saez, E. (2014). Where is the land of opportunity? The geography of intergenerational mobility in the United States. *The Quarterly Journal of Economics*, *129*(4), 1553–1623. https://scholar.harvard.edu/files/hendren/files/mobility_geo.pdf

[1097] Sacks, V., & Murphey, D. (2018). The prevalence of adverse childhood experiences, nationally, by state, and by race or ethnicity. *Child Trends.* https://www.childtrends.org/publications/prevalence-adverse-childhood-experiences-nationally-state-race-ethnicity

[1098] Slopen, N., Shonkoff, J. P., Albert, M. A., Yoshikawa, H., Jacobs, A., Stoltz, R., & Williams, D. R. (2016). Racial disparities in child adversity in the U.S.: Interactions with family immigration history and income. *American Journal of Preventive Medicine, 50*(1), 47–56. https://doi.org/10.1016/j.amepre.2015.06.013

[1099] Sheats, K. J., Irving, S. M., Mercy, J. A., Simon, T. R., Crosby, A. E., Ford, D. C., Merrick, M. T., Annor, F. B., & Morgan, R. E. (2018). Violence-related disparities experienced by Black youth and young adults: Opportunities for prevention. *American Journal of Preventive Medicine, 55*(4), 462–469. https://doi.org/10.1016/j.amepre.2018.05.017

[1100] Walsh, D., McCartney, G., Smith, M., & Armour, G. (2019). Relationship between childhood socioeconomic position and adverse childhood experiences (ACEs): a systematic review. *Journal of Epidemiology & Community Health, 73*(12). http://dx.doi.org/10.1136/jech-2019-212738

[1101] Sacks, V., & Murphey, D. (2018). The prevalence of adverse childhood experiences, nationally, by state, and by race or ethnicity. *Child Trends.* https://www.childtrends.org/publications/prevalence-adverse-childhood-experiences-nationally-state-race-ethnicity

[1102] Centers for Disease Control and Prevention. (2020). *Behavioral risk factor surveillance system.* https://www.cdc.gov/brfss/index.html

[1103] Menschner, C., & Maul, A. (2016). *Key ingredients for successful trauma-informed care implementation. Issue Brief.* Center for Health Care Strategies and Robert Wood Johnson Foundation. https://www.samhsa.gov/sites/default/files/programs_campaigns/childrens_mental_health/atc-whitepaper-040616.pdf

[1104] Schulman, M., & Maul, A. *Screening for adverse childhood experiences and trauma*. Center for Health Care Strategies. https://www.chcs.org/media/TA-Tool-Screening-for-ACEs-and-Trauma_020619.pdf

[1105] McLennan, J. D., MacMillan, H. L., & Afifi, T. O. (2020). Questioning the use of adverse childhood experiences (ACEs) questionnaires. *Child Abuse & Neglect*, *101.* https://doi.org/10.1016/j.chiabu.2019.104331

[1106] Bethell, C. D., Davis, M. B., Gombojav, N., Stumbo, S., & Powers, K. (2017). *Issue brief: A national and across state profile on adverse childhood experiences among children and possibilities to heal and thrive.* Johns Hopkins Bloomberg School of Public Health. https://www.semanticscholar.org/paper/A-national-and-across-state-profile-on-Adverse-U.S.-Bethell-Davis/253b25ebe07b12ac08aa9be1e999e3ebfe17e299

[1107] Purewal, S. K., Marques, S. S., Koita, K., & Bucci, M. (2016). Assessing the integration of the Center for Youth Wellness Adverse Childhood Experiences Questionnaire (CYW ACE-Q) in a pediatric primary care setting. *Journal of Adolescent Health, 58*(2), S47. https://doi.org/10.1016/j.jadohealth.2015.10.106

[1108] Lipscomb, S. T., Hatfield, B., Lewis, H., Goka-Dubose, E., & Abshire, C. (2020). Adverse childhood experiences and children's development in early care and education programs. *Journal of Applied Developmental Psychology, 72*. https://doi.org/10.1016/j.appdev.2020.101218

[1109] Bucci, M., Wang, L. G., Koita, K., Purewal, S., Marques, S. S., & Harris, N. B. (2015). *ACE-questionnaire user guide*. Center for Youth Wellness. https://centerforyouthwellness.org/aceq-pdf/

[1110] McLennan, J. D., MacMillan, H. L., & Afifi, T. O. (2020). Questioning the use of adverse childhood experiences (ACEs) questionnaires. *Child Abuse & Neglect*, *101*. https://doi.org/10.1016/j.chiabu.2019.104331

[1111] Stanford University. (n.d.). *Adverse childhood experiences (ACE).* https://sparqtools.org/mobility-measure/family-support-and-strain/

[1112] Turner, M. A., Acs, G., Brown, S., Solari, C. D., & Fudge, K. (2020). *Boosting upward mobility: Metrics to inform local action summary.* Urban Institute, p. 4. https://www.urban.org/research/publication/boosting-upward-mobility-metrics-inform-local-action-summary

[1113] Straus, M. A. (1987). *The conflict tactics scale and its critics: an evaluation and new data on validity and reliability.* https://eric.ed.gov/?id=ED297030

[1114] See Turner et al. (2020).

[1115] Byck, G. R. (2000). A comparison of the socioeconomic and health status characteristics of uninsured, state Children's health insurance program-eligible children in the United States with those of other groups of insured children: Implications for policy. *Pediatrics*, *106*(1), 14–21. https://doi.org/10.1542/peds.106.1.14

[1116] Wisk, L. E., & Witt, W. P. (2012). Predictors of delayed or foregone needed health care for families with children. *Pediatrics, 130*(6), 1027–1037. https://doi.org/10.1542/peds.2012-0668

[1117] Case, A., Fertif, A., & Paxson, C. (2005). The lasting impact of childhood health and circumstance. *Journal of Health Economics, 24*, 365–389. https://doi.org/10.1016/j.jhealeco.2004.09.008

[1118] Currie, J., Stabile, M., Manivong, P., & Roos, L. L. (2010). Child health and young adult outcomes. *The Journal of Human Resources, 45*(3), 517–548. https://www.jstor.org/stable/25703468

[1119] Sommers, B. J. (2017). Why health insurance matters—and why research evidence should too. *Academic Medicine, 92*(9), 1228–1230. https://doi.org/10.1097/ACM.0000000000001723

[1120] Ross, D. C., & Cox, L. (2004). *Beneath the surface: Barriers threaten to slow progress on expanding health coverage of children and families.* Kaiser Commission on Medicaid and the Uninsured. https://www.kff.org/wp-content/uploads/2013/01/beneath-the-surface-barriers-threaten-to-slow-progress-on-expanding-health-coverage-of-children-and-families-pdf.pdf

[1121] Artiga, S., & Pham O. (2019). *Recent Medicaid/CHIP enrollment declines and barriers to maintaining coverage*. Kaiser Family Foundation. https://files.kff.org/attachment/Issue-Brief-Recent-Medicaid-CHIP-Enrollment-Declines-and-Barriers-to-Maintaining-Coverage

[1122] Orgera, K., Rudowitz, R., & Damico, A. (2021). *A closer look at the remaining uninsured population eligible for Medicaid and CHIP*. Kaiser Family Foundation. https://www.kff.org/uninsured/issue-brief/a-closer-look-at-the-remaining-uninsured-population-eligible-for-medicaid-and-chip/

[1123] Buchmueller, T. C., Levinson, Z. M., Levy, H. G., Wolfe, B. L. (2016). Effect of the affordable care act on racial and ethnic disparities in health insurance coverage. *American Journal of Public Health*, *106*, 1416–1421. https://doi.org/10.2105/AJPH.2016.303155

[1124] Artiga, S., Hill, L., Orgera, K., & Damico, A. (2021). Health coverage by race and ethnicity, 2010–2019. *Issue Brief.* Kaiser Family Foundation. https://www.kff.org/racial-equity-and-health-policy/issue-brief/health-coverage-by-race-and-ethnicity/

[1125] KidsData. (2022). *Health insurance coverage status, by race/ethnicity.* KidsData. https://www.kidsdata.org/topic/752/health-insurance-race/table#fmt=1145&loc=1&tf=108&ch=200,201,7,11,726,10,72,9,73&sortColumnId=0&sortType=asc

[1126] United States Census Bureau. (2022a). *Current population survey (CPS).* U.S. Bureau of Labor Statistics. https://www.census.gov/programs-surveys/cps.html

[1127] Agency for Healthcare Research and Quality. (n.d.). *Medical expenditure panel survey (MEPS).* https://www.meps.ahrq.gov/mepsweb/

[1128] Centers for Disease Control and Prevention. (2022). *National health interview survey.* National Center for Health

Statistics. https://www.cdc.gov/nchs/nhis/index.htm

[1129] United States Census Bureau. (2020). *Survey of income and program participation (SIPP).* https://www.census.gov/programs-surveys/sipp.html

[1130] National Education Association (NEA). (2021). *Great public schools indicators framework.* https://www.nea.org/student-success/great-public-schools/what-students-deserve

[1131] Kamimura, A., Higham, R., Panahi, S., Lee, E., Griffin, R. J., Sundrud, J., & Lucero, M. (2022). How food insecurity and financial difficulty relate to emotional well-being and social functioning. *Southern Medical Journal, 115*(1), 1–7. https://doi.org/10.14423/SMJ.0000000000001342

[1132] Hines, C. T., Markowitz, A. J., & Johnson, A. D. (2021). Food insecurity: What are its effects, why, and what can policy do about it? *Policy Insights from the Behavioral and Brain Sciences, 8*(2), 127–135. https://doi.org/10.1177/23727322211032250

[1133] Goldrick-Rab, S., Richardson, J., Schneider, J., Hernandez, A., & Cady, C. (2018). *Still hungry and still homeless in college.* Wisconsin Hope Center. https://hope4college.com/still-hungry-and-homeless-in-college/

[1134] Phillips, E., McDaniel, A., & Croft, A. (2018). Food insecurity and academic disruption among college students. *Journal of Student Affairs Research and Practice,* 55(4), 353–372. https://doi.org/10.1080/19496591.2018.1470003

[1135] Odoms-Young, A. M. (2018). Examining the impact of structural racism on food insecurity: Implications for addressing racial/ethnic disparities. *Family and Community Health, 41,* S3–S6. https://doi.org/10.1097/FCH.0000000000000183

[1136] Walker, R. J., Garacci, E., Dawson, A. Z., Williams, J. S., Ozieh, M., & Egede, L. E. (2021). Trends in food insecurity in the United States from 2011 to 2017: Disparities by age, sex, race/ethnicity, and income. *Population*

Health Management, 24(4). https://doi.org/10.1089/pop.2020.0123

[1137] Hilmers, A., Hilmers, D. C., & Dave, J. (2012). Neighborhood disparities in access to healthy foods and their effects on environmental justice. *American Journal of Public Health, 102*(9), 1644–1654.

https://doi.org/10.2105/AJPH.2012.300865

[1138] Nord, M., & Golla, M. (2009). Does SNAP decrease food insecurity? Untangling the self-selection effect. *Economic Research Report No. (ERR-85),* U.S. Department of Agriculture. https://www.ers.usda.gov/publications/pub-details/?pubid=46297

[1139] See Nord & Golla (2009).

[1140] USDA Economic Research Service. (2021a). *Survey tools: Food security survey module.* https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/survey-tools/

[1141] USDA Economic Research Service. (2021b). *Documentation: Food access research atlas.* https://www.ers.usda.gov/data-products/food-access-research-atlas/documentation/

[1142] Webb, P., Coates, J., Frongillo, E. A., Lorge Rogers, B., Swindale, A., & Bilinsky, P. (2006). Measuring household food insecurity: Why it's so important and yet so difficult to do. *The Journal of Nutrition, 136*(5), 1404S–1408S. https://doi.org/10.1093/jn/136.5.1404S

[1143] See Nord & Golla (2009).

[1144] StriveTogether. (2021). *A guide to racial and ethnic equity systems indicators.* https://www.strivetogether.org/wp-content/uploads/2021/09/A-guide-to-racial-and-ethnic-equity-systems-indicators.pdf

[1145] Burgard, S., Seefeldt, K., & Zelner, S. (2012). Housing instability and health: Findings from the Michigan recession and recovery study. *Social Science & Medicine,* 75(12), 2215–2224. https://doi.org/10.1016/j.socscimed.2012.08.020

[1146] Levin Coley, R., Doyle Lynch, A., & Kull, M. (n.d.). *The effects of housing and neighborhood chaos on children.* MacArthur Foundation. https://www.macfound.org/media/files/hhm_brief_-_the_effects_of_housing_neighborhood_chaos_on_children.pdf

[1147] Hepburn, P., Louis, R., & Desmond, M. (2020). *Racial and gender disparities among evicted Americans.* The Eviction Lab. https://evictionlab.org/demographics-of-eviction/

[1148] United States Census Bureau. (2022b). *American community survey (ACS).* https://www.census.gov/programs-surveys/acs

[1149] Center on Budget and Policy Priorities. (2019). *National and state housing fact sheets and data.* Center on Budget and Policy Priorities. https://www.cbpp.org/research/housing/national-and-state-housing-fact-sheets-data

[1150] Turner, M.A., Acs, G., Brown, S., Solari, C. D., & Fudge, K. (2020). *Boosting upward mobility: Metrics to inform local action summary.* Urban Institute. https://www.urban.org/research/publication/boosting-upward-mobility-metrics-inform-local-action-summary

[1151] Katz, V., & Rideout, V. (2021). *Learning at home while under-connected. Lower-income families during the COVID-19 pandemic.* New America. https://www.newamerica.org/education-policy/collections/learning-at-home-while-under-connected-project/

[1152] Atske, S., & Perrin, A. (2021). *Home broadband adoption, computer ownership vary by race, ethnicity in the U.S.* Pew Research Center. https://www.pewresearch.org/fact-tank/2021/07/16/home-broadband-adoption-computer-ownership-vary-by-race-ethnicity-in-the-u-s/

[1153] Vogels, E. A. (2021). *Digital divide persists even as Americans with lower incomes make gains in tech adoption.* Pew Research Center. https://www.pewresearch.org/fact-tank/2021/06/22/digital-divide-persists-even-as-americans-with-lower-incomes-make-gains-in-tech-adoption/

[1154] Rideout, V., & Katz, V. S. (2016). *Opportunity for all? Technology and learning in lower-income families*. The Joan Ganz Cooney Center at Sesame Workshop. https://joanganzcooneycenter.org/publication/opportunity-for-all-technology-and-learning-in-lower-income-families/

[1155] Vogels, E. A., Perrin, A., Rainie, L., & Anderson, M. (2020). *53% of Americans say the Internet has been essential during the COVID-19 outbreak.* Pew Research Center. https://www.pewresearch.org/internet/2020/04/30/53-of-americans-say-the-internet-has-been-essential-during-the-covid-19-outbreak/

[1156] United States Census Bureau. (2022b). *American community survey (ACS).* https://www.census.gov/programs-surveys/acs

[1157] Civil Rights Data Collection. (2020). *2020-21 civil rights data collection—School form*. Office of Civil Rights, U.S. Department of Education. https://www2.ed.gov/about/offices/list/ocr/data.html

[1158] Gautier, P., & Zenou, Y. (2010). Car ownership and the labor market of ethnic minorities. *Journal of Urban Economics, 67*(3), 392–403. http://dx.doi.org/10.2139/ssrn.1298257

[1159] Chetty, R., & Hendren, N. (2018). The impacts of neighborhoods on intergenerational mobility II: County-level estimates. *Quarterly Journal of Economic, 133*(3), 1163–1228. https://academic.oup.com/qje/article/133/3/1163/4850659

[1160] Austin, A. (2017). *To move is to thrive: Public transit and economic opportunity for people of color*. Demos. https://www.demos.org/research/move-thrive-public-transit-and-economic-opportunity-people-color

[1161] Fast, I. (2020). Unequal traveling: How school district and family characteristics shape the duration of students' commute to school. *Travel Behaviour and Society, 20*, 165–173. https://doi.org/10.1016/j.tbs.2020.03.008

[1162] College Board. (2022). *Living Expense Budget 2020–21: 2020-21 low and moderate budgets for developing student expense budgets.* College Board. https://professionals.collegeboard.org/higher-ed/financial-aid/living-expense/2020

[1163] Elengold, K. S., Dorrance, J., Martinez, Foxen, P., & Mihas, P. (2021). *Dreams interrupted: A mixed-methods research project exploring Latino college completion.* UnidosUS, University of North Carolina at Chapel Hill. https://eric.ed.gov/?id=ED615020

[1164] Office of Policy Development and Research (PD&R). (2020). *Low transportation cost index.* Department of Housing and Urban Development. https://hudgis-hud.opendata.arcgis.com/datasets/HUD::low-transportation-cost-index/about

[1165] Burd, C., Burrows, M., & McKenzie, B. (2021). *Travel time to work in the United States: 2019*. American Community Survey Report. U.S. Census Bureau. https://www.census.gov/content/dam/Census/library/publications/2021/acs/acs-47.pdf

[1166] Turner, M. A., Acs, G., Brown, S., Solari, C. D., & Fudge, K. (2020). *Boosting upward mobility: Metrics to inform local action summary.* Urban Institute. https://www.urban.org/research/publication/boosting-upward-mobility-metrics-inform-local-action-summary

[1167] StriveTogether. (2021). *A guide to racial and ethnic equity systems indicators.* https://www.strivetogether.org/wp-content/uploads/2021/09/A-guide-to-racial-and-ethnic-equity-systems-indicators.pdf

[1168] Chetty, R., & Hendren, N. (2018). The impacts of neighborhoods on intergenerational mobility II: County-level estimates. *Quarterly Journal of Economics, 133*(3), 1163–1228. https://www.nber.org/papers/w23002

[1169] Sharkey, P., Schwartz, A. E., Goul Ellen, I., & Lacoe, J. (2014). High stakes in the classroom, high stakes on the street: The effects of community violence on student's standardized test performance. *Sociological Science.* https://doi.org/10.15195/v1.a14

[1170] O'Brien, D. T., Ciomek, A., & Tucker, R. (2021). How and why is crime more concentrated in some neighborhoods than others?: A new dimension to community crime. *Journal of Quantitative Criminology*. https://doi.org/10.1007/s10940-021-09495-9

[1171] Singer, M. I., Anglin, T. M., Song, L. Y., & Lunghofer, L. (1995). Adolescents' exposure to violence and associated symptoms of psychological trauma. *Journal of the American Medical Association, 273*(6), 477–482. https://doi.org/10.1001/jama.273.6.477

[1172] Rosenthal, B. S. (2000). Exposure to community violence in adolescence: Trauma symptoms. *Adolescence, 35*(138), 271–284. https://pubmed.ncbi.nlm.nih.gov/11019771/

[1173] Kling, J. R., Ludwig, J., & Katz, L. F. (2005). Neighborhood effects on crime for female and male youth: Evidence from a randomized housing voucher experiment. *The Quarterly Journal of Economics.* https://doi.org/10.1162/0033553053327470

[1174] Kelly, S. (2010). The psychological consequences to adolescents of exposure to gang violence in the community: An integrated review of the literature. *Journal of Child and Adolescent Psychiatric Nursing, 23*(2), 61–73. https://doi.org/10.1111/j.1744-6171.2010.00225.x

[1175] See Kling et al. (2005).

[1176] Lodge, E. K., Hoyo, C., Gutierrez, C. M., Rappazzo, K. M., Emch, M. E., & Martin, C. L. (2021). Estimating exposure to neighborhood crime by race and ethnicity for public health research. *BMC Public Health*, *21*(1078). https://doi.org/10.1186/s12889-021-11057-4

[1177] See Lodge et al. (2021).

[1178] Browning, C. R., Calder, C. A., Ford, J. L., Boettner, B., Smith, A. L., & Haynie, D. (2017). Understanding racial differences in exposure to violent areas: Integrating survey, smartphone, and administrative data resources. *Annals of the American Academy of Political and Social Science, 669*(1), 41–62. https://doi.org/10.1177/0002716216678167

[1179] Federal Bureau of Investigation. (n.d.). *Uniform crime reporting program (UCR).* Criminal Justice Information Services (CJIS). https://www.fbi.gov/services/cjis/ucr

[1180] Reaves, B. A. (2017). *Police response to domestic violence, 2006-2015.* Battered Women's Justice Project, U.S. Department of Justice. https://www.bwjp.org/news/police-response-to-domestic-violence-2006-to-2015.html

[1181] Morgan, R. E., & Truman, J. L. (2020). Criminal victimization, 2019. *Bureau of Justice Statistics,* U.S. Department of Justice. https://bjs.ojp.gov/library/publications/criminal-victimization-2019

[1182] Turner, M. A., Acs, G., Brown, S., Solari, C. D., & Fudge, K. (2020). *Boosting upward mobility: Metrics to inform local action summary.* Urban Institute. https://www.urban.org/research/publication/boosting-upward-mobility-metrics-inform-local-action-summary

[1183] Hamm, L., & McDonald, S. (2015). Helping hands: Race, neighborhood context, and reluctance in providing job-finding assistance. *The Sociological Quarterly, 56*(3), 539–557. https://doi.org/10.1111/tsq.12091

[1184] Owens, A., Reardon, S. F., & Jencks, C. (2016). Income segregation between schools and school districts. *American Educational Research Journal, 53*(4), 1159–1197. https://doi.org/10.3102/0002831216652722

[1185] Chetty, R., Hendren, N., Kline, P., & Saez, E. (2014). Where is the land of opportunity? The geography of intergenerational mobility in the United States. *The Quarterly Journal of Economics*, *129*(4), 1553–1623. https://doi.org/10.1093/qje/qju022

[1186] Chetty, R., Hendren, N., & Katz, L.F. (2016). The effects of exposure to better neighborhoods on children: New evidence from the moving to opportunity experiment. *American Economic Review, 106*(4), 855–902. https://doi.org/10.1257/aer.20150572

[1187] Loh, T. H., Coes, C., & Buthe, B. (2020). *The great real estate reset: Separate and unequal: Persistent residential segregation is sustaining racial and economic injustice in the U.S.* The Brookings Institution. https://www.brookings.edu/essay/trend-1-separate-and-unequal-neighborhoods-are-sustaining-racial-and-economic-injustice-in-the-us/

[1188] United States Census Bureau. (2022b). *American community survey (ACS).* https://www.census.gov/programs-surveys/acs

[1189] Turner, M. A., Acs, G., Brown, S., Solari, C. D., & Fudge, K. (2020). *Boosting upward mobility: Metrics to inform local action summary.* Urban Institute. https://www.urban.org/research/publication/boosting-upward-mobility-metrics-inform-local-action-summary

[1190] Chetty, R., & Hendren, N. (2018). The impacts of neighborhoods on intergenerational mobility II: County-level estimates. (2018). *Quarterly Journal of Economics, 133*(3), 1163–1228. https://doi.org/10.1093/qje/qjy006

[1191] Rumberger, R. W., & Willms, J. D. (1992). The impact of racial and ethnic segregation on the achievement gap in California high schools. *Educational Evaluation and Policy Analysis, 14*,(4), 377–396. https://doi.org/10.3102/01623737014004377

[1192] Card, D., & Rothstein, J. (2007). Racial segregation and the black-white test score gap. *Journal of Public Economics, 91*(11–12), 2158–2184. https://doi.org/10.1016/j.jpubeco.2007.03.006

[1193] Reardon, S. F. (2016). School segregation and racial academic achievement. *The Russell Sage Foundation Journal of the Social Sciences, 2*(5), 34–57. https://doi.org/10.7758/rsf.2016.2.5.03

[1194] Frey, W. H. (2020). *Even as metropolitan areas diversify, White Americans still live in mostly White neighborhoods.* Brookings Institution. https://www.brookings.edu/research/even-as-metropolitan-areas-diversify-white-americans-still-live-in-mostly-white-neighborhoods/

[1195] Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology, 90*(5), 751–783. http://dx.doi.org/10.1037/0022-3514.90.5.751

[1196] United States Census Bureau. (2022b). *American community survey (ACS).* https://www.census.gov/programs-surveys/acs

[1197] Turner, M. A., Acs, G., Brown, S., Solari, C. D., & Fudge, K. (2020). *Boosting upward mobility: Metrics to inform local action summary.* Urban Institute. https://www.urban.org/research/publication/boosting-upward-mobility-metrics-inform-local-action-summary

[1198] StriveTogether. (2021). *A guide to racial and ethnic equity systems indicators.* https://www.strivetogether.org/wp-content/uploads/2021/09/A-guide-to-racial-and-ethnic-equity-systems-indicators.pdf

[1199] Aizer, A., & Dyle, J. J. (2013). *Juvenile incarceration, human capital and future crime: Evidence from randomly assigned judges*. National Bureau of Economic Research. https://www.nber.org/papers/w19102

[1200] Office of Juvenile Justice and Delinquency Prevention. (2019). *Statistical briefing book: Racial and ethnic fairness*. U.S. Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention. https://www.ojjdp.gov/ojstatbb/special_topics/qa11501.asp?qaDate=2019&text=yes

[1201] Turner, M. A., Acs, G., Brown, S., Solari, C. D., & Fudge, K. (2020). *Boosting upward mobility: Metrics to inform local action summary.* Urban Institute. https://www.urban.org/research/publication/boosting-upward-mobility-metrics-inform-local-action-summary

[1202] Legewie, J., & Fagan, J. (2019). Aggressive policing and the educational performance of minority youth. *American Sociological Review, 84*(2), 220–247. https://doi.org/10.1177/0003122419826020

[1203] Horowitz, J. M., Brown, A., & Cox, K. (2019, April 9). *Race in America 2019: Public has negative views of the country's racial progress; more than half say Trump has made race relations worse.* Pew Research Center. https://www.pewresearch.org/social-trends/2019/04/09/race-in-america-2019/

[1204] Federal Bureau of Investigation. (n.d.). *Uniform crime reporting program (UCR).* Criminal Justice Information Services (CJIS). https://www.fbi.gov/services/cjis/ucr

[1205] See Turner et al. (2020).

III. Disaggregates

A. Overview

"Disaggregates" refer to background or contextual characteristics of individuals and systems by which data should be examined to analyze disparities, monitor progress, and guide action. We recommend that education-to-workforce (E-W) systems collect or link data on the 25 disaggregates identified in this chapter. To develop this recommended list, we reviewed the 41 source frameworks listed in Appendix A and synthesized common disaggregates for E-W data systems. We acknowledge that some disaggregates will be more or less relevant in certain contexts. For example, although all sectors should disaggregate data by background characteristics such as race and ethnicity, income, gender, and disability status, postsecondary systems should also consider disaggregating data by factors such as students' enrollment intensity and field of study.

National Academies guidance on tracking disparities

In its 2019 report, *Monitoring Educational Equity,* the National Academies of Sciences, Engineering, and Medicine recommend that systems measure educational equity based on indicators of disparities—that is, between-group differences among those student groups most salient for policy attention.

As noted in the report, "the purpose of such indicators is not to track progress toward aggregate goals, such as that all students graduate high school within 4 years of entering 9th grade, but to identify differences in progress toward that goal, differences in students' family background and other characteristics, and differences in the conditions and structures in the education system that may affect students' education."

The National Academies define a disparity as not just a large difference in individual outcomes, but also a lack of appropriate resources or effort to meet the needs of all groups of students.

Per our guidance in the data equity principles chapter, we emphasize the importance of disaggregating data on both outcomes and system conditions to identify, expose, and act on the structural inequities that cause disparate outcomes across groups, and avoid perpetuating existing stereotypes and deficit narratives. Data Equity Principle 3 contains additional guidance on data disaggregation to support equity goals, including suggestions on how to apply disaggregation throughout the data cycle, reflection questions and potential pitfalls for data users to consider, and additional resources to consult.

For each disaggregate listed in this chapter (Exhibit III.1), we provide the following information:

- **Sectors.** The sectors that should prioritize collecting and analyzing data on the disaggregate (pre-K, K–12, postsecondary, and/or workforce). Although some disaggregates are most relevant to only one sector, many apply to multiple sectors.
- **Definition.** A suggested definition for the disaggregate that can be applied across contexts.
- **Why it matters.** A summary of the importance of disaggregating E-W data by that characteristic.
- **What to know about measurement.** Considerations about measuring the disaggregate, including best practices for collecting the information appropriately and consistently. We also note when there is limited consensus on measurement and opportunities to advance the field.
- **Source frameworks.** The number of sources (including indicator frameworks, program reporting guidelines, and data system elements) consulted that mention the disaggregate.

Exhibit III.1. Disaggregates

	Pre-K	K–12	Postsecondary	Workforce
Disaggregates	Race and ethnicity			
	Gender			
		LGBT status		
	Disability status			
	Income level			
	Parental education level			
		First-generation college student		
	Student from migrant family household			
	Home language			
	English learner			
	Attendance intensity			
		K–12 school type		
			PS institution classification	
			Transfer enrollment status	
			Credential-seeking status	
			Postsecondary major	
				Occupation category
			Dislocated worker status	
				Basic skills level
	Age group (e.g., adult learners)			
	Urbanicity			
	Individuals experiencing homelessness			
	Individual or family military status			
	Individuals with current or past child welfare involvement			
		Justice involvement		

LGBT = lesbian, gay, bisexual, or transgender; PS = postsecondary.

B. Recommended disaggregates for E-W systems

Race and ethnicity

Definition: Self-reported race and ethnicity

Why it matters: Disaggregating data by race and ethnicity is critical for identifying and addressing disparities in outcomes related to systemic and institutional racism. As discussed throughout this report, individuals and communities of color are often disadvantaged by inequitable access to resources and services in education systems, workforce systems, and beyond. Measuring outcomes by racial and ethnic groups is required for accountability in grades K–12 under the Every Student Succeeds Act (ESSA) and as part of required reporting to the Integrated Postsecondary Education Data System (IPEDS) for postsecondary institutions receiving Title IV funds.

What to know about measurement: Data systems across sectors do not always use the same reporting standards for race and ethnicity, which can limit the comparability and availability of data reported across sectors. For example, IPEDS requires postsecondary institutions to exclude students who are nonresident aliens according to the visa and citizenship information on record at the institution from race and ethnicity reporting; these students instead are classified as a separate category of nonresident aliens.[1206] The National Student Clearinghouse (NSC) also asks institutions to follow these guidelines established by IPEDS. Further, the NSC does not require institutions to report students' race and ethnicity, and only 62 percent of 2020–2021 enrollment records reported to the NSC included this information.[1207]

E-W systems should align their approaches to collecting and reporting race and ethnicity data. These systems may follow the minimum categories required by the U.S. Department of Education, which are based on guidelines by the Office of Management and Budget. These include collecting data on two categories for ethnicity (Latino or Hispanic or not Latino or Hispanic) and five categories for race (American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or Other Pacific Islander; White). Individuals may select more than one race. This information is then used to report on seven categories: Latino or Hispanic of any race, and—for individuals who are not Latino or Hispanic—American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or Other Pacific Islander; White; or two or more races.[1208, 1209] Note that this guidance requires collecting data separately on Latino or Hispanic ethnic identity and racial identity, which are not mutually exclusive categories, and reporting race and ethnicity data for all students, including nonresident aliens.

In addition to these minimum categories, we recommend capturing more detailed ethnicity data based on national origin, as broad race and ethnicity groupings can mask disparities. For instance, there are more than 48 Asian ethnicities, and patterns of disparities emerge when disaggregating data for South Asian groups, such as Laotians and Cambodians, separately from East Asian groups, such as Chinese and Korean.[1210] As another example, individuals with origins in North Africa and the Middle East are categorized as "White" under federal definitions, though these groups may face different experiences and challenges than do White Americans with European roots.

Source frameworks: This disaggregate appeared in 25 source frameworks reviewed for this report, including the Institute for Higher Education Policy (IHEP) Postsecondary Metrics framework,[1211] the StriveTogether Guide to Racial and Ethnic Equity Systems Indicators,[1212] and the Urban Institute's Boosting Upward Mobility framework.[1213]

Gender

Definition: Self-identified gender

Why it matters: Gender disparities are evident in many E-W outcomes, both overall and within groups, such as groups broken out by race and ethnicity. Women now graduate from high school, enroll in college, and complete college (across all degree types) at higher rates than men.[1214, 1215] However, pay inequities that disadvantage women persist in the workforce, with women earning approximately 82 cents for every dollar earned by men.[1216] Although wage data disaggregated by nonbinary status is not currently widely available, research by the Human Rights Campaign suggests that workers identifying as nonbinary earn approximately 70 cents for every dollar compared to the "typical" worker (based on median weekly earnings of all full-time workers reported by the Bureau of Labor Statistics).[1217] Disaggregation by gender is required in grades K–12 under the Every Student Succeeds Act (ESSA). The Integrated Postsecondary Education Data System (IPEDS) also collects and reports postsecondary enrollment and completion data by gender.

What to know about measurement: We encourage E-W systems to systematically collect and report gender, and include a nonbinary option. Currently, most E-W data systems collect and report information only on male and female gender. For example, IPEDS allows reporting only for these two categories, and "it is up to the institution to decide how best to handle reporting individuals whose gender does not align with the 'Men' and 'Women' categories."[1218] Similarly, the National Student Clearinghouse (NSC) offers only these two options in its reporting guidance. Further, it does not require institutions to report students' gender, and only 64 percent of 2020–2021 enrollment records reported to the NSC included this information.[1219] For students whose gender is not reported, the NSC imputes whether they are male or female based on the probability of their first name being associated with either of these two genders.[1220] According to the Williams Institute, a leading lesbian, gay, bisexual, and transgender (LGBT) research center based at the UCLA School of Law, an estimated 1.2 million adults in the United States identify as nonbinary.[1221] Some public data systems are already moving to include a nonbinary option, including the planned 2022 Civil Rights Data Collection (CRDC) by the U.S. Department of Education.[1222]

Currently, there are various ways in which transgender status might be captured in data collection. Transgender could be included as a gender option: for example, the Williams Institute recommends offering seven options for self-reporting gender: (1) male, (2) female, (3) transgender male, (4) transgender female, (5) gender nonconforming, (6) nonbinary, (7) other gender identity. [1223] Alternatively, systems could ask a separate question about LGBT status that allows disaggregation by transgender status, as described below under "LGBT status." We encourage E-W systems to align on how they collect gender data to inform policy and practice that supports equity for individuals of all gender identities.

Source frameworks: This disaggregate appeared in 13 source frameworks reviewed for this report, including the Postsecondary Value Commission (PVC) Equitable Value framework,[1224] the Institute for Higher Education Policy (IHEP) Postsecondary Metrics framework,[1225] and the Urban Institute's Boosting Upward Mobility framework.[1226]

LGBT status

PK K12 PS WF

Definition: Individuals who identify as a member of the LGBT community

Why it matters: Lesbian, gay, bisexual, and transgender (LGBT) individuals come from diverse backgrounds but can face similar challenges related to overt and/or covert discrimination. For example, same-sex and transgender couples face discrimination in housing markets,[1227] and approximately 30 percent of LGBT individuals report experiencing workplace discrimination at some point in their careers.[1228] An analysis by the Human Rights Campaign finds that LGBTQ+ workers earn approximately 90 cents for every dollar compared to the "typical" worker (based on median weekly earnings of all full-time workers reported by the Bureau of Labor Statistics).[1229] In addition, LGBT individuals experience poverty at a higher rate (22 percent) than non-LGBT individuals (16 percent).[1230]

Source: The Williams Institute (2018).

What to know about measurement: The Williams Institute recommends measuring LGBT status in the following way: "Do you think of yourself as (please check all that apply): (1) Straight; (2) Gay or lesbian; (3) Bisexual; (4), Transgender, transsexual, or gender non-conforming. IF yes to transgender, then probe: (1) Transgender or transsexual, male to female; (2) Transgender or transsexual, female to male; (3) Gender non-conforming." Other measures broaden LGBT to include IA for intersex individuals and asexuality or Q for queer. However, because these terms might be interpreted differently, the Williams Institute does not recommend their inclusion, though respondents should be given a write-in option.[1231] As a less detailed alternative, the Gallup Institute asks a single question: "Do you personally identify as lesbian, gay, bisexual, or transgender?" We encourage E-W systems to align on LGBT data collection to inform policy and practice that supports LGBT individuals. As with other sensitive information, questions about LGBT status should be voluntary and confidential.

Source frameworks: This disaggregate (or a similar indicator of sexual orientation) appeared in three source frameworks reviewed for this report: the United Way Equity framework,[1232] the California Cradle-to-Career Data System,[1233] and the Urban Institute Robust and Equitable Measures to Identify Quality Schools (REMIQS) framework.[1234]

Disability status

PK K12 PS WF

Definition: Students who receive special education supports or adults with a disability

Why it matters: Individuals with disabilities may benefit from individualized supports throughout the E-W continuum. For example, in 2017, the national adjusted cohort graduation rate (ACGR) for students with disabilities was approximately 67 percent, an 18-point difference from the overall ACGR of 85 percent.[1235] In the workforce, individuals with disabilities tend to earn less than non-disabled workers. In 2017, median earnings for full-time, year-round workers with disabilities were $41,332, compared with $47,279 for full-time, year-round, non-disabled workers.[1236] Individuals with disabilities often face higher medical, transportation, and housing costs than those without disabilities, which may present additional obstacles to achieving economic mobility and security.[1237] Disaggregating outcomes for students who receive special education services is required for accountability in grades K–12 under the Every Student Succeeds Act (ESSA). These data can and should be used to identify both whether students are gaining appropriate access to special education supports and whether some student groups are overrepresented in special education.

What to know about measurement: Disability status is defined and captured differently across systems based on the policy context. In pre-K and K–12, disability status is based on whether students have an individualized education program (IEP) or 504 plan. Students with an IEP or 504 plan, which includes those who do not qualify for an IEP but may benefit from additional accommodations, receive special education services under the Individuals with Disabilities Education Act. Pre-K and K–12 data systems must capture this information, along with the reason for the student's disability, which can be grouped into categories (for example, intellectual disabilities; developmental delays and autism spectrum disorder; speech and language impairments; specific learning disabilities; physical disabilities; and other disabilities, which include attention deficit hyperactivity disorder). This detailed information should also be used to disaggregate data for students receiving special education services, as additional patterns of disparities may emerge.

In postsecondary and workforce contexts, individuals must self-identify as having a disability to receive certain accommodations.[1238] Adult disability status is defined by federal law as "someone who (1) has a physical or mental impairment that substantially limits one or more 'major life activities,' (2) has a record of such an impairment, or (3) is regarded as having such an impairment."[1239] Individuals who meet the U.S. Department of Labor's definition of "frail" would also be included.[xxvii]

Source frameworks: This disaggregate appeared in 10 source frameworks reviewed for this report, including the National Education Association Great Public Schools Indicator Framework,[1240] the Council of Great City Schools Academic Key Performance Indicator framework,[1241] and multiple publications by the National Academies.[1242, 1243]

[xxvii] The definition of frail is "an individual 55 years of age or older who is determined to be functionally impaired because the individual - (1) (i) Is unable to perform at least two activities of daily living without substantial human assistance, including verbal reminding, physical cueing, or supervision; or (ii) is unable to perform at least three such activities without such assistance; or (2) Due to a cognitive or other mental impairment, requires substantial supervision because the individual behaves in a manner that poses a serious health or safety hazard to the individual or to another individual."

Income level

PK K12 PS WF

Definition: Whether individuals or households are considered low income, middle income, or high income

Why it matters: Disaggregating data by income level is important for identifying disparities caused by economic inequality and unequal access to certain supports. For example, in 2017, the national adjusted cohort graduation rate (ACGR) for economically disadvantaged students was 78 percent, compared to the overall ACGR of 85 percent.[1244] In addition, students who graduate from low-income high schools are more likely to leave college after the first year than those from higher income high schools.[1245] One study showed that just 14 percent of students classified as low socioeconomic status[xxviii] (SES) earned a bachelor's degree or higher within eight years of high school completion, compared to 29 percent of middle-SES students and 60 percent of high-SES students.[1246] Measuring outcomes for students from low-income households is required for accountability in grades K–12 under the Every Student Succeeds Act (ESSA), and the Integrated Postsecondary Education Data System (IPEDS) collects and reports postsecondary enrollment and completion by Pell Grant status, as well as net price by income level.

What to know about measurement: E-W systems currently use various (and sometimes proxy) measures to determine income level, as the available data vary across sectors. For example, K–12 systems might measure low-income status based on whether students receive free or reduced-price lunch, whereas postsecondary systems might measure it based on Pell Grant receipt. These classifications are often imperfect proxies for income level. For example, schools eligible for the Community Eligibility Provision program do not collect individual-level data to determine eligibility for the National School Lunch Program (NSLP). Because of the limitations of data on NSLP eligibility, some districts are beginning to track alternative measures of economic disadvantage. For instance, Pittsburgh and Philadelphia schools determine whether students are directly certified for the NSLP through the Supplemental Nutrition Assistance Program (SNAP), Temporary Assistance for Needy Families (TANF), Medicaid, or other social service programs.[1247] However, not all low-income individuals may be eligible or participate, so program receipt (whether NSLP, Pell Grants, SNAP, or other programs) may undercount individuals in lower income categories.

We recommend that E-W systems collect data on household income directly and use that information to determine income groupings for disaggregation. One standard approach is to form income groupings in relation to the federal poverty level (FPL): for example, (1) up to 200 percent of FPL, (2) 200 to 399 percent of FPL, and (3) 400 percent or higher. In 2021, the 200 percent threshold for a family of a four was $53,000 and the 400 percent threshold was $106,000.[1248] (These values apply to the contiguous United States; FPL values are higher in Hawaii and Alaska.) Another approach, one the U.S. Department of Housing and Urban Development uses, is based on the area median income (AMI) rather than the FPL. Under this guidance, "low income" is defined as up to 80 percent of AMI and "moderate income" is defined as 80 to 120 percent of AMI. Because AMI definitions are based on local data, the thresholds can vary significantly across localities and better reflect differences in the cost of living. For instance, the

[xxviii] Per the U.S. Department of Education, "students' SES is based on their parents' education and occupations as well as family income, and is measured by a composite score on these variables. The low-SES group is the lowest quartile; the middle-SES group is the middle two quartiles; and the high-SES group is the upper quartile."

"low-income" threshold for a family of four living in San Francisco, California in 2021 was $106,550.[1249] In Chattanooga, Tennessee, that threshold was $57,050.[1250] We encourage E-W systems to converge on an approach to reporting income groups for data disaggregation.

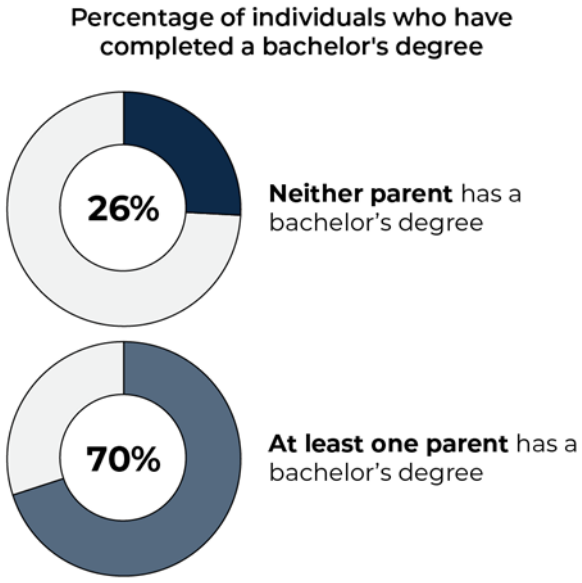
Source frameworks: This disaggregate appeared in 20 source frameworks reviewed for this report, such as the National School Readiness Indicators Initiative,[1251] the Urban Institute Robust and Equitable Measures to Identify Quality Schools (REMIQS) framework,[1252] and the Postsecondary Value Commission Equitable Value framework.[1253]

Parental education level

PK K12 PS WF

Definition: Highest level of education achieved by either parent

Why it matters: Parents' education levels are strongly associated with educational outcomes, including grades, graduation, and students' aspirations for their own achievement.[1254, 1255, 1256] Individuals who have at least one parent with a bachelor's degree have higher rates of bachelor's degree attainment, higher median household income, and higher median wealth.[1257] Higher levels of parental education are also associated with intergenerational wealth and therefore greater economic security.[1258]



Data source: Pew Research Center (2021).

What to know about measurement: E-W systems should collect consistent information on the educational attainment of both parents—for example, by adopting the following categories used in the American Community Survey (ACS): no schooling completed; nursery school; grades 1 through 11; 12th grade—no diploma; regular high school diploma; general equivalency diploma (GED) or alternative credential; some college credit but less than one year of college; one or more years of college credit, no degree; associate's degree; bachelor's degree; master's degree; professional degree beyond bachelor's degree; doctorate degree. As a simpler alternative, the Free Application for Federal Student Aid (FAFSA) uses four categories to ask about the level of schooling completed by each parent: middle school/junior high; high school; college or beyond; and other or unknown. These data can be used to determine whether a student is a first-generation college student while also allowing for further disaggregation if needed.

Source frameworks: This disaggregate appeared in six source frameworks reviewed for this report, such as the National School Readiness Indicators Initiative[1259] and the California Cradle-to-Career Data System.[1260]

First-generation college student

Definition: Students who are the first in their family to complete any postsecondary degree

Why it matters: First-generation students may benefit from additional supports to prepare for standardized tests, submit college applications, enroll in postsecondary school, and succeed in their first year of college and beyond. Students whose parents have limited experience with the postsecondary system "may lack the critical cultural capital necessary for college success."[1261] First-generation college students tend to have lower rates of postsecondary persistence and completion: one study showed that 33 percent of first-generation students left school without returning within three years of beginning college, compared to 14 percent of students with at least one parent with a bachelor's degree.[1262]

What to know about measurement: Many definitions of "first-generation" college students are used in practice, with one study finding that estimates of the prevalence of first-generation status can range from 22 to 77 percent, depending on the definition used.[1263] Under federal guidance used to determine eligibility for TRIO programs (Upward Bound, Talent Search, and Student Support Service), a student is considered "first generation" if neither parent completed a four-year college degree.[1264] The Institute for Higher Education Policy defines first-generation status based on neither parent having *completed* any college degree—that is, a student may be considered first generation if their parents enrolled in college but did not complete it.[1265] In contrast, the National Student Clearinghouse (NSC) classifies a student as "first generation" if neither parent *ever* attended a college or university.[1266] More recently, some support organizations, such as College Track, consider students whose parents completed a four-year degree outside of the United States as "first generation." We encourage E-W systems to align on a definition of "first generation" to support coherence and common understanding in the field.

Source frameworks: This disaggregate appeared in six source frameworks reviewed for this report, such as the Institute for Higher Education Policy Postsecondary Metrics Framework[1267] and the National Student Clearinghouse Postsecondary Data Partnership.[1268]

Student from migrant family household

Definition: Students who are the children of migratory or seasonal farmworkers or are migratory or seasonal farmworkers themselves

Why it matters: Migratory children frequently change schools and districts, forcing them to contend with varied curricula and school processes and limiting their ability to develop support systems and sustained social connections. The Association of Farmworker Opportunity Programs estimates there are approximately half a million child farmworkers in the United States,[1269] and estimates of graduation rates for migrant students are approximately 45 to 50 percent, well below the national average.[1270] In high school, college outreach programs do not consistently reach students from migrant households, which negatively impacts their likelihood of applying for and enrolling in postsecondary education.[1271]

What to know about measurement: Under the Every Student Succeeds Act (ESSA), a migratory child is defined as "a child or youth who made a qualifying move in the preceding 36 months—(A) as a migratory agricultural worker or a migratory fisher; or (B) with, or to join, a parent or spouse who is a migratory agricultural worker or a migratory fisher." Migratory children may receive support from federally funded pre-K programs such as Migrant and Seasonal Head Start and the Migrant Education Program in K–12. Although migrant students can be difficult to track, the U.S. Department of Education's Migrant Student Records Exchange Initiative provides a data infrastructure to track and manage records for students who move frequently and have data records in more than one state.[1272] At the postsecondary level, first-year undergraduate students who are the children of migratory or seasonal farmworkers or are migratory or seasonal farmworkers themselves can receive support through the federal College Assistance Migrant Program.

Source frameworks: This disaggregate appeared in three source frameworks reviewed for this report: the Urban Institute Robust and Equitable Measures to Identify Quality Schools (REMIQS) framework,[1273] Workforce Innovation and Opportunity Act reporting guidelines,[1274] and the California Cradle-to-Career Data System.[1275]

Home language

PK K12 PS WF

Definition: The language an individual speaks at home, if not English

Why it matters: Home language can provide greater insight into the experiences of emerging multilingual students classified as English learners and those who speak another language at home but may not be classified as English language learners. Data from the American Community Survey show that approximately 20 percent of the U.S. population primarily speaks a language other than English at home.[1276] As noted in the E-W System Conditions section of this report, school-family engagement is important for students' success; however, families with limited English proficiency often face barriers to accessing or understanding educational resources.[1277]

What to know about measurement: All state departments of education recommend or require school districts to use a home language survey (often during the school enrollment process) as a first step to identify children who many need English language learner services. The following three home language survey questions have been approved by the U.S. Department of Education Office for Civil Rights and the U.S. Department of Justice: "(1) What is the primary language used in the home, regardless of the language spoken by the student? (2) What is the language most often spoken by the student? (3) What is the language that the student first acquired?"[1278] It is also common to include a question on the language in which parents or other individuals prefer to receive communications. Postsecondary and workforce institutions may also consider collecting this information on a voluntary basis.

Source frameworks: This disaggregate appeared in two source frameworks reviewed for this report: the Urban Institute Robust and Equitable Measures to Identify Quality Schools (REMIQS) framework[1279] and the Project THRIVE State Indicators for Early Childhood.[1280]

English learner

Definition: A student or individual who is classified as an English language learner or as having limited English proficiency

Why it matters: Approximately 9 percent of K–12 students are considered English learners.[1281] In 2017, the national adjusted cohort graduation rate (ACGR) for students with limited English proficiency was approximately 66 percent—a 19-point difference from the overall ACGR of 85 percent.[1282] One analysis of labor market outcomes shows that English-proficient workers earn 25 to 40 percent more than individuals with limited English proficiency.[1283] A survey of low-wage workers by the Harvard Business School indicates that English language fluency is helpful in achieving upward mobility in the workplace.[1284] Disaggregating outcomes for English learners is required for accountability in grades K–12 under the Every Student Succeeds Act (ESSA).

What to know about measurement: In pre-K and K–12, students with a home language other than English must be assessed for their English proficiency. Students who do not meet local English proficiency standards are classified as English language learners, and their proficiency (and status as an English learner) is reassessed each academic year. In addition to tracking students' current status as an English learner, some systems further disaggregate data by whether a student was *ever* an English learner (which includes students who have been reclassified), is a newcomer English learner (enrolled for less than four years in U.S. schools), or is a long-term English learner (classified as an English learner for more than five years). In postsecondary and workforce contexts, the federal government defines limited English proficiency as "individuals who do not speak English as their primary language and who have a limited ability to read, speak, write, or understand English."[1285] These individuals may be entitled to receive language support from federal and state agencies.

Source frameworks: This disaggregate appeared in nine source frameworks reviewed for this report, such as the Council of Great City Schools Academic Key Performance Indicator framework,[1286] the California Cradle-to-Career Data System,[1287] and Workforce Innovation and Opportunity Act reporting requirements.[1288]

Attendance intensity

Definition: Whether a child attends a half-day or full-day pre-K or kindergarten program, or a postsecondary student attends college part time or full time

Why it matters: As noted in the E-W System Conditions section of this report, access to and participation in full-day pre-K and kindergarten are associated with greater academic achievement for children. Full-day programs can also help mitigate logistical challenges for working families, improve children's attendance in school,[1289] and increase mothers' labor force participation.[1290]

At the postsecondary level, part-time college students often face greater challenges in completing their postsecondary credentials than students who attend full time. Data from the National Student

Clearinghouse (NSC) show that six-year degree completion rates for full-time students are approximately four times higher (84 percent) than for part-time students (21 percent) and nearly twice as high as for students who alternate between part-time and full-time enrollment (44 percent).[1291] In addition, to be eligible for the maximum award amounts for federal financial aid, students must be enrolled for 12 credit hours or the equivalent (that is, considered full-time students). The Integrated Postsecondary Education Data System (IPEDS) reports data by full-time and part-time status.

What to know about measurement: States and districts use different definitions to determine which pre-K and kindergarten programs are half day versus full day,[1292] so these labels are not always comparable. We recommend collecting information on the duration of programs and following the Civil Rights Data Collection (CRDC), which defines full-day programs as being six hours per day each weekday.[1293]

Postsecondary institutions may also classify part-time and full-time students differently, though all must collect data on the number of credits students are taking because this information affects financial aid awards. We recommend using this information to consistently report on part-time and full-time status following IPEDS, which defines full-time students as those taking 12 or more semester credits, 12 or more quarter credits, or 24 or more clock hours a week in each term.

Source frameworks: This disaggregate appeared in three source frameworks reviewed for this report: the California Cradle-to-Career Data System,[1294] the Institute for Higher Education Policy Postsecondary Metrics Framework,[1295] and the NSC Postsecondary Data Partnership.[1296]

K–12 school type

Definition: The type of school that a student attends

Why it matters: Different types of K–12 schools, including charter schools, magnet schools, and alternative education schools, may have different educational aims and student populations, making it critical to understand who they serve, what types of supports they provide to students, and how well they support student outcomes. Of the more than 50 million public school students in 2018–2019, approximately 7 percent were enrolled in charter schools, 5 percent in magnet schools, and 0.9 percent in alternative schools.[1297] Another 4.7 million students attended private schools.[1298]

What to know about measurement: The U.S. Department of Education's Common Core of Data classifies K–12 schools according to whether they are public or private; charter or non-charter; magnet or non-magnet; and whether they are regular schools, special education schools, career and technical schools, or alternative education schools. The categories are not mutually exclusive—per the U.S. Department of Education, "magnet, charter, and virtual schools are also included under regular, special education, vocational, or alternative schools as appropriate."[1299] Each of these distinctions may be relevant for disaggregation, depending on the context and the question being asked of the data.

Source frameworks: This disaggregate appeared in one source framework reviewed for this report: the California Cradle-to-Career Data System. [1300]

Postsecondary institution classification

Definition: The highest undergraduate degree level (less than two years, two year, or four year) and the sector (public, nonprofit, or for-profit) of a postsecondary institution

Why it matters: Disaggregating student achievement and earnings by postsecondary institution level and sector can reveal disparities in whether and how institutions produce value for students. Data from 2022 published by the National Student Clearinghouse (NSC) show that four-year college students who attend private nonprofit institutions graduate within six years at the highest rate (78 percent), followed by students in public institutions (69 percent) and private for-profit institutions (46 percent); the graduation rate for students in public two-year colleges is 42 percent.[1301] Institution type has also been shown to be related to debt burdens and unemployment rates.[1302] As discussed in the Outcomes and Milestones section of this report, private for-profit institutions, which disproportionately serve students from low-income households, are less likely to deliver a minimum economic return for students than their public and private nonprofit counterparts.[1303] The Integrated Postsecondary Education Data System (IPEDS) reports data by the level and sector of postsecondary institutions.

What to know about measurement: In IPEDS, postsecondary institutions are classified by the highest undergraduate degree level they offer (less than two years, two year, or four year) and the sector of funding control (public, private nonprofit, or private for-profit). The Carnegie Classification of Institutions of Higher Education offers more detailed institutional categories that can also be useful for disaggregation, as recommended by the National Academies. For instance, these tiers distinguish "R1" doctoral universities with very high research activity from "R2" doctoral universities with high research activity and other doctoral/professional universities, which are classified as "D/PU."[1304]

Source frameworks: This disaggregate appeared in two source frameworks reviewed for this report: the California Cradle-to-Career Data System[1305] and the NSC Postsecondary Data Partnership.[1306]

Transfer enrollment status

Definition: Whether students are first-time students in college or have transferred from another postsecondary institution

Why it matters: Nearly half of first-time college students begin their postsecondary career in community colleges.[1307] The transfer process can increase time to degree and, depending on institutional policies and norms, create logistical and other challenges for students. Transfer students sometimes face difficulty in accessing support services and integrating into campus culture,[1308] which may in turn affect their chances of graduation. Approximately 42 percent of students who start at community colleges and transfer out earn a bachelor's degree within six years, compared to 66 percent of students who start at public four-year institutions.[1309, 1310] Disaggregating data by transfer enrollment status can allow colleges and universities to better identify and support transfer students.

What to know about measurement: The Integrated Postsecondary Education Data System (IPEDS) surveys institutions on their number of "transfer-in (non-first-time entering)" students but does not provide information on the type of institution from which they transferred, which is important in understanding students' experiences. Institutions can use individual-level student records to identify whether a student is a first-time or transfer student, as well as the type of institution from which they transferred (for example, from a two-year college into a four-year college).

Source frameworks: This disaggregate appeared in three source frameworks reviewed for this report: the California Cradle-to-Career Data System,[1311] the National Student Clearinghouse Postsecondary Data Partnership,[1312] and the Institute for Higher Education Policy Postsecondary Metrics framework.[1313]

Credential-seeking status

Definition: Type of award a student is seeking upon completion of studies

Why it matters: Not everyone who enrolls in postsecondary education intends to earn a credential; for instance, some students audit or take courses to pursue personal interests or fulfill other academic requirements. Disaggregating data by credential-seeking status can help colleges (1) identify and provide support to students seeking different types of credentials, and (2) adjust for non-credential seekers in calculating completion rates to offer a more accurate representation of student outcomes.

What to know about measurement: We recommend postsecondary institutions track whether students seek a postsecondary credential, as well as the type of credential they seek. The National Student Clearinghouse (NSC) collects data on students' "degree-seeking" status (whether they are seeking a degree or not) as well as their "class/credential level" (whether they are enrolled in or completing an undergraduate certificate program, associate's degree program, bachelor's degree program, post-baccalaureate certificate program, master's degree program, doctoral degree program, post-doctorate degree program, or professional degree program). For students not seeking degrees, it captures whether they are enrolled at the undergraduate or graduate or professional level. However, these fields are not required for all students. Although 88 percent of 2020–2021 enrollment records reported to the NSC included students' class or credential level, only 37 percent included their degree-seeking status.[1314]

Source frameworks: This disaggregate appeared in three source frameworks reviewed for this report: the California Cradle-to-Career Data System,[1315] the NSC Postsecondary Data Partnership,[1316] and the Institute for Higher Education Policy Postsecondary Metrics framework.[1317]

Postsecondary major

Definition: A student's postsecondary major(s)

Why it matters: Some fields of study are more lucrative than others; therefore, a student's postsecondary major is likely to be linked to longer-term economic outcomes. Degree holders in science, technology, engineering, or mathematics (STEM) fields, for example, tend to earn higher wages.[1318, 1319] Degree holders in business and health fields also tend to earn above-average wages, whereas degree holders in arts, social work, and education tend to earn the lowest wages over time, based on an analysis by Georgetown University that analyzed earnings by major groupings.[1320] The same analysis also noted that, despite being associated with lower earnings, more than 20 percent of students choose to major in education, arts, psychology, or social work. The Postsecondary Value Commission calls these fields "high social value" fields and points out that these professions are systematically undervalued.[1321]

What to know about measurement: Postsecondary institutions that receive federal financial aid are required to report students' field of study across 33 areas; specifically, fields of study are tracked using Classification of Instructional Programs (CIP) codes, which are divided into 60 main areas.[1322] Information on field of study is also reported in the Integrated Postsecondary Education Data System (IPEDS). CIP codes can be further grouped into STEM fields using a list published by the U.S. Department of Homeland Security.[1323] CIP codes can also be linked to occupational categories via Standard Occupational Classification (SOC) codes, allowing E-W systems to link postsecondary data to labor market data.

Source frameworks: This disaggregate appeared in two source frameworks reviewed for this report: the California Cradle-to-Career Data System[1324] and the Institute for Higher Education Policy Postsecondary Metrics framework.[1325]

Occupation category

Definition: A worker's occupational category

Why it matters: An individual's occupation type can help or hinder their ability to achieve economic mobility and security. Across industries, individuals in management occupations earn the highest median wages ($109,760 annually, as of 2020), whereas individuals in food preparation and serving occupations earn the lowest median wages ($25,500 annually, as of 2020).[1326] Other high-wage categories include occupations in computer science, law, engineering, and business, whereas other low-wage categories include jobs in personal care and service, health care support, and building maintenance. Nearly half of American workers are employed in low-wage jobs (defined as earning less than approximately $20 per hour), and low-wage jobs generally provide limited opportunities for advancement and upward mobility.[1327]

What to know about measurement: The Bureau of Labor Statistics publishes wage data by occupational category (using the Standard Occupational Classification [SOC] system), job characteristics, and industry. Within the SOC system, occupations are categorized into 22 major categories (such as "management occupations" and "food preparation and serving occupations," described above), and 92 minor categories (such as "top executives" and "cooks and food preparation workers").[1328] SOC codes can be linked to fields of postsecondary study using a "CIP-SOC Crosswalk," a joint effort by the Bureau of Labor Statistics and the National Center for Education Statistics (NCES),

which matches six-digit Classification of Instructional Programs (CIP) codes with six-digit SOC codes.[1329] The Census Bureau also provides information on how to map SOC codes to industry codes from the North American Industrial Classification System (NAICS), which is used to classify employers' industries.[1330] Wage records in state unemployment insurance systems contain information on the employer's industry but do not always report the employee's occupation, although in recent years some states have added SOC codes to wage records, as there can be several occupations within an industry.[1331]

Source frameworks: This disaggregate is required for Workforce Innovation and Opportunity Act reporting.[1332] It did not appear in any other source frameworks reviewed for this report.

Dislocated worker status

Definition: Individuals who have been terminated or laid off from employment, are unemployed due to economic conditions or natural disaster, are unemployed or underemployed spouses of active-duty members of the U.S. Armed Forces, or are displaced homemakers having trouble finding employment

Why it matters: Losing one's job can have significant emotional, social, and financial consequences. Low-wage workers were displaced by the COVID-19 pandemic at higher rates than middle- and high-wage workers, according to an analysis by the Brookings Institution.[1333] Dislocated low-wage workers often do not have substantial savings or family economic support for backup. They may benefit from services to help them identify financial supports, navigate the emotional impacts of a job loss, and prepare to return to the workforce or pursue further education or training.[1334]

What to know about measurement: Under the Workforce Innovation and Opportunity Act (WIOA), dislocated workers include individuals experiencing job instability due to a number of reasons, including but not limited to "job loss, mass layoffs, global trade dynamics, or transitions in economic sectors."[1335] Displaced homemakers and spouses of active-duty members of the U.S. Armed Forces facing unemployment or underemployment and difficulty obtaining or upgrading employment are also included in the definition.[1336] Outside of workforce development programs, information on individuals' status as dislocated workers is also captured in the Free Application for Federal Student Aid (FAFSA) to determine their expected family contribution.

Source frameworks: This disaggregate is required for WIOA reporting.[1337] It did not appear in any other source frameworks reviewed for this report.

Basic skills level

Definition: An individual's level of basic skills proficiency

Why it matters: The Workforce Innovation and Opportunity Act (WIOA) considers an individual to be "basic skills deficient" if they are "unable to compute or solve problems, or read, write, or speak English, at a level necessary to function on the job, in the individual's family, or in society."[1338] As discussed in

the Outcomes and Milestones section of this report, competencies such as math and reading proficiency, communication skills, higher-order thinking skills, and digital skills are important for workforce readiness and success. English proficiency is also associated with greater academic achievement and improved workforce outcomes, as discussed under the English learner disaggregate.

What to know about measurement: Basic skills deficiency is used as an eligibility criterion for some federal workforce development programs, including Job Corps and YouthBuild. Federal regulations allow states to adapt the federal definition of "basic skills deficient," as long as the modified definitions retain core components of the federal definition.[1339] Federal law also allows states to determine how to measure basic skills level, and assessment methods vary across states. For example, Washington State exclusively uses the Comprehensive Adult Student Assessment System (CASAS) tests to determine basic skills deficiency,[1340] whereas South Dakota permits the use of ACCUPLACER®, ACT® WorkKeys® Curriculum™ Placement Quiz, WorkKeys Assessments, TABE™, National Career Readiness Certificate (NCRC), or Best Plus™ and Best Literacy™ assessments.[1341]

Source frameworks: This disaggregate is required for WIOA reporting.[1342] It did not appear in any other source frameworks reviewed for this report.

Age group (for example, adult learners)

Definition: An individual's age grouping

Why it matters: Approximately 50 percent of adult learners—that is, those first starting college after age 24—complete degrees within six years, compared to approximately 64 percent of traditional-age students (those starting college at age 20 or younger).[1343] Furthermore, more than 30 million adults have completed some college but have not earned a college degree. Although completing a degree program is likely to result in higher earnings for working adults, adult learners often need to balance competing demands when considering reentry to college, such as work and family obligations.[1344] In the workforce, older workers often contend with age discrimination in hiring: one experimental study found that younger applicants received callbacks for jobs at higher rates than older applicants, despite their resumes being identical otherwise.[1345]

What to know about measurement: Data systems regularly collect individuals' date of birth, which can be used to disaggregate data by age groups. For example, it is common to disaggregate enrollment in early learning programs by age, especially because eligibility for programs depends on the age of the child. Although K–12 systems typically do not disaggregate data by age groups, schools and districts can use students' age to determine whether they exceed the expected age for their grade level. The National Student Clearinghouse (NSC) Postsecondary Data Partnership disaggregates data by the age at which students first enter college, with categories including "traditional age" (20 or younger), "delayed entry" (21 to 24), and "adult learners" (older than 24). The Integrated Postsecondary Education Data System (IPEDS) reports postsecondary enrollment using more detailed age groups: 14 to 17, 18 and 19, 20 and 21, 22 to 24, 25 to 29, 30 to 34, and 35 and older. To report labor market data, the Bureau of Labor Statistics also uses several age groupings, starting with 16 to 19 years through 65 years and older.

Source frameworks: This disaggregate appeared in eight source frameworks reviewed or this report, such as the National Academies Key National Education Indicators,[1346] the Institute for Higher Education Policy Postsecondary Metrics framework,[1347] and the Urban Institute's Boosting Upward Mobility framework.[1348]

Urbanicity

Definition: Whether an individual or institution is located in an urban, suburban, town, or rural area

Why it matters: Place-based characteristics influence opportunities for students, as well as challenges they may face. For example, those in urban areas may be more likely to experience pollution and violence, whereas those in rural areas may have more difficulty accessing health care and transportation. A study by ACT Research suggests a third of residents in rural areas do not have access to high-quality broadband internet and found that rural students are less likely to rate their home internet as "great" and more likely to rate it as "unpredictable" than non-rural students.[1349] The same study found that students in rural schools are less likely to enroll in rigorous coursework (including advanced math or science courses and Advanced Placement [AP] classes) than non-rural students, and more likely to participate in extracurricular activities, such as varsity athletics and student government.

What to know about measurement: Urbanicity can be defined according to the categories developed by the National Center for Education Statistics (NCES) in partnership with the Census Bureau. They include four major locale categories—city, suburban, town, and rural—each of which contain three subtypes, for a total of 12 categories.[1350] The categories are based not just on population size, but also on proximity to larger urban centers, and can be determined for a given location using a geographic database maintained by the Census Bureau.[1351] The Census Bureau also classifies census blocks according to three broader categories—urban areas, urban clusters, and rural areas—which are updated after each decennial census.[1352]

Source frameworks: "Urbanicity" did not appear in any source frameworks reviewed for this report, but three frameworks—the National Academies Key National Education Indicators,[1353] the California Cradle-to-Career Data System,[1354] and the Institute for Higher Education Policy's Higher Education in Prison Key Performance Indicator Framework[1355] —recommend capturing "region" or "geography."

Individuals experiencing homelessness

Definition: Any individual who lacks a fixed, regular, and adequate nighttime residence[1356]

Why it matters: Individuals experiencing homelessness or housing instability face a host of unique challenges, including unsafe shelter and limited or inconsistent access to food, transportation, health care, and technology.[1357] The instability caused by intermittent or chronic homelessness can make it difficult for students to attend and succeed in school, and for job seekers to secure and retain

employment. More than 1.3 million students in public elementary and secondary schools are estimated to experience homelessness.[1358] Students experiencing homelessness are significantly less likely to graduate high school than housed students, with graduation rates below 60 percent in some states, compared to the national adjusted cohort graduation rate (ACGR) of 86 percent.[1359] K–12 schools are required to disaggregate data by homelessness status under the Every Student Succeeds Act (ESSA).

What to know about measurement: Federally funded pre-K programs and K–12 schools, the Free Application for Federal Student Aid (FAFSA), and Department of Labor programs collect data on whether individuals are experiencing homelessness, broadly defined as lacking a "fixed, regular, and adequate nighttime residence." However, this definition is not detailed further in federal law, and the resulting data may fail to capture the true extent of this issue. For example, students who live with extended family members for temporary housing may be undercounted. Although the FAFSA asks about homelessness, postsecondary institutions should consider collecting this information via application and registration materials, as students without access to a permanent home may have more difficulty completing the FAFSA.[1360] Finally, we note that it is possible to experience housing instability or insecurity without experiencing homelessness. Though there are several definitions of housing instability or insecurity, work is underway in the field to develop unified measures.[1361]

Source frameworks: This disaggregate appeared in four source frameworks reviewed for this report: the Urban Institute Robust and Equitable Measures to Identify Quality Schools (REMIQS) framework,[1362] the Dimensions of Equity Framework,[1363] the California Cradle-to-Career Data System,[1364] and Workforce Innovation and Opportunity Act (WIOA) reporting requirements.[1365]

Individual or family military status

Definition: Whether a student, parent, or spouse is a member of the U.S. Armed Forces (including the reserves or National Guard)

Why it matters: Children and spouses of active military members relocate frequently, creating challenges for students navigating different school systems and military spouses seeking stable employment.[1366] Military veterans also experience disability at disproportionately high rates, with 26 percent of veterans reporting a service-connected disability in 2020, thus creating obstacles to workforce reentry.[1367] The Every Student Succeeds Act (ESSA) requires K–12 schools to disaggregate data for students who have parents or guardians in the military.

What to know about measurement: E-W systems frequently collect information on individual or family military status. K–12 systems track whether a student's family is in the military. The Free Application for Federal Student Aid (FAFSA) asks students to report if they are veterans of the U.S. Armed Forces, and the Integrated Postsecondary Education Data System (IPEDS) asks institutions to report data on students receiving military service member and veteran benefits.[1368] The National Student Clearinghouse (NSC) collects information on a student's status as either a veteran receiving benefits, a veteran who does not receive benefits, or a veteran's dependent receiving benefits (though as an optional field, it is seldom reported).[1369] Federally funded workforce programs collect information on whether someone is a veteran or eligible spouse,[1370] and employees may also self-identify as a veteran to employers.

Source frameworks: This disaggregate appeared in three source frameworks reviewed for this report: the California Cradle-to-Career Data System,[1371] the Institute for Higher Education Policy's Higher Education in Prison Key Performance Indicator Framework,[1372] and Workforce Innovation and Opportunity Act (WIOA) reporting requirements.[1373]

Individual with current or past child welfare involvement

Definition: Students in foster care

Why it matters: Students in foster care change schools more frequently than other students, tend to have higher rates of absenteeism, and experience trauma at higher rates.[1374, 1375] Students involved in foster care are significantly less likely to graduate high school than their peers, with graduation rates below 50 percent in some states compared to the national adjusted cohort graduation rate (ACGR) of 86 percent.[1376] Youth who age out of foster care are employed at lower rates, earn less, and progress more slowly in the labor market than other youth.[1377] K–12 schools are required to disaggregate data by foster care status under the Every Student Succeeds Act (ESSA).

What to know about measurement: Children in foster care are eligible for free Head Start, and some states have begun to link data between early childhood and child welfare data systems.[1378] K–12 systems are required to track whether students are in foster care, and some states have also begun to coordinate data linkages between education and child welfare agencies.[1379] College students with past experience in foster care are eligible for different types of state and federal financial aid assistance. For example, the Free Application for Federal Student Aid (FAFSA) asks students to report whether they were in foster care or a dependent or ward of the court since turning 13.

Source frameworks: This disaggregate appeared in four source frameworks reviewed for this report: the National School Readiness Indicators Initiative, the Dimensions of Equity framework,[1380] the California Cradle-to-Career Data System,[1381] and Workforce Innovation and Opportunity Act (WIOA) reporting requirements.[1382]

Justice involvement

Definition: Individuals who have interacted with the justice system in any capacity

Why it matters: Being arrested, even if an individual ultimately is not convicted of a crime, can result in emotional and psychological trauma, as well as missed school and work opportunities. More than one-quarter of justice-involved youth drop out of school within six months of being released from juvenile justice facilities, and only 15 percent of students released from juvenile detention in 9th grade graduate high school within four years.[1383] Justice-involved adults also face dire labor market prospects: according to a study by the U.S. Department of Justice, one-third of formerly incarcerated individuals in the study population remained unemployed for four years after their release from prison.[1384]

What to know about measurement: There is no single definition of justice involvement used across sectors. Our suggested definition, which draws on the Institute for Higher Education Policy's Higher Education in Prison Key Performance Indicator Framework, is intentionally broad. At the K–12 level, schools may coordinate with the juvenile justice system to provide support to students reentering school after being in detention and those under probation supervision, given that attending school is a common requirement for youth on probation.[1385] At the postsecondary level, students under incarceration or with certain types of criminal convictions can have limited eligibility for federal student aid and face other challenges (though as of the 2022–2023 award year, incarcerated students will no longer be ineligible for federal Pell Grants).[1386] Though some localities and states have banned employers from asking job applicants about their criminal history, the U.S. Department of Labor continues to track this information for program participants. We recommend collecting information on justice involvement only to identify individuals who need additional support from E-W systems—for example, during reentry into school, college, or the workforce. This information should not be used for exclusionary or discriminatory purposes, and every effort should be made to protect and respect individuals' privacy.

Source frameworks: This disaggregate appeared in four source frameworks reviewed for this report: the Dimensions of Equity framework,[1387] the Institute for Higher Education Policy's Higher Education in Prison Key Performance Indicator Framework,[1388] Workforce Innovation and Opportunity Act (WIOA) reporting requirements,[1389] and the Urban Institute's Boosting Upward Mobility framework.[1390]

Disaggregates endnotes

[1206] Integrated Postsecondary Education Data System. (n.d.1). *Definitions for new race and ethnicity categories*. U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. https://nces.ed.gov/ipeds/report-your-data/race-ethnicity-definitions

[1207] National Student Clearinghouse Research Center. (2022). *Reporting of NSC additional data elements.* https://nscresearchcenter.org/wp-content/uploads/Reporting_of_NSC_Additional_Data_Elements.pdf

[1208] National Center for Education Statistics. (n.d.1). *Appendix A: Revisions to the standards for the classification of federal data on race and ethnicity*. U.S. Department of Education, National Center for Education Statistics. https://nces.ed.gov/programs/handbook/data/pdf/appendix_a.pdf

[1209] U.S. Department of Education. (2007). *Final guidance on maintaining, collecting, and reporting racial and ethnic data to the U.S. Department of Education.* Federal Register. https://www.federalregister.gov/documents/2007/10/19/E7-20613/final-guidance-on-maintaining-collecting-and-reporting-racial-and-ethnic-data-to-the-us-department

[1210] Southeast Asia Resource Action Center. (2013). *Moving beyond the "Asian" check box.* https://www.searac.org/education/moving-beyond-the-asian-check-box/

[1211] Janice, A., & Voight, M. (2016). *Toward convergence: A technical guide for the postsecondary metrics framework*. Institute for Higher Education Policy. https://www.ihep.org/publication/toward-convergence-a-technical-guide-for-the-postsecondary-metrics-framework./

[1212] StriveTogether. (2021). *A guide to racial and ethnic equity systems indicators.* https://www.strivetogether.org/wp-content/uploads/2021/09/A-guide-to-racial-and-ethnic-equity-systems-indicators.pdf

[1213] Turner, M.A., Acs, G., Brown, S., Solari, C. D., & Fudge, K. (2020). *Boosting upward mobility: Metrics to inform local action summary.* Urban Institute. https://www.urban.org/research/publication/boosting-upward-mobility-metrics-inform-local-action-summary

[1214] Reeves, R. V., Buckner, E., & Smith, E. (2021). *The unreported gender gap in high school graduation rates.* Brooking Institute. https://www.brookings.edu/blog/up-front/2021/01/12/the-unreported-gender-gap-in-high-school-graduation-rates/

[1215] Reeves, R. V., & Smith, E. (2021). *The male college crisis is not just in enrollment, but completion.* Brookings Institute. https://www.brookings.edu/blog/up-front/2021/10/08/the-male-college-crisis-is-not-just-in-enrollment-but-completion/

[1216] Dowell, E. K. (2022). *Women consistently earn less than men.* U.S. Census Bureau. https://www.census.gov/library/stories/2022/01/gender-pay-gap-widens-as-women-age.html

[1217] Human Rights Campaign. (2022). *The wage gap among LGBTQ+ workers in the United States.* https://www.hrc.org/resources/the-wage-gap-among-lgbtq-workers-in-the-united-states

[1218] Integrated Postsecondary Education Data System. (n.d.2). *Changes to the 2021-22 IPEDS data collection.* U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. https://surveys.nces.ed.gov/ipeds/public/changes-to-the-current-year

[1219] See National Student Research Center Research Center (2022).

[1220] National Student Research Center Research Center (2013). *Gender imputation.*https://nscresearchcenter.org/wp-content/uploads/NSC_Gender_Imputation_20130307.pdf

[1221] Wilson, B.D.M., & Meyer, I.H. (2021). *Nonbinary LGBTQ adults in the United States.* Williams Institute, UCLA School of Law. https://williamsinstitute.law.ucla.edu/publications/nonbinary-lgbtq-adults-us/

[1222] U.S. Department of Education. (2021). *U.S. Department of Education's office for Civil Rights solicits public input on civil rights data collection for 2021-22 school year.* https://www.ed.gov/news/press-releases/us-department-educations-office-civil-rights-solicits-public-input-civil-rights-data-collection-2021-22-school-year

[1223] Williams Institute Scholars. (2014). *Best practices for asking questions to identify transgender and other gender minority respondents on population-based surveys (GenIUSS).* UCLA School of Law. http://williamsinstitute.law.ucla.edu/wp-content/uploads/SOGI-Measures-FAQ-Mar-2020.pdf

[1224] Postsecondary Value Commission (PVC). (2021). *Equitable value: Promoting economic mobility and social justicethrough postsecondary education.* Institute for Higher Education Policy. https://postsecondaryvalue.org/reports/

[1225] See Janice & Voight (2016).

[1226] See Turner et al. (2020).

[1227] Levy, D. K., Wissoker, D. A., Aranda, C., Howell, B., Pitingolo, R., Sewell, S. H., & Santos, R. (2017). *A paired-testing pilot study of housing discrimination against same-sex couples and transgender individuals.* The Urban Institute. https://www.urban.org/research/publication/paired-testing-pilot-study-housing-discrimination-against-same-sex-couples-and-transgender-individuals

[1228] Sears, B., Mallory, C., Flores, A. R., & Conron, K. J. (2021). *LGBT people's experiences of workplace discrimination and harassment.* Williams Institute, UCLA School of Law. https://williamsinstitute.law.ucla.edu/publications/lgbt-workplace-discrimination/

[1229] See Human Rights Campaign (2022).

[1230] Lee Badgett, M. V., Kyu Choi, S., & Wilson, B.D.M. (2019). *LGBT poverty in the United States: A study of differences between sexual orientation and gender identity groups.* Williams Institute, UCLA School of Law. https://williamsinstitute.law.ucla.edu/publications/lgbt-poverty-us/

[1231] Williams Institute. (2016). *Data collection methods for sexual orientation and gender identity*. Williams Institute. UCLA School of Law, Williams Institute. https://williamsinstitute.law.ucla.edu/publications/data-collection-sogi/

[1232] United Way. (2020). *The United Way equity framework.* https://s3.amazonaws.com/uww.assets/site/Publications/United_Way_Worldwide_Equity_Framework.pdf

[1233] California Department of Education. (2021). *Cradle-to-career data system public data definitions.* https://cadatasystem.wested.org/system/resources/W1siZiIsIjIwMjEvMDYvMTcvMTUvNTcvMDMvZjM1NjIxODgtYWFmZi00MzhkLTk2ZTQtYTQ0ZTUyMDc5Y2Q3L0NyYWRsZSBobyBDYXJlZXIgRGF0YSBQb2ludCBEZWZpbml0aW9ucy5wZGYiXV0/Cradle%20to%20Career%20Data%20Point%20Definitions.pdf?sha=51a51be01c948a01

[1234] Anderson, T., Blount, D., Lindsay, C., Blom, E., Gebrekristos, S., & Alba, F. (2019). *Robust and equitable measures to identify quality schools (REMIQS).* The Urban Institute. https://www.urban.org/sites/default/files/2019/04/15/remiqs-detailed-model-final.pdf

[1235] National Center for Education Statistics. (2017). *Trends in high school dropout and completion rates in the United States: Indicator 4: Adjusted cohort graduation rate.* Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/programs/dropout/ind_04.asp#:~:text=In%202016%E2%80%9317%2C%20the%20U.S.,85%20percent%20(table%204.1).

[1236] U.S. Census Bureau. (2021a). *Disability data tables.* https://www.census.gov/topics/health/disability/data/tables.2017.List_1747386362.html

[1237] Altiraifi, A. (2019). *Advancing economic security for people with disabilities.* Center for American Progress. https://www.americanprogress.org/article/advancing-economic-security-people-disabilities/

[1238] Office of Civil Rights. (2011). *Students with disabilities preparing for postsecondary education: Know your rights and responsibilities.* U.S. Department of Education. https://www2.ed.gov/about/offices/list/ocr/transition.html

[1239] U.S. Department of Labor. (n.d.). *How does the federal government define 'disability'?* Frequently Asked Questions. https://webapps.dol.gov/dolfaq/go-dol-faq.asp?faqid=67

[1240] National Education Association (NEA). (2021). *Great public schools indicators framework.* https://www.nea.org/student-success/great-public-schools/what-students-deserve

[1241] Palacios, M., Vignola, E., Lyons, R., Hart, R., & Casserly, M. (2019). *Academic key performance indicators.* Council of the Great City Schools. https://eric.ed.gov/?q=council+of+the+great+city+schools+key+performance+indicators&id=ED603169

[1242] National Academies of Sciences, Engineering, and Medicine. (2020). *Building educational equity indicator systems: A guidebook for states and school districts.* The National Academies Press. https://nap.nationalacademies.org/read/25833/chapter/2

[1243] National Research Council. (2012). *Key national education indicators: Workshop summary.* The National Academies Press. https://doi.org/10.17226/13453

[1244]See National Center for Education Statistics (2017).

[1245] National Student Clearinghouse. (2017). *High school benchmarks 2017: National college progression rates.* https://nscresearchcenter.org/hsbenchmarks2017/

[1246] National Center for Education Statistics. (2015a). *Educational attainment differences by students' socioeconomic status. Condition* of Education. https://nces.ed.gov/programs/coe/pdf/coe_tva.pdf

[1247] Hewins, J., & Levin, M. (2014). *The community eligibility provision: Alternatives to school meal applications.* Center on Budget and Policy Priorities. https://www.cbpp.org/research/the-community-eligibility-provision-alternatives-to-school-meal-applications

[1248] Office of the Assistant Secretary for Planning and Evaluation. (2021). *U.S. federal poverty guidelines used to determine financial eligibility for certain federal programs. 2021 Poverty Guidelines.* U.S. Department of Health and Human Services. https://aspe.hhs.gov/topics/poverty-economic-mobility/poverty-guidelines/prior-hhs-poverty-guidelines-federal-register-references/2021-poverty-guidelines

[1249] City and County of San Francisco. (2021). *Find your area median income (AMI) level*. https://sf.gov/find-your-area-median-income-ami-level

[1250] U.S. Department of Housing and Urban Development. (2021). *2021 adjusted home income limits: Tennessee.* https://www.huduser.gov/portal/datasets/il.html

[1251] Rhode Island KIDS COUNT. (2005). *Getting ready: National School Readiness Indicators.* https://www.rikidscount.org/Portals/0/Uploads/Documents/Early%20Learning/Getting%20Ready/Executive%20Summary.pdf

[1252] See Anderson et al. (2019).

[1253] See Postsecondary Value Commission (2021).

[1254] Ludeke, S. G., Junge, S. Y., John, O. P., Gensowski, M., Kirkpatrick, R. M., & Anderson S. C. (2020). Does parental education influence child education outcomes? A developmental analysis in a full-population sample and adoptee design. *Journal of Personality and Social Psychology, 120*(4), 1074–1090. https://doi.org/10.1037/pspp0000314

[1255] Spera, C., Wentzel, K. R., & Matto, H. C. (2009). Parental aspirations for their children's educational attainment: relations to ethnicity, parental education, children's academic performance, and parental perceptions of school climate. *Journal of Youth and Adolescence, 38*(8), 1140–1152. https://doi.org/10.1007/s10964-008-9314-7

[1256] Dubow, E. F., Boxer, P., & Huesmann, L. R. (2009). Long-term effects of parents' education on children's educational and occupational success: Mediation by family interactions, child aggression, and teenage aspirations. *Merrill Palmer Q (Wayne State University Press), 55*(3), 224-249. https://doi.org/10.1353/mpq.0.0030

[1257] Fry, R. (2021). *First-generation college graduates lag behind their peers on key economic outcomes*. Pew Research Center. https://www.pewresearch.org/social-trends/2021/05/18/first-generation-college-graduates-lag-behind-their-peers-on-key-economic-outcomes/

[1258] Federal Reserve. (2020). Changes in U.S. family finances from 2016 to 2019: Evidence from the survey of consumer finances. *Federal Reserve Bulletin, 105*(5). https://www.federalreserve.gov/publications/files/scf20.pdf

[1259] See Rhode Island KIDS COUNT (2005).

[1260] See California Department of Education (2021).

[1261] Center for First-Generation Student Success. (2017). Defining first-generation. *The Center.* https://firstgen.naspa.org/blog/defining-first-generation

[1262] Forrest Cataldi, E., Bennett, C. T., & Chen, X. (2018). *First-generation students: College access, persistence, and postbachelor's outcomes. States in brief.* National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2018421

[1263] Toutkoushian, R. K.,Stollberg, R. S., & Slaton, K. A. (2018). Talking 'bout my generation: Defining 'first-generation students' in higher education research. *Teachers College Record, 120*(4). https://eric.ed.gov/?id=EJ1162857

[1264] Higher Education Act of 1965, 1998 Higher Education Act Amendments Subpart 2—Federal Early Outreach and Student Services Programs. 20 U.S.C. 1070a–11. https://www2.ed.gov/about/offices/list/ope/trio/triohea.pdf

[1265] See Janice & Voight (2016).

[1266] National Student Clearinghouse. (n.d.). *Filters and dimensions.* NSC.

https://www.studentclearinghouse.org/pdphelp/knowledge-base/filters-and-dimensions/

[1267] See Janice & Voight (2016).

[1268] National Student Clearinghouse. (2022). *Postsecondary data partnership.* https://www.studentclearinghouse.org/colleges/pdp/

[1269] Association of Farmerworker Opportunity Programs. (2021). *Children in the field campaign.* https://afop.org/cif/

[1270] U.S. Department of Education. (2015). *Migrant education secondary student initiative.* https://www2.ed.gov/admins/lead/account/secondarystudent.html

[1271] Nunez, A. M. (2017). What can Latina/o migrant students tell us about college outreach and access? *Facilitating Educational Success for Migrant Farmworker Students in the U.S*. Routledge.

https://www.taylorfrancis.com/chapters/edit/10.4324/9781315413815-6/latina-migrant-students-tell-us-college-outreach-access-anne-marie-n%C3%BA%C3%B1ez

[1272] Office of Elementary & Secondary Education. (2021). *Migrant student records exchange initiative.* U.S. Department of Education. https://oese.ed.gov/offices/office-of-migrant-education/migrant-student-records-exchange-initiative/

[1273] See Anderson et al. (2019).

[1274] U.S. Department of Labor. (2022a). *WIOA performance indicators and measures*. https://www.dol.gov/agencies/eta/performance/performance-indicators

[1275] See California Department of Education (2021).

[1276] U.S. Census Bureau. (2015). *Detailed language spoken at home and ability to speak English for the population 5 years and over: 2009-2013.* https://www.census.gov/data/tables/2013/demo/2009-2013-lang-tables.html

[1277] Firgens, E., & Matthews, H. (2012). *State child care policies for limited English proficient families.* Center for Law and Social Policy. https://files.eric.ed.gov/fulltext/ED538051.pdf

[1278] Office for Civil Rights. (2016). Tools and resources for identifying all English learners. In *English Language Tool Kit* (pp. 1–12). U.S. Department of Education, Office for Civil Rights. https://www2.ed.gov/about/offices/list/oela/english-learner-toolkit/chap1.pdf

[1279] See Anderson et al. (2019).

[1280] National Center for Children in Poverty. (2008). *State indicators for early childhood.* Project Thrive, Columbia University. https://academiccommons.columbia.edu/doi/10.7916/D8ZP4FT8/download

[1281] National Center for Education Statistics. (2015b). *Table 204.20. English language learner (ELL) students enrolled in public elementary and secondary schools, by state: Selected years, fall 200 through fall 2015.* Digest of Education Statistics. Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/programs/digest/d17/tables/dt17_204.20.asp

[1282] See National Center for Education Statistics (2017).

[1283] Wilson, J. H. (2014). *Investing in English skills: The limited English proficient workforce in U.S. metropolitan areas.* Brookings Institute. https://www.brookings.edu/research/investing-in-english-skills-the-limited-english-proficient-workforce-in-u-s-metropolitan-areas/

[1284] Fuller, J. B., & Raman, M. (2022). *Building from the bottom up.* Harvard Business School. https://www.hbs.edu/managing-the-future-of-work/research/Pages/building-from-the-bottom-up.aspx

[1285] LEP.gov. (2011). *Commonly asked questions and answers regarding Limited English Proficient (LEP) individuals*. U.S. Department of Justice, LEP.gov. https://www.lep.gov/sites/lep/files/media/document/2020-03/042511_QA_LEP_General_0.pdf

[1286] See Palacios et al. (2019).

[1287] See California Department of Education (2021).

[1288] See U.S. Department of Labor (2022a).

[1289] Ehrlich, S. B., Allensworth, E. M., & Tansey, J. (2022). *Meeting families' needs: Attendance rates in full-day vs. half-day pre-K.* UChicago Consortium on School Research. https://consortium.uchicago.edu/publications/meeting-families-needs

[1290] Malik, R. (2018). *The effects of universal preschool in Washington, D.C.* Center for American Progress. https://www.americanprogress.org/article/effects-universal-preschool-washington-d-c/

[1291] Shapiro, D., Dundar, A., Huie, F., Wakhungu, P.K., Bhimdiwala, A., & Wilson, S. E. (2018). *Completing college: A national view of student completion rates – Fall 2012 Cohort (Signature Report No. 16).* NSC Research Center. https://eric.ed.gov/?id=ED595342

[1292] Holt, A. (2014). *Making the hours count.* New America. https://www.newamerica.org/education-policy/policy-papers/making-the-hours-count/

[1293] U.S. Department of Education Office for Civil Rights. (2014). *Civil rights data collection: Data snapshot: Early childhood education.* Issue Brief no., 2. U.S. Department of Education, Office for Civil Rights. https://www2.ed.gov/about/offices/list/ocr/docs/crdc-early-learning-snapshot.pdf

[1294] See California Department of Education (2021).

[1295] See Janice & Voight (2016).

[1296] See National Student Clearinghouse (2022).

[1297] National Center for Education Statistics. (2020a). *Table 216.20. Number and enrollment of public elementary and secondary schools, by school level, type, and charter, magnet, and virtual status: Selected years, 1990-91 through 2018-19.* Digest of Education Statistics. Institute of Education, U.S. Department of Education. https://nces.ed.gov/programs/digest/d20/tables/dt20_216.20.asp

[1298] National Center for Education Statistics (2021). *Table 1. Number and percentage distribution of private schools, students, and full-time equivalent (FTE) teachers, by selected characteristics: United States, 2019-2020.* Private School Universe Survey. Institute of Education, U.S. Department of Education. https://nces.ed.gov/surveys/pss/tables/TABLE01fl1920.asp

[1299] See National Center for Education Statistics (2020a).

[1300] See California Department of Education (2021).

[1301] National Student Clearinghouse Research Center. (2022). *Completing college: National and state reports with new longitudinal data dashboard.* https://nscresearchcenter.org/completing-college/

[1302] U.S. Government Accountability Office. (2011). *Postsecondary education: Student outcomes vary at for-profit, nonprofit, and public schools. GAO-12-143.* https://www.gao.gov/products/gao-12-143

[1303] See Postsecondary Value Commission (2021).

[1304] The Carnegie Classification of Institutions of Higher Education. (2021). *News & announcements*. Carnegie Classification of Institutions of Higher Education, Indiana University Center for Postsecondary Research. https://carnegieclassifications.acenet.edu/

[1305] See California Department of Education (2021).

[1306] See National Student Clearinghouse (2022).

[1307] Shapiro, D., Dundar, A., Huie, F., Wakhungu, P. K., Yuan, X., Nathan, A., & Hwang, Y. (2017). *Tracking transfer: Measures of effectiveness in helping community college students to complete bachelor's degrees (Signature Report No. 13).* NSC Research Center. https://eric.ed.gov/?id=ED580214

[1308] Matthews, O. V. (2015). *The transfer student experience: Challenges and institutional support systems for undergraduate transfer students at a public four-year university.* Wright State University. https://corescholar.libraries.wright.edu/etd_all/1281/

[1309] See Shapiro et al. (2017).

[1310] See National Student Clearinghouse (2022).

[1311] California Department of Education (2021).

[1312] See National Student Clearinghouse (2022).

[1313] See Janice & Voight (2016).

[1314] See National Student Clearinghouse Research Center (2022).

[1315] See California Department of Education (2021).

[1316] See National Student Clearinghouse (2022).

[1317] See Janice & Voight (2016).

[1318] Noonan, R. (2017). *STEM jobs: 2017 update*. U.S. Department of Commerce, Economics and Statistics Administration, Office of the Chief Economist. https://eric.ed.gov/?id=ED594354

[1319] Carnevale, A. P., Cheah, B., & Wenzinger, E. (2021). *The college payoff: More education doesn't always mean more earnings.* Georgetown University, McCourt School of Public Policy, Center on Education and the Workforce. https://cew.georgetown.edu/cew-reports/collegepayoff2021/

[1320] See Carnevale et al. (2021).

[1321] See Postsecondary Value Commission (2021).

[1322] NCES Blog. (2019). Introducing the 2020 Classification of Instructional Programs (CIP) and its website. *NCES Blog*. U.S. Department of Education, National Center for Education Statistics. https://nces.ed.gov/blogs/nces/post/introducing-the-2020-classification-of-instructional-programs-cip-and-its-website

[1323] ICE.gov. (2016). *STEM designated degree program list, effective May 10, 2016*. U.S. Department of Homeland Security, U.S. Immigration and Customs Enforcement. https://www.ice.gov/sites/default/files/documents/Document/2016/stem-list.pdf

[1324] See California Department of Education (2021).

[1325] See Janice & Voight (2016).

[1326] U.S. Bureau of Labor Statistics. (2022). *May 2021 national occupational employment and wage estimates United States.* Occupational Employment and Wage Statistics. https://www.bls.gov/oes/current/oes_nat.htm#00-0000

[1327] https://www.hbs.edu/managing-the-future-of-work/Documents/research/Building%20From%20The%20Bottom%20Up.pdf

[1328] See U.S. Bureau of Labor Statistics (2022).

[1329] National Center for Education Statistics Classification of International Programs. (n.d.). *CIP SOC crosswalk*. U.S. Department of Education, Center for Education Statistics. https://nces.ed.gov/ipeds/cipcode/post3.aspx?y=56

[1330] U.S. Census Bureau. (2021b). *Industry and occupation code lists & crosswalks.* U.S. Department of Commerce, Census Bureau. https://www.census.gov/topics/employment/industry-occupation/guidance/code-lists.html

[1331] National Payroll Reporting Consortium. (2018). *Enhanced state UI wage reporting.* National Payroll Reporting Consortium. https://www.nprc-inc.org/blog/enhanced-state-ui-wage-reporting/

[1332] See U.S. Department of Labor (2022).

[1333] Bateman, N., & Ross, M. (2021). *The pandemic hurt low-wage workers the most—and so far, the recovery has helped them the least.* Brookings Institute. https://www.brookings.edu/research/the-pandemic-hurt-low-wage-workers-the-most-and-so-far-the-recovery-has-helped-them-the-least/

[1334] Parker, H. (2011). *Partnering effectively to better serve dislocated workers: A learning history of the mid-Michigan partnership for training in healthcare (M-PaTH).* Corporation for a Skilled Workforce. https://skilledwork.org/publications/partnering-effectively-to-better-serve-dislocated-workers/

[1335] State of Hawaii Department of Labor and Industrial Relations. (n.d.). *WIOA definitions [WIOA Section 3].* State of Hawaii Department of Labor and Industrial Relations. https://labor.hawaii.gov/wdc/files/2013/01/Local-Plan-Definitions-061715.pdf

[1336] Workforce Innovation and Opportunity Act. Public Law 113–128 113th Congress. https://www.govinfo.gov/content/pkg/PLAW-113publ128/pdf/PLAW-113publ128.pdf#page=6

[1337] See U.S. Department of Labor (2022a).

[1338] Workforce Innovation and Opportunity Act. Public Law 113–128 113th Congress. https://www.govinfo.gov/content/pkg/PLAW-113publ128/pdf/PLAW-113publ128.pdf#page=6

[1339] Workforce Innovation and Opportunity Act, 113-128 U.S.C. STAT. 1425. (2014). https://www.govinfo.gov/content/pkg/PLAW-113publ128/pdf/PLAW-113publ128.pdf#page=6

[1340] State of Washington Employment Security Department. (2018). *Workforce Innovation and Opportunity Act policy: Employment system administration and policy.* State of Washington Employment Security Department. https://workforcesw.org/wp-content/uploads/policy-1011-rev3-casas-for-basic-skills-deficiency.pdf

[1341] U.S. Department of Labor. (2022b). *Basic skills deficient.* https://dlr.sd.gov/workforce_services/wioa/wioa_manual/4.8_basicskillsdeficient.pdf

[1342] See U.S. Department of Labor (2022b).

[1343] National Student Clearinghouse Research Center. (2022). Completing college national and state reports with new longitudinal data dashboard. https://nscresearchcenter.org/completing-college/

[1344] Shapiro, D., Dundar, A., Yuan, X., Harrell, A., Wild, J., & Ziskin, M. (2014). *Some college, no degree: A national view of students with some college enrollment, but no completion (Signature Report No. 7).* NSC Research Center. https://eric.ed.gov/?id=ED556472

[1345] Neumark, D. (2019). *Strengthen age discrimination protections to help confront the challenge of population aging.* Brookings Institute. https://www.brookings.edu/wp-content/uploads/2020/11/ES-11.19.20-Neumark.pdf

[1346] See National Research Council (2012).

[1347] See Janice & Voight (2016).

[1348] See Turner et al. (2020).

[1349] Croft, M., & Moore, R. (2019). *Rural students: Technology, coursework, and extracurricular activities.* ACT Center for Equity in Learning. https://eric.ed.gov/?id=ED596140

[1350] National Center for Education Statistics. (n.d.2). *Rural education in America*. Institute of Education Sciences, U.S. Department of Education,

https://nces.ed.gov/surveys/ruraled/definitions.asp#:~:text=Urbanized%20areas%20and%20urban%20clusters,are%20designated%20as%20urban%20clusters.

[1351] National Center for Education Statistics. (n.d.3). *Education Demographic and Geographic Estimates (EDGE) Program: Locale boundaries file documentation*. Institute of Education Sciences, U.S. Department of Education,. https://nces.ed.gov/programs/edge/Geographic/LocaleBoundaries

[1352] U.S. Census Bureau. (2021c). *2010 Census urban and rural classification and urban area criteria.* U.S. Department of Commerce, Census Bureau. https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural/2010-urban-rural.html

[1353] See National Research Council (2012).

[1354] See California Department of Education (2021).

[1355] Brick, M., & Ajinkya, J. (2020). *Supporting success: The higher education in prison key performance indicator framework*. Institute for Higher Education Policy. https://www.ihep.org/wp-content/uploads/2018/11/ihep_kpi_report_rd5_web_3.pdf

[1356] National Center for Homeless Education. (n.d.). *The McKinney-Vento Homeless Assistance Act.* National Center for Homeless Education. https://nche.ed.gov/legislation/mckinney-vento/

[1357] Sulkowski, M. L. (2016). The student homelessness crisis and the role of school psychology: Missed opportunities, room for improvement, and future directions. *Psychology in the Schools*. https://doi.org/10.1002/pits.21936

[1358] National Center for Education Statistics. (2018). *Table 204.75a. Homeless students enrolled in public elementary and secondary schools, by grade, primary night time residence, and selected student characteristics: 2009-10 through 2016-17.* Digest of Education Statistics, Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/programs/digest/d19/tables/dt19_204.75a.asp

[1359] National Center for Education Statistics. (2020b). *Table 219.46. Public high school 4-year adjusted cohort graduation rate (ACGR), by selected student characteristics and state: 2010-11 through 2018-19.* Digest of Education Sciences, Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/programs/digest/d20/tables/dt20_219.46.asp

[1360] Laman, B. (2022).*The impact of housing insecurity on college students.* TimelyMD. https://timely.md/blog/housing-insecurity-college-students/

[1361] Cox, R., Henwood, B., Rice, R., & Wenzel, S. (2016). *Roadmap to a unified measure of housing insecurity*. CESR-Schaeffer Working Paper No. 2016-013. USC Center for Economic and Social Research. http://dx.doi.org/10.2139/ssrn.2817626

[1362] See Anderson et al. (2019).

[1363] Alliance for Resource Equity. (2022). *Dimensions of equity.* Education Resource Strategies and EdTrust. https://www.educationresourceequity.org/dimensions

[1364] See California Department of Education (2021).

[1365] See U.S. Department of Labor (2022a).

[1366] Military Child Education Coalition (MCEC). (2020). *Memorandum for Biden administration: How the military child education coalition can serve an advisory role on military family issues.* https://www.militarychild.org/upload/files/resources/issue%20papers/MCEC_Memo_to_Biden_administratio.pdf

[1367] U.S. Bureau of Labor Statistics. (2021). *Employment situation of veterans news release.* Economic News Release. https://www.bls.gov/news.release/vet.htm

[1368] National Center for Education Statistics. (2019). *Integrated Postsecondary Education Data System (IPEDS).* National Center for Education Statistics. https://nces.ed.gov/statprog/handbook/pdf/ipeds.pdf

[1369] See National Student Clearinghouse Research Center (2022).

[1370] U.S. Employment and Training Administration and Veterans Employment and Training Service. (n.d.). *A protocol for implementing priority of service for veterans and eligible spouses*. U.S. Department of Labor, Employment and Training Administration and Veterans Employment and Training Service. https://wdr.doleta.gov/directives/attach/TEN/ten2010/ten15-10a1.pdf

[1371] See California Department of Education (2021).

[1372] Brick, M., & Ajinkya, J. (2020). *Supporting success: The higher education in prison key performance indicator framework*. Institute for Higher Education Policy. https://www.ihep.org/wp-content/uploads/2018/11/ihep_kpi_report_rd5_web_3.pdf

[1373] See U.S. Department of Labor (2022).

[1374] Moyer, A. M., & Goldberg, A. E. (2020). Foster youth's educational challenges and supports: Perspectives of teachers, foster parents, and former foster youth. *Child and Adolescent Social Work Journal, 32*(1), 123–136. https://doi.org/10.1007/s10560-019-00640-9

[1375] Blankenship, G. (2018). *Reducing chronic absenteeism for children in foster care and FINS.* Arkansas Advocates for Children & Families. https://www.aradvocates.org/publications/reducing-chronic-absenteeism-for-children-in-foster-care-and-fins/

[1376] See National Center for Education Statistics (2020b).

[1377] George, R. M., Bilaver, L., Joo Lee, B., Needell, B., Brookhart, A., & Jackman, W. (2002). *Employment outcomes for youth aging out of foster care.* Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services. https://aspe.hhs.gov/reports/employment-outcomes-youth-aging-out-foster-care

[1378] U.S. Department of Health and Human Services and the U.S. Department of Education. (2016. *The integration of early childhood data*. https://www.acf.hhs.gov/ecd/early-childhood-data

[1379] Data Quality Campaign. (2017). *Roadmap for foster care and K–12 data linkages.* https://dataqualitycampaign.org/resource/roadmap-for-foster-care/

[1380] See Alliance for Resource Equity (2022)

[1381] See California Department of Education (2021).

[1382] See U.S. Department of Labor (2022).

[1383] U.S. Department of Education. (2016). *Fact sheet: Reducing recidivism for justice-involved youth.* *https://content.govdelivery.com/accounts/USED/bulletins/1769405*

[1384] Carson, E. A., Sandler, D. H., Bhaskar, R., Fernandez, L. E., & Porter, S. R. (2021). *Employment of persons released from federal prison in 2010.* Bureau of Justice Statistics, U.S. Department of Justice. https://bjs.ojp.gov/content/pub/pdf/eprfp10.pdf

[1385] Development Services Group, Inc. (2019). *Education for youth under formal supervision of the juvenile justice system.* Office of Juvenile Justice and Delinquency Prevention. https://eric.ed.gov/?id=ED600319

[1386] U.S. Department of Education. (2021). *U.S. Department of Education announces it will expand the second chance Pell experiment for the 2022-2023 award year*. https://www.ed.gov/news/press-releases/us-department-education-announces-it-will-expand-second-chance-pell-experiment-2022-2023-award-year

[1387] See Alliance for Resource Equity (2022).

[1388] Brick, M., & Ajinkya, J. (2020). *Supporting success: The higher education in prison key performance indicator framework*. Institute for Higher Education Policy. https://www.ihep.org/wp-content/uploads/2018/11/ihep_kpi_report_rd5_web_3.pdf

[1389] See U.S. Department of Labor (2022).

[1390] See Turner et al. (2020).

IV. Evidence-based practices

A. Overview

Education-to-workforce (E-W) decision makers must use data to drive action. In many cases, the data may point to a need to address inequitably distributed system conditions, such as increasing funding, hiring more advisors, or offering more early college classes in schools. However, these system conditions are not the only levers for change. Often a new practice, program, policy, product, or intervention may be needed.[xxix] For example, students who have fallen behind may need individualized support, such as through an academic intervention, tutoring, or summer program. To help E-W decision makers determine which practices are most likely to be effective for implementation, the framework offers summary guidance on how to vet and select practices that meet evidence standards and are relevant to their contexts. This guidance is followed by examples of evidence-based practices that have been shown to move the needle for priority groups on key E-W outcomes and milestones, and related system conditions. The list is not comprehensive; however, it provides an illustrative sample of practices across the continuum of pre-K to workforce that are backed by evidence for decision makers to consider.

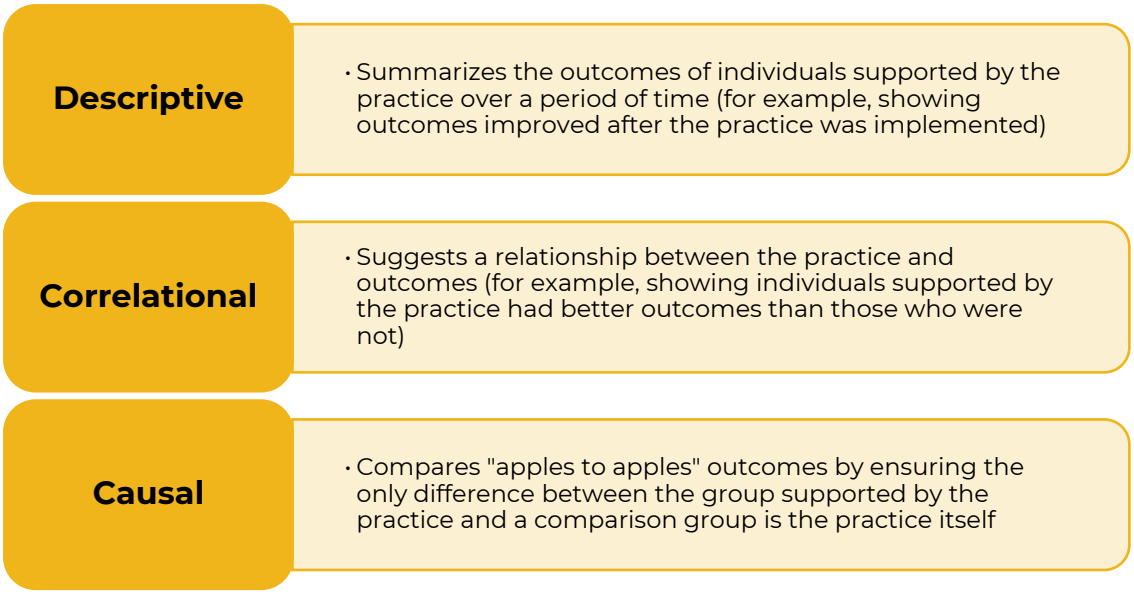
B. What is an evidence-based practice?

We define evidence-based practices as those informed and supported by rigorous evidence demonstrating consistent, positive impacts on individual outcomes. The level of evidence is an important factor to consider when selecting a practice for implementation, but not the only one. For instance, E-W decision makers should also consider factors such as the funding, staffing, training, and buy-in needed to ensure high-quality implementation in their local contexts, as we discuss later in our recommended guidance. However, a critical step is identifying potential practices that research has shown to be effective.

Different types of research may be available, ranging in their degree of rigor (Exhibit IV.1). Causal research that makes "apples to apples" comparisons between the outcomes of an intervention group and a similar comparison group ensures that the only likely difference between the two groups is the practice being tested. Thus, causal research is the most rigorous type of evidence available to gauge the effectiveness of a practice in the context studied. Causal research includes experimental studies (also known as randomized control trials, in which individuals are randomly assigned to the intervention or a control condition) and quasi-experimental studies, such as those identifying a matched comparison group similar to the intervention group based on available baseline data. Other types of research, such as descriptive or correlational studies, can point to promising practices and inform our understanding of a problem and potential solutions, but these studies do not conclusively show whether a practice was effective. Newer practices, programs, and interventions, or those more difficult to evaluate using experimental or quasi-experimental methods, may be promising but understudied. Therefore, the rigor of the available research is an important consideration, but not the only one, for assessing the evidence.

[xxix] In this chapter, we use the terms "practice" and "intervention" interchangeably to refer broadly to programs, products, practices, policies, and other types of interventions aimed at improving outcomes.

Exhibit IV.1. Three types of research evidence, from weakest to strongest



Source: Adapted from Mathematica (2016).[1391]

In practice, there is no single approach to determine whether a study is sufficiently rigorous, although there have been efforts to standardize definitions. As just one example, the U.S. Department of Education's What Works Clearinghouse (WWC) has developed standards for assessing whether a study provides causal evidence of effectiveness. (Refer to the WWC[1392] for a description of how a study meets WWC standards.) In summary, studies must use experimental or quasi-experimental research designs to make valid comparisons between the outcomes of an intervention group and a similar comparison group. Only high-quality experimental studies can receive a rating of meeting WWC standards "without reservations." However, it is worth noting that other evidence clearinghouses may apply similar but slightly different standards. For example, a study could receive a rating of "high causal evidence" by the U.S. Department of Labor's Clearinghouse for Labor Evaluation and Research (CLEAR), but not be eligible to meet WWC standards "without reservations." Although both clearinghouses review studies according to detailed, carefully vetted technical standards, there is a degree of subjectivity in determining whether a study provides sufficiently strong causal evidence.

In addition to considering the rigor of a given study, it is critical to synthesize the available evidence based on additional considerations, such as the number of studies conducted; whether they demonstrate consistent, positive findings; and whether they were conducted in multiple, diverse settings. A single causal study can point to whether a practice worked in a particular context, but not necessarily whether it is likely to be successful in other settings. As noted above, there is no one approach for determining the overall level of evidence behind a practice, though the WWC again serves as an example of a standard approach. In addition to reviewing individual studies, the WWC periodically assesses and synthesizes the overall evidence base on a topic area to develop "practice guides" that summarize recommended practices backed by minimal, moderate, or strong levels of evidence (Exhibit IV.2). For example, one recent practice guide the WWC published summarized evidence-based practices for "effective advising for postsecondary students."[1393] The WWC determines the overall level of evidence for a practice based on the following:

- The number of studies evaluating the practice that meet WWC standards of rigor for causal research
- Whether the practice was tested directly or in combination with other practices
- Whether the practice consistently led to improved outcomes, both within and across studies
- Whether the studies captured a diverse range of students and contexts

Each recommended practice also is assessed by a panel of nationally recognized researchers and practitioners before it is assigned a level of evidence, highlighting the value of consensus expert opinion in determining whether something can be considered "evidence based."

Exhibit IV.2. The WWC's levels of evidence for practice guides

Minimal evidence	Moderate evidence	Strong evidence
• Evidence may not meet WWC standards or may exhibit weak or conflicting evidence of effectiveness • Based on expert opinion of researchers and practitioners, the practice is necessary to complement other evidence-based practices	• Some evidence that meets WWC standards and indicates the practice improves student outcomes • Unclear whether that improvement is the direct result of the practice • Unclear whether findings can be replicated with a diverse population of students	• Consistent evidence that meets WWC standards without reservations and indicates the practice improves student outcomes • Evidence based on a diverse population of students

Source: Adapted from WWC (2017a).[1394]

Other levels or tiers of evidence are also used in practice. Since passage of the Every Student Succeeds Act (ESSA) in 2015, education agencies have been formally encouraged to select evidence-based interventions shown to improve student outcomes. There are four tiers of evidence under ESSA (Exhibit IV.3), which are based on the following:

- Whether there is at least one study evaluating the intervention that meets WWC standards of rigor, and whether the study meets standards with or without reservations
- Whether the intervention led to improved outcomes in that study, and there were no strong negative findings in any other studies conducted
- The size of the study sample, and whether it is based on more than one school or district
- Whether the study population or setting are relevant to the policymaker's local setting

Exhibit IV.3. The ESSA tiers of evidence

TIER 4: Demonstrates a rationale	TIER 3: Promising evidence	TIER 2: Moderate evidence	TIER 1: Strong evidence
• Well-defined logic model based on rigorous research • Effort to study the effects of the intervention is planned or underway	• At least one well-designed and implemented correlational study, or a study that meets WWC standards but is based on fewer than 350 participants or just one district or school • Statistically significant positive effect on a relevant outcome, and no strong negative findings from other experimental or quasi-experimental studies	• At least one study that meets WWC standards with reservations • Statistically significant positive effect on a relevant outcome, and no strong negative findings from other experimental or quasi-experimental studies • Study sample includes at least 350 participants in more than one district or school • Either the study population or setting are relevant to the local context	• At least one study that meets WWC standards without reservations (must be a randomized control trial) • Statistically significant positive effect on a relevant outcome, and no strong negative findings from other experimental or quasi-experimental studies • Study sample includes at least 350 participants in more than one district or school • Either the study population or setting are relevant to the local context

Source: Adapted from Regional Educational Laboratory Midwest (n.d.).[1395]

The WWC can be used to identify interventions that meet ESSA evidence tiers, although the levels of evidence currently used in WWC practice guides differ somewhat from ESSA's tiers of evidence. For example, whereas the WWC practice guides consider the *number* of studies that meet WWC standards of rigor to determine whether there is a strong level of evidence, it is possible for an intervention to meet the highest tier of evidence under ESSA with just one study that meets its standards. This example highlights that there is no single definition of what constitutes "strong" evidence. (Refer to WWC[1396] for more information.)

Other efforts to develop research quality standards are underway, including the Institute of Education Sciences' (IES) Standards for Excellence in Education Research (SEER), which builds on and complements the WWC's focus on causal rigor to identify "additional factors that can make research transformational."[1397] SEER has developed a number of recommendations to improve the overall quality and usefulness of research. Recommendations to researchers include pre-registering studies (that is, documenting their confirmatory research questions and planned analyses ahead of time to limit the risk of cherry-picking findings); making data openly available to allow other researchers to replicate findings; describing the components of an intervention and how they are hypothesized to affect outcomes; describing the implementation context, including the comparison condition and fidelity of the intervention's implementation; measuring the cost of the intervention relative to the comparison condition; examining both immediate and more distal outcomes, and the potential that initial impacts may fade over time; and being attentive to whether the findings can be generalized to other contexts and the intervention can be scaled. IES continues to refine these recommendations, with the ultimate goal of developing concrete standards that can be used to assign quality ratings to studies: certified, silver, gold, or platinum.

Rather than endorse a single definition of what constitutes "strong" evidence, we recommend E-W decision makers consider several factors in assessing the level of evidence available, including the following:

- The number and quality of causal studies that have been conducted
- Whether the practice consistently led to improved outcomes both within and across studies, and the magnitude of those improvements
- Whether the practice was tested directly or in combination with others
- The number of individuals included in the studies
- Whether the studies were implemented in multiple sites
- Whether the studies include diverse populations or populations relevant to the local context
- Whether the studies include diverse settings or settings relevant to the local context
- Whether there is consensus among experts (including researchers and practitioners) about the effectiveness of the practice

Together, these considerations inform the likelihood that a given practice may be effective if replicated in other contexts, assuming it is implemented well. E-W decision makers should consult evidence clearinghouses, such as the WWC and CLEAR, as well as meta-analyses, because they systematically review and synthesize the extent and quality of available studies. It is the responsibility of researchers, not policymakers, to review and synthesize the research field, which is vast and continuously evolving. However, being aware of and considering the above factors can help E-W decision makers become better consumers of research. In addition, the process for assessing evidence and ultimately selecting a practice to implement should be a collaborative, multistep process. As a starting point, below we provide an overview of guidance for selecting an evidence-based practice.

C. How to select an evidence-based practice?

We recommend following a four-step process before deciding to adopt a particular practice:

1. **Diagnose the need to be addressed by conducting a root cause analysis.** Before assessing possible practices and their evidence base, decision makers should have a clear understanding of the need they are trying to address (for example, reducing disparities in early college coursework and credit completion). The E-W Framework's synthesis of data equity principles offers guidance and links to resources on how to disaggregate data to analyze disparities and guide action, and how to examine social and historical contexts to identify root causes and develop data-driven solutions. Existing tools, such as the Resource Equity Guidebooks published by the Alliance for Resource Equity,[1398] can guide users through the process of unpacking data to identify underlying causes for observed disparities and develop an action plan. The data equity principles also discuss best practices and resources for engaging community members because it is important for community members to take part meaningfully in the decision-making process. Before moving on to the next step, there should be consensus among key decision makers on the problem of practice to prioritize and the hypothesized root causes behind it.
1. **Identify potential evidence-based practices for consideration.** Once a clear problem of practice has been identified, decision makers should consider whether the root cause analysis suggests that disparities can be addressed by taking action around one or more of the system indicators in the framework (for example, improving course placement policies to ensure they are equitable, increasing the number of Advanced Placement [AP] courses offered across subjects, and subsidizing AP exam fees). Alternatively, addressing disparities might require implementing a new practice (such as after-school tutoring to help students prepare for AP exams).

If a new practice is needed, decision makers should examine the quality, quantity, and relevance of studies that make up the evidence base. (Refer to resources such as National Center for Education Evaluation and Regional Assistance [NCEERA][1399] and Planning Realistic Implementation and Maintenance by Educators [PRIME][1400] for additional guidance on how to assess the evidence base and implementation factors to select an intervention.) A good starting point is to consult relevant evidence clearinghouses or meta-analyses that review and synthesize high-quality, rigorous studies (including, but not limited to, those cited in the E-W Framework). Decision makers should be careful not to simply pick out individual studies of which they are aware or might come across. Evidence clearinghouses and meta-analyses provide a fuller picture of the available causal evidence. For example, WWC practice guides synthesize the available evidence on a topic, drawing on studies it has reviewed and vetted.

Evidence syntheses also consider the quantity and relevance of evidence that meets standards for quality and rigor. Having multiple high-quality studies with consistent positive findings makes it more likely that an intervention will work in different contexts. Findings based on larger sample sizes and multiple sites also increase the likelihood they can be successfully replicated. Decision makers should also consider the relevance of the studies to their particular context, including whether the intervention has been tested with diverse populations of students in diverse settings or with populations and settings that resemble the local community. Another consideration is whether the intervention has been compared to "business-as-usual" alternatives relevant to the local policy context. For example, curricula typically are compared to other curricula to gauge their effectiveness, so knowing what the comparison curriculum was and whether it generally resembles what is being implemented locally is important for interpreting the available evidence. Finally, it can be helpful to consult with experts, including researchers and practitioners, to gauge the likelihood that an intervention backed by evidence will be effective.

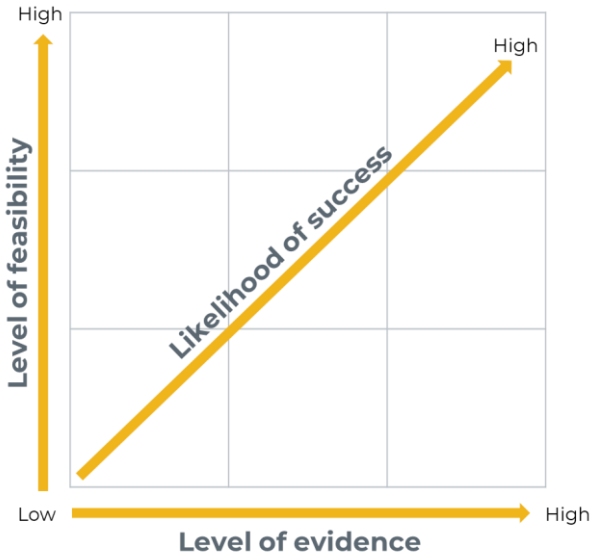
Relying on evidence to identify potential practices should not stifle innovation or assume a one-size-fits-all approach. It is important to start by reviewing the evidence, rather than preselecting a practice and looking for evidence to justify it. However, if there is limited causal evidence on effective interventions to address a particular problem of practice, decision makers should consider promising interventions with weaker evidence bases. Lack of causal evidence is not the same as having evidence of an intervention's lack of effectiveness. Newer practices or practices not readily evaluated using causal research methods may be understudied but still hold promise. It is for this reason the ESSA tiers of evidence include a fourth tier for interventions that demonstrate a rationale. We recommend developing a logic model for how the potential intervention is expected to improve outcomes, drawing on research to outline hypothesized chains of cause and effect. (A logic model is a visual representation of the hypothesized chains of cause and effect that will lead to the intended outcomes. See Kekahio et al. for additional guidance on developing logic models for education interventions.[1401] Creating a logic model also is a useful and recommended exercise for selected interventions regardless of the strength of the available evidence, as this process helps decision makers identify the necessary inputs and outputs that make an intervention "work.")

2. **Select a practice, weighing the evidence base against the feasibility of implementation.** After identifying a candidate list of practices that meet the identified needs of the problem of practice and root cause analysis, decision makers should weigh the evidence base against the feasibility of implementing the practices successfully in their contexts. Community members and practitioners should be a part of this process, as they may have the best understanding of how the candidate practices will play out in practice. Key implementation factors to consider include whether funding

is available to enact and sustain the practice; whether there are qualified staff to implement it as designed (including leadership to oversee and facilitate implementation and resources); what additional training or support staff may need to build their capacity; and whether there is buy-in from key community members, such as teachers, students, and families. It is also important to consider whether any adaptations to the intervention will be needed, given the particular implementation context, and how they might affect the intervention's effectiveness.

An evidence-based practice decision-making matrix (Exhibit IV.4) can be a useful tool for mapping candidate practices along a continuum of low, medium, and high evidence versus low, medium, and high feasibility. Identifying where each potential practice falls within this matrix can facilitate the selection of an intervention most likely to be successful. In making the ultimate selection, decision makers should collaborate with the practitioners who will be responsible for its implementation, as well as with students and families who will be impacted.

Exhibit IV.4. Evidence-based practice decision-making matrix



Source: Adapted from Andrews and Buettner.[1402]

3. **Plan and monitor the implementation and outcomes of the practice.** Once a practice has been identified, decision makers will need to plan for its implementation. It can be helpful to conduct an assessment to gauge whether key drivers of successful implementation are in place for the practice, and to guide action steps. Existing resources, such as the Drivers Best Practices Assessment (DBPA) developed by the National Implementation Research Network, can assist organizations in assessing their readiness for quality implementation of a selected practice and planning next steps to ensure implementation can be executed successfully. For example, the DBPA helps organizations identify strengths and opportunities for improving their current supports and resources; select implementation best practices to strengthen staff competency and organizational practices; and provide an implementation team with a structured process to develop an action plan and data to monitor progress.[1403]

   In addition to planning for resources, staffing, professional development, communication, and other facets of execution, it is important to develop a plan for monitoring the degree to which the practice is being implemented as designed and outcomes are improving as intended. Decision

makers should track progress on the key indicator(s) they used to identify the problem of practice, as well as the leading outcome or related system indicators also expected to improve if the practice is being implemented effectively.

Decision makers need to assess implementation and outcomes continually in this step until the practice is consistently being implemented well and there is progress on key indicator(s). A rigorous evaluation may be appropriate at this point, particularly if the intervention does not already have a strong evidence base supporting it, it has been adapted, or outcomes are not trending in the right direction. Continued monitoring of implementation and outcome data can also help decision makers determine whether a new cycle of inquiry is needed to further diagnose and address the problem of practice.

D. Examples of E-W evidence-based practices

The evidence-based practices in the E-W Framework are examples drawn from leading syntheses of E-W research, supplemented by evidence reviews the Bill & Melinda Gates Foundation has conducted to guide the foundation's investment areas, as well as recommendations from the External Advisory Board. Identifying a complete set of practices across the pre-K-to-workforce continuum that meet accepted evidence standards would be a large, complex task beyond the scope of this framework; our intent is instead to highlight examples of evidence-based interventions as a starting place for E-W decision makers. Because we drew from different sources, there is no single standard of evidence that applies equally to all of the examples listed. However, we sought to identify practices informed and supported by rigorous evidence demonstrating consistent, positive impacts on individual outcomes.

We began by reviewing the following three syntheses of E-W research:

1. **What Works in Early Childhood Education Programs?** This meta-analysis of preschool enhancement programs by Sun Joo et al.[1404] is based on a comprehensive database of early childhood research developed by the National Forum on Early Childhood Policy and Programs. The database includes 277 studies on early childhood education (ECE) programs for children up to five years of age that met review criteria from more than 10,000 reports considered for inclusion.
2. **WWC.** This evidence clearinghouse, developed by the U.S. Department of Education, has reviewed nearly 10,000 studies spanning pre-K through postsecondary education. We focused on practices[xxx] with moderate or strong evidence appearing in its Practice Guides, which summarize effective practices based on studies that met review criteria, the experiences of practitioners, and the expert opinions of recognized experts.
3. **CLEAR**. This evidence clearinghouse, developed by the U.S. Department of Labor, has reviewed more than 1,000 studies of labor programs and policies. We focused on practices with moderate or high causal evidence appearing in its Synthesis Reports, which summarize the research across studies in a topic area.

These sources are only three out of a number that have systematically reviewed and synthesized studies on the effectiveness of E-W practices, and it is important to remember that no single source provides a comprehensive list of promising practices. To curate the list of practices appearing in the framework, we also drew on recommendations from the Bill & Melinda Gates Foundation and External Advisory Board, and reviewed the underlying research base—for example, by consulting WWC

[xxx] We excluded specific instructional practices (such as reading comprehension strategies or approaches to teaching fractions) from the review.

Intervention Reports and published literature reviews. From this collaborative process, we identified examples of 26 evidence-based practices (Exhibit IV.5). Below we provide summaries of these practices by sector, which we have mapped to associated indicators that appear in the E-W Framework in Appendix E. Framework users may wish to consult the sources cited in the framework, as well as other evidence clearinghouses and meta-analyses, to learn more about the evidence base behind specific practices.

Exhibit IV.5. Select evidence-based practices

	Pre-K	K–12	Postsecondary	Workforce
Evidence-based practices	Teacher coaching and professional development	Response to Intervention	Co-requisite support	Employer partnerships with CTE programs
	Skill-based curricula	High-impact tutoring	Comprehensive, integrated advising	Youth workforce development programs
	Social skills training	Out-of-school programs	Mentoring and coaching	Sector-oriented job training programs
	Parent programs	Evidence-based curricula	Financial incentives for students	
		SEL curricula and programs	Digital learning	
		Intensive, individualized support for students off track on early warning indicators	SEL curricula and programs	
		Small, personalized learning communities	Contextualized or integrated basic skills instruction in occupational training	
		Accelerated postsecondary pathways	Intentionally designed career pathway programs	
		Career pathway programs		
		Financial aid advising and hands-on assistance		
		Enhanced college advising		

Note: CTE = career and technical education; SEL = social-emotional learning.

Pre-K education

Teacher coaching and professional development

Professional development and coaching interventions generally focus on improving teacher-child interactions and instruction. A review of multiple studies suggests that these programs—which take many forms, but typically offer individualized coaching or mentoring from a more experienced individual—can improve the quality of pre-K instruction, as well as children's learning and development outcomes.[1405] Early research suggests that technology and assessment data may play a role in effective teacher coaching and professional development. For example, MyTeachingPartner, a web-mediated feedback and consultation program that uses data from the Classroom Assessment Scoring System, was associated with improvements in the quality of instructional support for pre-K students. (However, no studies of MyTeachingPartner have met WWC standards.)[1406, 1407] The National Institute for Early Education Research (NIEER) benchmarks for high-quality pre-K recommend that both lead and assistant teachers receive at least 15 hours of approved professional learning activities per year, and that all lead teachers receive coaching.[1408] Further research is needed to understand the types of professional development and coaching that are most effective, as the overall effectiveness of ECE professional development programs is mixed.[1409]

Skill-based curricula

Using skill-based curricula in ECE programs is tied to large improvements in children's cognitive abilities, pre-academic skills, and overall outcomes—especially for literacy or language-specific curricula.[1410] Although most ECE programs use some form of a curriculum to promote children's early learning, not every program uses evidence-based curricula that provide explicit academic instruction and focus a portion of the day on developing specific skills. The language-specific curricula reviewed by Sun Joo et al.[1411] provided teachers with structured guidelines to promote literacy/language skills in classroom activities (for example, role play, reading books, and so on) and instructional materials. For example, the Literacy Express curriculum, which includes teaching materials, suggested activities, recommendations for room arrangement, daily schedules, and classroom management, as well as professional development opportunities for teachers, had positive impacts on English learner pre-K students' language and literacy skills.[1412] As another example, Doors to Discovery, a literacy curriculum that provides teachers with resource kits organized into eight thematic units, had positive impacts on children's oral language and print knowledge.[1413] The NIEER benchmarks for high-quality pre-K recommend states offer guidance on criteria for selecting evidence-based curricula or require adoption of specific curricula by all programs and sites.[1414] Additional research is needed to identify effective pre-K curricula and the characteristics that make them effective, particularly for Black or Latino children, emerging multilingual children, and those experiencing poverty.

Social skills training

Social skills training refers to a series of practices that apply a behavioral approach to teaching children age-appropriate social skills and competencies, including communication, problem solving, decision making, self-management, and peer relations. The WWC found that social skills training had positive effects on social-emotional development and behavior for children with disabilities in early education settings, but no discernible effects on children's cognition.[1415] Existing studies tend to be small, and additional research is needed to identify effective programs, as there are a variety of social skills training approaches and curricula that can be used in different settings. As one example, the Taking Part curriculum[1416] was effective in improving the social-emotional development of children with developmental delays among a sample of 38 children.[1417] However, all social skills programs are intended to promote positive interactions among children and between children and their teachers, through modeling, role-playing, specific instruction, and classroom reinforcement of social skills.

Parent programs

ECE programs designed to teach parents how to better support their children's early learning by providing stimulating interactions during daily routines and playtime at home are related to large improvements in children's behavioral, health, and some dimensions of socio-emotional outcomes, as well as modest improvements in their cognitive abilities and overall outcomes in general.[1418] The ECE parent programs reviewed by Sun Joo et al.[1419] were delivered in a variety of formats, including parent training, group meetings, family classes, and home visits, or parents were provided with at-home instructional materials to facilitate children's early learning processes. However, each of them was a fully developed, curriculum-based program, and generally they had a specific target of intervention (such as children's cognitive development or phonemic awareness). For example, the Research-based Developmentally Informed Parent (REDI-P) program provided additional home visits to parents of children in Head Start to help them use learning activities and games at home to enhance their children's readiness for school. It led to significant improvements in language and literacy skills, and social-emotional development.[1420]

K–12 education

Response to Intervention

Response to Intervention (RTI) is an early detection and prevention strategy that combines universal screening for all students with instructional interventions targeted to students who need additional support. Universal screening is a critical first step in identifying students at risk of falling behind. The WWC[1421, 1422, 1423] recommends screening all students at the beginning of each school year and again in the middle of the year. The WWC recommends that once students have been identified for support, schools should select an intervention that provides an explicit instructional focus to meet each student's identified learning needs. The greater the instructional need, the more intensive the intervention should be in the size of instructional groups and amount of instructional time. Students who score below benchmark should receive intensive instruction in small homogenous groups ranging from three to four students, using curricula that address foundational skills, and should meet

approximately three to five times per week for 20 to 40 minutes. The WWC is a good source for examples of specific instructional intervention programs that have proven effective for particular subjects, grades, and student needs (for example, Leveled Literacy Intervention[1424] for struggling readers in K–2 or Read180[1425] for struggling readers in grades 4–10). Intensive instructional support may need to be provided by trained specialists.

High-impact tutoring

The National Student Support Accelerator (NSSA) recognizes high-impact tutoring programs as those that have either directly demonstrated significant gains in student learning through research studies or have characteristics proven to accelerate student learning.[1426] These characteristics include substantial time each week spent on required tutoring, sustained and strong relationships between students and their tutors, close monitoring of student knowledge and skills, alignment with school curricula, and oversight of tutors to ensure quality interactions. Tutoring has an extensive evidence base, with a recent meta-analysis of 96 randomized evaluations of one-on-one and small-group tutoring finding consistent and substantial positive impacts on learning outcomes.[1427] This meta-analysis also found that tutoring delivered by teachers and paraprofessionals was generally more effective than tutoring delivered by nonprofessional staff or parents. Also, programs held during school tended to have larger impacts than those conducted after school. Other research suggests that high dosage has larger effects on student achievement.[1428]

Out-of-school programs (such as summer programs)

Academically focused after-school, weekend, and summer programs (also known as out-of-school programs) can promote student achievement. The WWC recommends the following key features for effective out-of-school programs: the program should be aligned academically with the school curriculum, maximize student participation attendance, adapt instruction to individual and small-group needs, and provide engaging learning experiences for students.[1429] One example of an effective out-of-school program is the Elevate [Math] Summer Program[1430] for middle school students struggling with math, which improved students' algebra readiness scores.[1431] Students participate in Elevate [Math] over a four-week period, receiving four hours of blended learning instruction a day focused on math content aligned with Common Core State Standards, and taught by trained, certified teachers.

Evidence-based curricula

A growing body of experimental research shows that particular subject-specific curricula can lead to different academic achievement outcomes for students.[1432] The WWC can be used to identify particular curricula that have proven effective in different grades and subjects. To illustrate just one example, the Great Explorations in Math and Science (GEMS) Space Science Sequence, which uses models, hands-on investigations, peer-to-peer discussions, reflection, and informational student readings, has been shown to improve science achievement for students in grades 4–5.[1433] As another example, the University of Chicago School Mathematics Project (UCSMP) core math curriculum, which emphasizes problem solving, real-world applications, and the use of technology "based on a student-centered approach with a focus on active learning," has been shown to improve math achievement for students in grades 7–10.[1434] There is limited evidence about the features of curricula that make them effective, although research summarized by Education First[1435] suggests that content richness and standards

alignment are common qualities of effective curricula. Also, curricula that prioritize student engagement through additional instructional materials or culturally relevant content may have positive effects on student achievement. Curricula that engage and support teachers effectively may increase the frequency and fidelity of implementation, which are likely to shape the effectiveness of those curricula in improving student achievement. We recommend decision makers consult the WWC, as well as resources such as EdReports, which rates curricula according to their coherence, standards alignment, and usability, to inform the selection of evidence-based curricula.

SEL curricula and programs (such as growth mindset interventions)

Students with stronger social and emotional skills tend to have better academic outcomes. To promote student engagement and prevent school dropout, the WWC[1436] recommends offering explicit social and emotional instruction through classroom curricula or separate programs offered outside of the classroom for off-track students. At the middle and high school levels, skills taught might include how to make better decisions in high-stakes situations, strategies for stress and anger management, and setting and tracking progress toward goals. There is also growing evidence on teaching growth mindsets, as this concept relates specifically to students' math identity and achievement. Students who are more confident about their abilities in math and science are more likely to choose elective math and science courses in high school and select math and science-related college majors and careers. A recent national experiment showed that an online growth mindset intervention teaching students that intellectual abilities can be developed led to improved self-determination and higher grades among lower-achieving students, although the impact on grades was small (on average, the intervention raised the math grade point average (GPA) of lower-achieving students from a 1.91 to a 1.99).[1437] As a strategy for encouraging girls in math and science, the WWC[1438] recommends that, to enhance students' beliefs about their abilities, teachers explicitly instruct students that academic abilities are expandable and can improve.

Intensive, individualized support for students off track on early warning indicators

Using data on on-track or early warning indicators (such as those recommended by the E-W Framework), schools can identify students who are off track for high school graduation or college readiness, and can intervene. The WWC[1439] recommends assigning these students a trained adult advocate who provides individualized support to meet their academic, social, and emotional needs. This individual can identify students' unmet needs and either directly provide support or coordinate additional support. An advocate is a student's "go-to person" for the resources and support needed to graduate or be ready for college. Advocates typically provide these supports for the entire time a student is enrolled in the school or, at a minimum, a full school year. They can be school staff or employed by outside organizations. Although the research reviewed is focused on dropout prevention in middle and high schools, intensive, individualized support that considers both academic *and* nonacademic needs may also be a promising intervention for students off track in elementary school or for college.

Small, personalized learning communities

In schools with many students who are off track to graduate, the WWC[1440] recommends creating small, personalized learning communities. By grouping students into small communities of no more than a

few hundred students, teachers and other school staff can be better equipped to implement other interventions, including providing students who are off track with intensive, individualized support. The WWC notes that in small, personalized communities, staff can check in with students more frequently, pay closer attention to their needs, and form stronger and more meaningful relationships with them. As the relationships between students, teachers, and other school staff grow, students may develop a greater sense of belonging in the school community, thus helping them stay engaged in school.

Accelerated postsecondary pathways

The WWC[1441] recommends that high schools offer courses of study that allow students to earn college credits, with an explicit goal of having a certain number of transferable credits upon high school graduation. Growing research, including studies that meet WWC standards, demonstrates that participation in accelerated postsecondary pathways (such as early college high schools and dual enrollment) have positive effects on high school graduation and postsecondary enrollment and completion.[1442, 1443, 1444, 1445] However, the evidence is not consistent for all types of accelerated coursework. In particular, there is mixed evidence on whether taking AP classes alone improves outcomes.[1446, 1447] Passing an AP exam (earning college credit), however, has positive impacts on college admissions scores and on-time postsecondary degree completion.[1448, 1449]

Career pathway programs

Offering curricula and programs clearly connected to a career pathway improves high school graduation rates.[1450] Career pathway programs have three main features: (1) they are organized as small learning communities, or schools within schools; (2) their curriculum centers on one career, occupation, or industry and combines academic and technical aspects relevant to that career; and (3) they provide work-based learning experiences, often through partnerships with local employers to offer students exposure to jobs in demand. These experiences can include summer employment, internships, and mentoring. Career pathway programs in high school produce strong and sustained increases in students' post-high school earnings, especially for young men.[1451, 1452]

Financial aid advising and hands-on assistance

High schools can ensure that students take the necessary steps to obtain financial aid by educating students and their parents about college affordability and the availability of financial aid—for example, through workshops offered at the start of students' senior year. Students also benefit from one-on-one hands-on assistance in meeting financial aid deadlines and completing application forms. Programs that inform students about financial aid opportunities and provide help in completing financial aid applications have had positive impacts on financial aid applications and college enrollment.[1453]

Enhanced college advising

Advising that engages students in the college application and enrollment process, providing hands-on assistance through each step, has had a positive impact on college enrollment. Advising providers may include traditional counselors; they may also include educators, school-based administrators, school staff (such as paraprofessionals), and third-party providers (such as nonprofit program staff or

AmeriCorps volunteers).[1454] There are somewhat varying models for advising programs with proven impacts, but the WWC[1455] recommends that students who want to attend a two- or four-year institution receive guidance in preparing for and taking college admissions tests; searching for a college that matches their qualifications, interests, and goals; and completing college applications. Students should receive one-on-one assistance with college applications (and financial aid applications, as noted above) to ensure they submit quality applications that are complete and on time. To expose students to the college environment and help them select a college, advising programs should coordinate college visits. Some programs also assist students in the transition to college. For example, OneGoal works with students for three years, including one year after high school graduation.[1456] Bottom Line, which has been proven effective in improving both college enrollment *and* degree completion, provides advising support for up to six years after high school.[1457, 1458]

Postsecondary education

Co-requisite support

Co-requisite approaches, in which students with developmental education needs receive support at the same time they take credit-bearing gateway courses (concurrent support), have had positive impacts on students passing gateway courses and progressing through college.[1459, 1460, 1461, 1462, 1463] These approaches stand in contrast to traditional developmental education, in which students must pass a developmental course before they can take a gateway course and then are placed directly into gateway courses without additional support. A multisite study of the Accelerated Learning Program (ALP)[1464]—an English co-requisite model with extended instructional time and academic support services—found that it improved students' likelihood of passing English Composition I in the first and second years, and increased the number of college-level credits they completed overall.[1465] In the ALP model, students receive support during classroom instruction. Courses include a mix of students with and without developmental needs, and class sizes are smaller to help instructors provide support. Another successful model is the Dana Center Mathematics Pathways (DCMP),[1466] which enrolls students directly into a gateway math course aligned to their program of study while offering enhanced supports (in some cases, including a co-requisite support course). This model, which has been implemented and studied in 27 community colleges in Texas, had positive impacts on students passing gateway math courses and earning college credits.[1467] Co-requisite approaches also include paired-course models (in which students enroll in a gateway and developmental course at the same time); extended instructional time models; required academic support models (which may include technology-mediated support); or some combination of the above.

Comprehensive, integrated advising

Comprehensive, integrated advising that connects students with a broad range of individualized academic and nonacademic supports helps students successfully complete developmental course requirements, earn credits, complete a degree or industry-recognized credential, and transfer to a four-year institution. [1468, 1469, 1470] This type of advising model stands in contrast with the light-touch, transactional structure of traditional college advising, encouraging advisors to engage with students though deeper, more frequent, and lasting interactions. By building and sustaining a relationship with

students, advisors can develop a better understanding of their holistic needs and help connect them to appropriate supports to meet their academic, financial, social, and emotional needs. An exemplar of this model is the Accelerated Study in Associate Programs (ASAP)[1471] model implemented by the City University of New York to help students graduate in three years. The program offers a suite of supports, including comprehensive advising, tutoring, career assistance, early registration, and financial support. Another successful model is the Monitoring Advising Analytics to Promote Success (MAAPS)[1472] project implemented at Georgia State University, in which an early warning data system with more than 800 alerts allows advisors to intervene quickly to help students get back on track. Key elements of effective advising models include access to data from progress monitoring or early warning systems (allowing advisors to proactively reach out to students); sustained relationships with the same advisor; frequent advisor-student interactions; social and emotional support in addition to academic support; and smaller caseloads to encourage advisors to spend more time with their assigned students.

Mentoring and coaching

Mentoring and coaching can enhance the role advisors play in helping students reach their educational and career goals.[1473] "Mentoring" refers to an informal, supportive learning relationship between a student and mentor (such as a faculty member, peer mentor, or professional with experience in the student's field of interest), whereas "coaching" describes a more formal and structured relationship with a trained coach (such as a "student success coach") built around specific goals. Both mentors and coaches can play an important role in motivating students and helping them set and achieve goals. Although the types of activities, frequency of meetings, and duration of the mentoring or coaching relationship varied across the studies reviewed, there were significant, positive impacts on students' progression through college, academic achievement, and degree completion. For example, in a study of the InsideTrack[1474] coaching program implemented in eight colleges, students were paired for two semesters with a trained coach, who communicated with them via phone, email, text, or social media around identifying strategies to overcome barriers to success. The program improved persistence and degree completion.[1475]

Financial incentives for students

Performance-based incentives are monetary awards disbursed to students based on meeting specific academic benchmarks, and are intended to supplement (not replace) students' financial aid packages. By identifying and incentivizing short-term goals (such as maintaining a minimum level of enrollment, successfully completing coursework, or participating in advising programs), these initiatives support students' progression through college.[1476] Incentive programs can vary in the amount of the incentive, the requirements for receiving it, and the number of semesters for which students are eligible for it. In the studies reviewed, incentive amounts ranged from about $600 to $1,500 per semester, and students typically were eligible for two or three semesters. For example, in the Louisiana Opening Doors program,[1477] students who were parents with low incomes received $1,000 per semester for two semesters for maintaining at least half-time enrollment and a 2.0 GPA. The ASAP program[1478] offers financial assistance with textbooks, a tuition waiver that covers the difference between a student's tuition and fees and the financial aid package, and a monthly transportation pass. To be eligible for these supports, students have to enroll in at least 12 credits per term; a 3.0 GPA or higher is required to be eligible for funds covering winter or summer coursework. Although performance-based awards may

reduce the amount of student loans or grants awarded in some instances, they usually result in a net financial gain for students.[1479]

Digital learning

Technology can help foster productive and engaging course experiences for larger numbers of students and a more diverse student population. The WWC[1480] recommends that postsecondary institutions leverage technology to (1) vary, blend, or accelerate course formats; (2) package course content to minimize cost, maximize accessibility, and accommodate different learning preferences; and (3) generate and provide timely performance data to students and instructors. These practices have led to improved academic achievement, credit accumulation, and persistence. As one example, in 2014 the Bill & Melinda Gates Foundation launched the Next Generation Courseware Challenge (NGCC)[1481] to develop and scale high-quality adaptive courseware in gateway courses with historically poor outcomes for students from low-income households and students of color. Evaluations of 28 courseware uses showed that implementing courseware in blended and fully online courses can improve student success in high failure-rate courses and save them money while potentially reducing instructional costs for the institution. The effects on students' course grades were positive overall, and greater for students of color. However, the results varied widely across contexts—for instance, courseware was more effective in four-year than two-year colleges, and in biology, psychology, and math courses than in courses in the humanities or social sciences.[1482]

SEL curricula and programs (such as self-regulated learning)

Teaching college students to be self-regulated learners means helping them focus on the parts of the learning process they can control. Self-regulating learning can be embedded in coursework by demonstrating to students how to approach a task, implement that approach, evaluate how well it worked, and decide what to do next. The WWC[1483] recommends using technology that models and promotes self-regulated learning strategies to promote postsecondary student learning—for instance, by prompting or supporting students to set goals, take effective notes, seek help, monitor their own progress, and plan and manage their time. Evidence reviewed by the WWC[1484] also suggests growth mindset interventions that encourage college students to view intelligence as a "malleable" characteristic that grows with effort and leads to higher academic achievement, although they had no discernable effects on measures of college progression. Social belonging interventions that aim to ease the burden of negative stereotypes underrepresented groups face had mixed effects on achievement and progression, and no discernable effects on degree completion.[1485]

Contextualized or integrated basic skills instruction in occupational training

Contextualized or integrated basic skills instruction offers career and technical education (CTE) students the opportunity to develop the foundations in math, reading, and writing ("basic skills") they need to be successful in occupational coursework and beyond. This type of instruction has had positive impacts on students' credit accumulation and completion of an industry-recognized credential.[1486] Students entering career pathways have diverse educational and employment backgrounds, and some may need support to build these foundations. "Contextualization" refers to instruction that explicitly links basic skills to concrete applications in an occupation of interest to the student. In integrated basic skills instruction, basic skills are taught at the same time as occupational content, often by a team of

instructors. For example, Washington State's Integrated Basic Education and Skills Training (I-BEST) program,[1487] an effective model developed by the Washington State Board for Community and Technical Colleges, uses a team-teaching approach to provide job training and basic skills instruction in reading, math, or English as a second language in the same classes as part of a structured career pathway. Both instructional approaches can help close skill gaps and improve student motivation, allowing students to see how basic skills apply to job training and future employment.

Intentionally designed career pathway programs

The design and implementation of career pathways can vary widely, depending on the target industries and occupations. However, key design elements can make a career pathway more effective at helping students earn credits, complete an industry-recognized credential, and gain employment and higher earnings.[1488] Effective career pathways offer students a clear blueprint for educational and employment advancement that meets industry needs. This blueprint should include multiple "on and off ramps" that individuals with varying needs can access. For example, students who need basic skills training may start in a pre-pathway bridge program, whereas others may enter directly into a short-term or one- to two-year certificate program. Pathways should offer stackable credentials that build on each other and allow students to enter and exit the pathway at multiple points as they progress in their careers. For instance, a short-term certificate can lead to an entry-level skilled job *and* a longer-term certificate, which then can be followed by mid-level skilled employment or a two-year degree, and so on. An example of an effective pathway program is the Pima Community College Pathways to Healthcare Health Profession Opportunity Grant (HPOG) Program,[1489] which features placement assessments, contextualized basic skills and training, support services (including advising, financial assistance, and social supports), and employment connections to work-based learning opportunities.

Workforce

Employer partnerships with CTE programs

Employer partnerships with high schools and postsecondary institutions are a key component of effective career pathways, offering students in CTE both classroom and work-based experiences to develop the skills they need to be successful in the workplace.[1490] Career pathways that develop and sustain employer partnerships can improve the relevance and alignment of the curriculum to employer or industry needs; expand opportunities for students to engage meaningfully with employers through presentations, onsite visits, work-based learning opportunities, and career fairs; and increase the potential for job placement and advancement.

Youth workforce development programs

Workforce development programs for disconnected youth can have positive effects on their education, employment, and earnings outcomes, although the evidence is mixed on which types of programs are most effective.[1491, 1492] Examples of effective programs include the National Guard Youth ChalleNGe program, which offers a six-month residential program for youth who have dropped out of high school, followed by placement in employment, education, or the military and a year of structured mentoring.

Experimental research found that the program increased educational attainment, employment, and earnings three years after enrollment.[1493] Another example is Youth Corps, which offers youth a stipend along with educational supports, employment and training, and community service activities, and led to higher earnings (a more than $1,200 per year increase) for youth 18 months after enrollment; however, it had no impacts on employment or education, and the program was not equally effective in all participating sites.[1494, 1495] Internship programs for youth and young adults also have shown encouraging findings. A study of the Young Adult Internship Program (now known as Intern & Earn), which offers disconnected youth a 10- to 12-week paid internship, along with job readiness workshops and individualized supports, found that the program increased earnings for participants a year after completing their internship.[1496] YearUp—which offers six months of intensive training followed by paid six-month internships in the fields of information technology and financial operations to youth from low-income households—improved earnings measured three years after participation (though not after four years).[1497, 1498] There are also examples of programs that have not yielded consistent benefits for participants; for example, evidence on summer job programs for youth is mixed.[1499,1500,1501] The Workforce Innovation and Opportunity Act (WIOA) recommends that youth programs include multiple elements, including education and other supportive services, work experience, occupational skills training, mentoring, leadership development opportunities, and follow-up support.[1502]

Sector-oriented job training programs

Sector-oriented training programs are designed to prepare workers for a particular industry or sector in demand by local employers. There are several examples of sector-oriented training programs that have proven effective in improving long-term employment, earnings, and educational attainment outcomes for participants.[1503] For example, the WorkAdvance model, which provides employee assessments, career readiness services, occupational skills training, and job development and placement services in different sectors, led to higher rates of credential attainment of 26 percentage points[1504] and increased earnings by an average of almost $3,000 several years after participation in the program.[1505] As another example, the Wisconsin Regional Training Partnership's sectoral employment program, which provided training lasting two to eight weeks, along with case management and job placement assistance, increased earnings by more than $6,000, on average, over two years after acceptance into the program.[1506] Common industries targeted by sector-oriented training programs include health care, information technology, manufacturing, and transportation.[1507] Research suggests that key aspects of effective sector-oriented job training programs are on-the-job training and technical instruction that lead to an industry-recognized credential in demand by local employers, job search assistance and placement supports, and post-employment job retention services.[1508, 1509]

Evidence-based practices endnotes

[1391] Chojnacki, G., Resch, A., & Vigil, A. (2016). *Understanding types of evidence: A guide for educators.* Mathematica. https://www.mathematica.org/publications/understanding-types-of-evidence-a-guide-for-educators

[1392] What Works Clearinghouse (WWC). (n.d.1) *How the WWC rates a study.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/Docs/referenceresources/wwc_info_rates_061015.pdf

[1393] What Works Clearinghouse (WWC). (2021a). *Effective advising for postsecondary students*. Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/PracticeGuide/28

[1394] What Works Clearinghouse (WWC). (2017a). *Practice guide level of evidence video.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/multimedia/39#:~:text=For%20each%20recommendation%20in%20a,rigorous%20research%20supporting%20the%20recommendation

[1395]Regional Educational Laboratories (REL) Midwest. (n.d.). *ESSA tiers of evidence: What you need to know*. Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/edlabs/regions/midwest/pdf/blogs/RELMW-ESSA-Tiers-Video-Handout-508.pdf

[1396] What Works Clearinghouse (WWC). (n.d.2). *Using the WWC to find ESSA tiers of evidence.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/essa

[1397] Institute of Education Sciences. (2021). *Standards for excellence in education research.* U.S. Department of Education, Institute of Education Sciences. https://ies.ed.gov/seer/index.asp

[1398] Alliance for Resource Equity. (n.d.). *Guidebooks: Explore underlying causes and how to make change in your system*. https://www.educationresourceequity.org/toolkit/guidebooks

[1399] National Center for Education Evaluation and Regional Assistance (NCEERA). (2003). *Identifying and implementing educational practices supported by rigorous evidence: A user friendly guide.* U.S. Department of Education, Institute of Education Sciences, NCEERA. https://ies.ed.gov/ncee/pubs/evidence_based/evidence_based.asp

[1400] Planning Realistic Implementation and Maintenance by Educators (PRIME). (n.d.). *How to select an evidence-based intervention: A guide.* PRIME. PRIME_quickguide_edvidence-based_intervention.pdf (uconn.edu)

[1401] Kekahio, W., Lawton, B., Cicchinelli, L., & Brandon, P. R. (2014). *Logic models: A tool for effective program planning, collaboration, and monitoring.* U.S. Department of Education, Institute of Education Sciences, NCEERA. https://www2.ed.gov/about/offices/list/oese/oss/technicalassistance/easnlogicmodelstoolmonitoring.pdf

[1402] Andrews, D.A., & Buettner, C. K. (2002). *Evidence and feasibility in program selection.* Unpublished Manuscript. Ohio State University. https://implementationscience.uconn.edu/wp-content/uploads/sites/1115/2014/12/PRIME_quickguide_edvidence-based_intervention.pdf

[1403] National Implementation Research Network. (2019). *Drivers Best Practices Assessment (DBPA)*. National Implementation Research Network. https://nirn.fpg.unc.edu/resources/drivers-best-practices-assessment-dbpa

[1404] See Sun Joo et al. (2019).

[1405] Diamond, K. E., Justice, L. M., Siegler, R. S., & Snyder, P. A. (2013). *Synthesis of IES research on early intervention and early childhood education.* U.S. Department of Education, National Center for Special Education Research. https://eric.ed.gov/?id=ED544212

[1406] Pianta, R., Mashburn, A. J., Downer, J. T., Hamre, B. K., & Justice, L. (2015). Effects of web-mediated professional development resources on teacher-child interactions in pre-kindergarten classrooms. *Early Childhood Research Quarterly*, 23(4), 431–451. https://doi.org/10.1016/j.ecresq.2008.02.001

[1407] What Works Clearinghouse (WWC). (2018). *MyTeachingPartner™ Pre-K.* U.S. Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/InterventionReport/690

[1408] National Institute for Early Education Research. (2019). *NIEER's benchmarks for high-quality pre-K.* Rutgers Graduate School of Education. https://nieer.org/2019/12/14/download-nieers-benchmarks-for-high-quality-pre-k

[1409] See Sun Joo et al. (2019).

[1410] See Sun Joo et al. (2019).

[1411] See Sun Joo et al. (2019).

[1412] What Works Clearinghouse (WWC). (2010). *Literacy Express*. Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/EvidenceSnapshot/2887

[1413] What Works Clearinghouse (WWC). (2013a). *Doors to Discovery*. Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/EvidenceSnapshot/153

[1414] See National Institute for Early Education Research (2019).

[1415] What Works Clearinghouse (WWC). (2013b). *Social skills training.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/InterventionReport/578

[1416] Cartledge, G., & Kleefeld, J. (2009). *Taking part: Introducing social skills to children*. Research Press. https://www.researchpress.com/product/taking-part/

[1417] Guglielmo, H. M., & Tryon, G. S. (2001). Social skill training in an integrated preschool program. *School Psychology Quarterly, 16*(2), 158–175 https://doi.org/10.1521/scpq.16.2.158.18701

[1418] See Sun Joo et al. (2019).

[1419] See Sun Joo et al. (2019).

[1420] Bierman, K. L., Welsh, J. A., Heinrichs, B. S., Nix, R. L., & Mathis, E. T. (2015). Helping Head Start parents promote their children's kindergarten adjustment: The Research-based Developmentally Informed Parent program. *Child Development, 86*(6), 1877–1891. https://doi.org/10.1111/cdev.12448

[1421] What Works Clearinghouse (WWC). (2009a). *Assisting students struggling with reading: Response to Intervention (RTI) and multi-tier intervention in the primary grades*. Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/PracticeGuide/3

[1422] What Works Clearinghouse (WWC). (2009b). *Assisting students struggling with mathematics: Response to Intervention (RTI) for elementary and middle schools.* Institute of Education Sciences, U.S. Department of Education.

https://ies.ed.gov/ncee/wwc/practiceguide/2

[1423] What Works Clearinghouse (WWC). (2008). *Improving adolescent literacy: Effective classroom and intervention practices.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/PracticeGuide/8

[1424] What Works Clearinghouse (WWC). (2017b). *Leveled literacy intervention.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/EvidenceSnapshot/679

[1425] What Works Clearinghouse (WWC) (2016a). *Read 180.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/Intervention/742

[1426] National Student Support Accelerator. (2022). Brown University. https://studentsupportaccelerator.com/

[1427] Nickow, A., Oreopoulos, P., & Quan, V. (2020). *The impressive effects of tutoring on preK–12 learning: A systematic review and meta-analysis of the experimental evidence.* National Bureau of Economic Research. https://doi.org/10.3386/w27476

[1428] Heinrich, C. J., Burch, P., Good, A., Acosta, R., Cheng, H., Dillender, M., Kirshbaum, C., Nisar, H., & Stewart, M. (2014). Improving the implementation and effectiveness of out-of-school-time tutoring. *Journal of policy analysis and management, 33*(2), 471–494. https://doi.org/10.1002/pam.21745

[1429] What Works Clearinghouse (WWC). (2009c). *Structuring out-of-school time to improve academic achievement.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/PracticeGuide/10

[1430] Silicon Valley Education Foundation. (2021). *Elevate [Math].* https://www.svefoundation.org/elevate-math

[1431] Snipes, J., Huang, C.-W., Jaquet, K., & Finkelstein, N. (2015). *The effects of the Elevate Math summer program on math achievement and algebra readiness (REL 2015-096).* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/Study/88782

[1432] Education First. (2019). *Curriculum evidence synthesis.* Bill & Melinda Gates Foundation. https://docs.google.com/document/d/1ga7fAdO6b_yzpVm8En6XY0PCogX7NQ5v1lTgQ5n91p4/edit

[1433] What Works Clearinghouse. (WWC). (2012). *Great Explorations in Math and Science® (GEMS®) Space Science Sequence.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/Intervention/784

[1434]What Works Clearinghouse (WWC). (2016b). *University of Chicago School Mathematics Project (UCSMP) multiple courses.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/Intervention/806

[1435] Education First. (2019). *Curriculum evidence synthesis.* Bill & Melinda Gates Foundation. https://docs.google.com/document/d/1ga7fAdO6b_yzpVm8En6XY0PCogX7NQ5v1lTgQ5n91p4/edit

[1436] See WWC (2017a).

[1437] Yeager, D. S., Hanselman, P., Walton, G. M., Murray, J. S., Crosnoe, R., Muller, C., Tipton, E. Schneider, B., Hulleman, C. S., Hinojosa, C. P., Panuesku, D., Romero, C., Flint, K., Roberts, A., Trott, J., Iachan, R., Buontempo, J., Man Yang, S.,

Carvalho, C. M., & Dweck, C. S. (2019). A national experiment reveals where a growth mindset improves achievement. *Nature, 573*, 364–369. https://airtable.com/shrpWsxf5jzBOyH0J/tbltnWMLyd3cmT6Yx/viwmIHLmCGdr0kVlx/recQQ5yrEIzCV2bp7/fldHQCZtd3F5KY7yV/attdbCLrcZJh18zT3

[1438] What Works Clearinghouse (WWC). (2007). *Encouraging girls in math & science*. U.S. Department of Education, Institute of Education Sciences. https://ies.ed.gov/ncee/wwc/PracticeGuide/5

[1439] See WWC (2017a).

[1440] See WWC (2017a).

[1441] See WWC (2017a).

[1442] An, B. P. (2013). The impact of dual enrollment on college degree attainment: Do low-SES students benefit? *Educational Evaluation and Policy Analysis, 35*(1), 57–75. https://doi.org/10.3102/0162373712461933

[1443] Berger, A., Turk-Bicakci, L., Garet, M., Song, M., Knudson, J., Haxton, C., Zeiser, K., Hoshen, G., Ford, J., Stephan, J., Keating, K., & Cassidy, L. (2013). *Early college, early success: Early college high school initiative impact study.* American Institutes of Research. https://eric.ed.gov/?id=ED577243

[1444] Edmunds, J. A., Unlu, F., Glennie, E., Bernstein, L., Fesler, L., Furey, J., & Arshavsky, N. (2017). Smoothing the transition to postsecondary education: The impact of the early college model. *Journal of Research on Educational Effectiveness, 10*(2), 297–325. https://eric.ed.gov/?id=EJ1135800

[1445] Shields, K. A., Bailey, J., Hanita, M., & Zhang, X. (2021). *The effects of accelerated college credit programs on educational attainment in Rhode Island.* U.S. Department of Education, Institute of Education Sciences, Regional Educational Laboratory Northeast & Islands. https://ies.ed.gov/ncee/rel/Project/5680

[1446] Warne, R. T. (2017). Research on the academic benefits of the advanced placement program: Taking stock and looking forward. *SAGE Open, 7*(1). https://doi.org/10.1177/2158244016682996

[1447] Prince Hagood, L., Webber, K., & Bell, A. (2017). *Investigating the causal effects of advanced placement programs on timely degree completion.* University System of Georgia. http://sft.yuelaihuoyun.com/research/assets/research/documents/publications/Investigating_Causal_Effects_of_AP.pdf

[1448] See Warne (2017).

[1449] Smith, J., Hurwitz, M., & Avery, C. (2017). Giving college credit where it is due: Advanced placement exam scores and college outcomes. *Journal of Labor Economics, 35*(1). https://doi.org/10.1086/687568

[1450] See WWC (2017a).

[1451] Kemple, J. (2008). Career academies: *Long-term impacts on work, education, and transitions to adulthood.* Manpower Demonstration Research Corporation (MDRC). https://www.mdrc.org/publication/career-academies-impacts-work-and-educational-attainment

[1452] Clearinghouse for Labor Evaluation and Research (CLEAR). (2014a). *Evidence on the effectiveness of career academies for high school students*. U.S. Department of Labor, CLEAR. https://clear.dol.gov/synthesis-report/evidence-effectiveness-career-academies-high-school-students

[1453] What Works Clearinghouse (WWC). (2009d). *Helping students navigate the path to college: What high schools can do.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/PracticeGuide/11

[1454] Hallberg, K., Eaglin, C., Hirami, R., & Ruizesparza, A. (2022). *Supporting students in achieving their postsecondary goals: A quasi-experimental program evaluation of OneGoal.* University of Chicago, UrbanLabs. https://urbanlabs.uchicago.edu/attachments/1edf0d3436aca76dfa0fcd23c7dcaad959734d88/store/6bc19f13b9e2314b7d160a50c02d58928df9d1c8f6d97c59eb1043b54791/OneGoal+PSM+Report_vFINAL+--+6.7.22.pdf

[1455] See WWC (2009d).

[1456] Kautz, T., & Zanoni, W. (2014). *Measuring and fostering non-cognitive skills in adolescence: Evidence from Chicago public schools and the OneGoal program.* University of Chicago. https://www.semanticscholar.org/paper/Measuring-and-Fostering-Non-Cognitive-Skills-in-%3A-Kautz-Zanoni/b6e19d3f8f1b20500b612870e8f838192ca62324

[1457] What Works Clearinghouse (WWC). (2017c). *WWC Review of this study: The bottom line on college counseling.* U.S. Department of Education, Institute of Education Sciences. https://ies.ed.gov/ncee/wwc/Study/88785

[1458] Barr, A., & Castleman, B. (2021). *The bottom line on college advising: Large increases in degree attainment.* EdWorking Papers, Brown University. https://www.edworkingpapers.com/ai21-481

[1459] Daugherty, L., Gomez, C. J., Gehlhaus Carew, D., Mendoza-Graf, A., & Miller, T. (2017). *Designing and implementing corequisite models of developmental education*. RAND Corporation. https://www.rand.org/pubs/research_reports/RR2337.html

[1460] Smith Jaggars, S., Hodara, M., Cho, S. W., & Xu, D. (2014). Three accelerated developmental education programs: Features, student outcomes, and implications. *Community College Review, 43*(1). https://ccrc.tc.columbia.edu/publications/three-accelerated-developmental-education-programs.html

[1461] Logue, A. W., Douglas, D., & Watanabe-Rose, M. (2019). Corequisite mathematics remediation: Results over time and in different contexts. *Educational Evaluation and Policy Analysis, 41*(3), 294–315. https://doi.org/10.3102/0162373719848777

[1462] Meiselman, A. Y., & Schudde, L. (2020). *The impact of corequisite math on community college student outcomes: Evidence from Texas.* University of Texas at Austin. http://dx.doi.org/10.26153/tsw/9560

[1463] Miller, T., Daugherty, L., Martorell, P., & Gerber, R. (2020). Assessing the effect of corequisite English instruction using a randomized controlled trial. *Journal of Research on Educational Effectiveness, 15*, 78–102. https://doi.org/10.1080/19345747.2021.1932000

[1464] Accelerated Learning Program (ALP). (2022). https://alp-deved.org/

[1465] See Smith Jaggars et al. (2014).

[1466] Charles A. Dana Center. (2022). *Data Center Mathematics Pathways.* University of Texas at Austin. https://www.utdanacenter.org/our-work/higher-education/dana-center-mathematics-pathways

[1467] What Works Clearinghouse (WWC). (2021b). *Dana Center Mathematics Pathways.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/InterventionReport/718

[1468] See WWC (2021b).

[1469] What Works Clearinghouse (WWC). (2016c). *Strategies for postsecondary students in developmental education—A practice guide for college and university administrators, advisors, and faculty.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/PracticeGuide/23

[1470] See WWC (2021a).

[1471] Manpower Demonstration Research Corporation (MDRC). (2022a). *Evaluation of accelerated study in associate programs 9ASAP) for developmental education students: Project Overview.* https://www.mdrc.org/project/evaluation-accelerated-study-associate-programs-asap-developmental-education-students#overview

[1472] Alamuddin, R., Rossman, D., & Kurzweil, M. (2018). *Monitoring advising analytics to promote success (MAAPS): Evaluating findings from the first year of implementation.* Ithaka S+R. https://doi.org/10.18665/sr.307005

[1473] See WWC (2021a).

[1474] InsideTrack. (2022). https://www.insidetrack.org/

[1475] Bettinger, E. P., & Baker, R. (2014). The effects of student coaching an evaluation of a randomized experiment in student advising. *Educational Evaluation and Policy Analysis, 36*(1), 3–19. https://doi.org/10.3102/0162373713500523

[1476] See WWC (2016c).

[1477] MDRC. (2022b). *Opening doors: Project overview.* https://www.mdrc.org/project/opening-doors#overview

[1478] See MDRC (2022a).

[1479] Patel, R., & Valenzuela, I. (2013). *Moving forward: Early findings from the performance-based scholarship demonstration in Arizona. The performance-based scholarship demonstration.* MDRC. https://eric.ed.gov/?id=ED545467

[1480] What Works Clearinghouse (WWC). (2019). *Using technology to support postsecondary student learning.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/PracticeGuide/25

[1481] Lessons on Courseware Development. (n.d.) *The next generation courseware challenge: Inspiring the future of courseware built for impact and sustainability.* Bill & Melinda Gates Foundation. https://coursewarechallenge.org/

[1482] House, A., Boyce, J., Wang, S., Means, B., Peters Hinton, V., & Wetzel, T. (2018). *Next generation courseware challenge evaluation.* SRI International. https://eric.ed.gov/?id=ED604261

[1483] See WWC (2019).

[1484] What Works Clearinghouse (WWC). (2022a). *Growth mindset.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/InterventionReport/719

[1485] What Works Clearinghouse (WWC). (2022b). *Social belonging.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/InterventionReport/720

[1486] What Works Clearinghouse (WWC). (2021c). *Designing and delivering career pathways at community colleges.* Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/PracticeGuide/27

[1487] Washington Community and Technical Colleges. (2022). *Integrated basic education skills and training (I-BEST).* https://www.sbctc.edu/colleges-staff/programs-services/i-best/

[1488] See WWC (2021c).

[1489] Engstrom, W., Gardiner, K., & Mitukiewicz, O. (2013). *Pathways for advancing courses and education career pathways program profile: Pima community college pathways to healthcare HPOG program. OPRE report # 2013-31.* U.S. Department of Health and Human Services, Administration for Children & Families, Office of Planning, Research and Evaluation. https://www.acf.hhs.gov/opre/report/pace-career-pathways-program-profile-pima-community-college-pathways-healthcare-hpog

[1490] See WWC (2021c).

[1491] Deutsch, J., Allison-Clark, K., & Yanez, A. (2021). *A research evidence scan of key strategies related to WIOA.* Mathematica. https://eric.ed.gov/?id=ED614830

[1492] Clearinghouse for Labor Evaluation and Research (CLEAR). (2017). *Apprenticeship and work-based training.* U.S. Department of Labor, CLEAR. https://www.apprenticeship.gov/employers/registered-apprenticeship-program

[1493] Clearinghouse for Labor Evaluation and Research (CLEAR). (n.d.). *Evidence on the effectiveness of the National Guard Youth ChalleNGe Program.* U.S. Department of Labor, CLEAR. https://clear.dol.gov/synthesis-report/evidence-effectiveness-national-guard-youth-challenge-program

[1494] Clearinghouse for Labor Evaluation and Research (CLEAR). (2013b). *National evaluation of Youth Corps: Findings at follow-up (Price et al. 2011).* U.S. Department of Labor, CLEAR. https://clear.dol.gov/study/national-evaluation-youth-corps-findings-follow-price-et-al-2011

[1495] New York City, Department of Youth & Community Development. (n.d.). *Jobs and internships: Intern & Earn Program.* https://www1.nyc.gov/site/dycd/services/jobs-internships/intern-and-earn.page

[1496] Skemer, M., Sherman, A., Williams, S., & Cummings, D. (2017). *Reengaging New York City's disconnected youth through work: Implementation and early impacts of the young adult internship program. OPRE Report 2017-22.* Administration for Children & Families. https://eric.ed.gov/?id=ED574349

[1497] Clearinghouse for Labor Evaluation and Research (CLEAR). (2014b). *Sustained gains: Year Up's continued impacts on young adults' earnings (Roder & Elliot 2014).* U.S. Department of Labor, CLEAR. https://clear.dol.gov/study/sustained-gains-year-%E2%80%99s-continued-impacts-young-adults%E2%80%99-earnings-roder-elliot-2014

[1498] What Works Clearinghouse (WWC). (2021d). *Year Up.* U.S. Department of Education, Institute of Education Sciences. https://ies.ed.gov/ncee/wwc/InterventionReport/722

[1499] Clearinghouse for Labor Evaluation and Research (CLEAR). (2014c). *Enriching summer work: An evaluation of the Summer Career Exploration Program (McClanahan et.al. 2004).* U.S. Department of Labor, CLEAR. https://clear.dol.gov/study/enriching-summer-work-evaluation-summer-career-exploration-program-mcclanahan-etal-2004

[1500] Carter, E. W., Trainor, A. A., Ditchman, N., & Owens, L. (2011). A pilot study connecting youth with emotional or behavioral difficulties to summer work experiences. *Career Development for Exceptional Individuals, 34*(2), 95–106. https://eric.ed.gov/?id=EJ930942

[1501] Heller, S. (2014). Summer jobs reduce violence among disadvantaged youth. *Science, 346*(6214), 1219–1223. https://doi.org/10.1126/science.1257809

[1502] State of California Employment Development Department (EDD). (2018). *WIOA youth program requirements*. EDD. https://www.edd.ca.gov/jobs_and_training/pubs/wsd17-07.pdf

[1503] See Deutsch et al. (2021).

[1504] Clearinghouse for Labor Evaluation and Research (CLEAR). (2020a). *Encouraging evidence on a sector-focused advancement strategy (Hendra et al. 2016).* U.S. Department of Labor, CLEAR. https://clear.dol.gov/Study/Encouraging-evidence-sector-focused-advancement-strategy-Hendra-et-al-2016-2

[1505] Schaberg, K., & Greenberg, D.H. (2020). *Long-term effects of a sectoral advancement strategy: Costs, benefits, and impacts from the WorkAdvance Demonstration.* MRDC. https://www.mdrc.org/publication/long-term-effects-sectoral-advancement-strategy#:~:text=The%20long%2Dterm%20economic%20impacts%20show%20that%20sector%20programs%20can,increases%20in%20employment%20and%20earnings.

[1506] Clearinghouse for Labor Evaluation and Research (CLEAR) (2020c). *Tuning in to local labor markets: Findings from the Sectoral Employment impact study (Maguire et al. 2010).* U.S. Department of Labor, CLEAR. https://clear.dol.gov/Study/Tuning-local-labor-markets-Findings-Sectoral-Employment-impact-study-Maguire-et-al-2010-3

[1507] Schaberg, K., & Greenberg, D.H. (2020, March). *Long-term effects of a sectoral advancement strategy: Costs, benefits, and impacts from the WorkAdvance Demonstration.* MRDC. https://www.mdrc.org/publication/long-term-effects-sectoral-advancement-strategy#:~:text=The%20long%2Dterm%20economic%20impacts%20show%20that%20sector%20programs%20can,increases%20in%20employment%20and%20earnings.

[1508] Schaberg, K. (2020). *Sector strategies for success: Meeting the needs of workers and employers*. MDRC. https://eric.ed.gov/?id=ED609362

[1509] Hendra, R., Greenberg, D. H., Hamilton, G., Oppenheim, A., Pennington, A., Schaberg, K., & Tessler, B. L. (2016). *Encouraging evidence on a sector-focused advancement strategy.* MDRC. https://www.mdrc.org/publication/encouraging-evidence-sector-focused-advancement-strategy

V. Data equity principles

A. Overview

Working with data involves making decisions with equity implications. More than ever, government agencies, community organizations, and foundations use data to inform decisions about how best to promote more equitable education, workforce, and other policy outcomes for priority communities. However, organizations must be intentional in their use of data. How we collect, access, analyze, and report data can have serious and potentially detrimental impacts on individuals and communities, especially those already most marginalized, such as Black and Indigenous people, if we do not apply proper care and consideration. To counter these risks, data equity principles seek to ensure data are meaningful, accessible, and actionable for communities too often left out of data-driven decision-making processes. This resource provides a synthesis of seven leading data equity principles that data users should apply throughout the data life cycle. It serves as a starting point, offering practical recommendations and additional resources for data users to approach education-to-workforce (E-W) data through an equitable lens and use data safely and securely.

Key terms

- **Asset framing:** Using language that focuses on the strengths, rather than deficits, of individuals or communities. Asset framing is the opposite of deficit framing.
- **Community:** A place, institution, or group that includes individuals with similar characteristics, interests, or experiences (such as a neighborhood, school, or church).
- **Data:** Distinct pieces of information, usually collected, stored, and processed in a way that is concordant with a specific purpose. They can be either quantitative or qualitative.
- **Data users:** Individuals within organizations who collect and analyze data to inform decisions. These can include policymakers, administrators, educators, community leaders, and researchers, among others.
- **Disparities:** Documented differences in outcomes between groups.
- **Equity:** Just and fair inclusion into a society in which all can participate, prosper, and reach their full potential. Equity is achieved when structural barriers based on race, ethnicity, gender, sexual orientation, zip code, class, disability, and other factors are dismantled such that an individual's background and identities no longer predict their outcomes in life.
- **Inequities:** The conditions that arise when policies, practices, attitudes, or cultural messages make it harder for some individuals—and easier for others—to fully participate, contribute, and take advantage of opportunities and resources based on their identities and background traits. Inequities are apparent when identities or background traits such as race, ethnicity, gender, sexual orientation, zip code, class, or disability statistically predict outcomes.
- **Priority communities:** In the context of the E-W Indicator Framework, priority communities are identified as Black, Indigenous, and other communities of color and/or communities experiencing poverty. Priority communities may differ depending on the context and locale in which the framework is used.
- **Proximate leaders:** Community advocates that share similar values and experiences of others within their community and are respected by community members as leaders and representatives.

B. What is data equity, and why does it matter?

Data can be a powerful tool when used purposefully and equitably. Data can empower practitioners, policymakers, and community members to make better, more informed decisions that are grounded in evidence, but they can also reinforce deficit narratives, biases, and other long-standing structural inequities when used inappropriately. To effectively assess and address disparities along the pre-K-to-workforce continuum, we must not only have access to more and better data, but also be deliberate in how we use those data. Whether intentionally or unintentionally, data can be misused and misinterpreted, sometimes causing harm to communities already most marginalized. Thus, we must be aware of these risks and apply an equity lens to every phase of the data life cycle.

Historically, E-W data have been used in both harmful and helpful ways, both to reinforce inequities or advance equity. Disaggregated education data have shined a light on the needs of particular groups of students, informing the passage of landmark policies such as the Elementary and Secondary Education Act, which established the Title I program to provide funding to schools with a high percentage of students from low-income households.[15][10] At the same time, data on disparate academic outcomes, often referred to as "achievement gaps," have been used to argue the inferiority of specific racial groups, primarily Black and Indigenous people, and reinforce deficit-oriented beliefs that blame individuals rather than the systems that generate advantages for some groups and not others.

Today, algorithms built on E-W data are used in an array of applications that can positively or negatively affect individuals depending on their use. For instance, schools that have implemented Early Warning Intervention and Monitoring Systems to identify students at risk of not graduating for additional support have reduced chronic absence and course failure rates more so than schools without such data systems.[15][11] But unintended consequences can also occur: after in-person exams were canceled due to the COVID-19 pandemic, the International Baccalaureate program's decision to use a data algorithm to predict students' grades resulted in systematically lower scores for high-achieving students from low-income households who had expected to earn college credit and save money on tuition.[15][12]

These examples illustrate that data are not inherently neutral; like any tool, they require thoughtful use to achieve the intended goals. Using data in service of equity goals means that at every stage of the data life cycle, users must think critically about both the possible risks and possible benefits data might bring to the communities that provide data yet too often are left out the decision-making processes their data is ultimately used to inform. Data equity principles offer necessary guidelines for data users to ensure data are meaningful, accessible, and actionable for priority communities—thereby minimizing the risk of harm while maximizing the potential to promote greater equity through data.

C. Who is this resource for (and how should it be used)?

A growing number of resources offer guidance on how to work toward the goal of data equity, though it can be difficult to know where to begin. Many resources focus on a particular audience (such as researchers), phase of the data life cycle (such as visualization), or data application (such as results-based accountability). However, they share a set of underlying principles. This resource synthesizes seven leading data equity principles to apply throughout the data life cycle that are relevant to different types of data users and data projects.

Key audiences for this resource are education and workforce policymakers, administrators, educators, community leaders, and researchers who use data to diagnose disparities, implement evidence-based decisions, and evaluate the impact of policies, programs, and investments to address those disparities. It is a companion to the E-W Framework, commissioned by the Bill & Melinda Gates Foundation to encourage greater cross-sector collaboration and alignment across local, state, and national data systems by promoting the use of a common set of metrics and principles to assess and address inequities along the pre-K-to-workforce continuum. Through improved data systems *and* practices, organizations will be better poised to support the individuals least well served by education and workforce systems to achieve economic mobility and security.

This resource is intended to serve as a starting point. Applying data equity principles in practice can be complex, and best practices can take many forms depending on the specific context; this synthesis is only one resource data users should consult. After a summary of the seven core data equity principles, we provide overviews that further explain each principle and offer examples of how to apply it along the data life cycle, reflection questions and potential pitfalls for data users to consider, and additional resources to consult for more in-depth guidance. We encourage readers to refer to these original sources to dive deeper into the principles and associated best practices.

D. How was this resource developed?

This resource draws on data equity considerations gleaned from multiple sources, including leading publications by data equity experts and input from partners involved in E-W data systems. We began by conducting a literature review to gather information on how data equity principles are currently defined and applied in practice. Next, we presented an initial synthesis of this literature to a diverse range of partners, including education and workforce policymakers and data strategists, researchers, equity advocates, and parents and educators who make—and feel the effects of—data-driven decisions. This two-pronged approach incorporates scholarly, practitioner, and lived-experience perspectives into the data equity principles described in this resource.

Literature review

Using a targeted, iterative search strategy, we identified 32 publications that discuss guiding principles and best practices for centering equity in research or different phases of the data life cycle (see Appendix D for a complete list of sources). We summarized the common themes in these sources, which we then coded and synthesized down to seven core data equity principles that undergird the recommendations in the different source publications. Through the literature review, we also identified six key phases of the data life cycle during which data users should apply these core principles (Exhibit V.1).

Exhibit V.1. The data life cycle

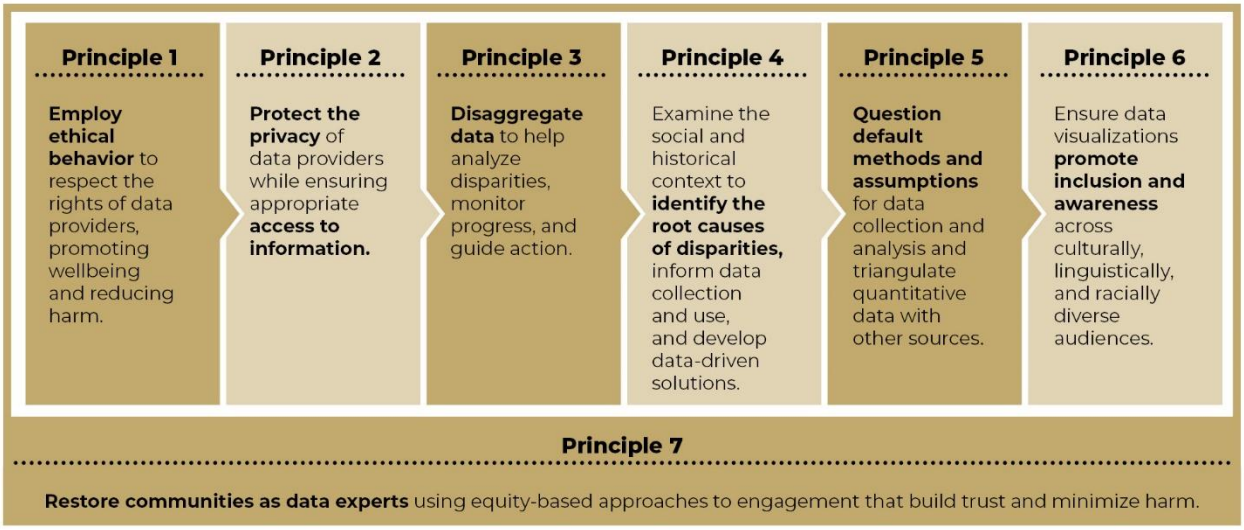
Contributory input

Following this initial analysis, we solicited feedback from a range of people connected to E-W research, advocacy, policy, and practice. This included the External Advisory Board of 18 E-W data experts and leaders and the internal working group of 10 Bill & Melinda Gates Foundation program officers, as well as members of five collective impact initiatives that lead advocacy efforts in their communities. (See the Introduction chapter for a complete list of individuals and organizations consulted.) During independent sessions with these groups, we solicited targeted feedback on the components of the E-W Framework, including this companion resource. Partners surfaced important gaps in current data systems and practices that too often omit contextual, system, and institutional factors that perpetuate inequities and leave out the communities most affected by the decision-making process. Their input informed the seven core data equity principles highlighted in this synthesis, as well as the guidance to implement them.

E. Seven core data equity principles

Below, we summarize the seven core principles for equitable data use (Exhibit V.2). The order in which they are listed is not indicative of their relative importance or priority—each principle must be put into action to achieve data equity. In particular, engaging community members as data experts (Principle 7) is critical to successfully implementing all of the other principles and meeting equity goals. Following this brief overview are three-page guides of each principle that include additional details, examples, and recommendations to guide their practical application throughout the data life cycle.

Exhibit V.2. Data equity principles



PRINCIPLE 1: Employ ethical behavior to respect the rights of individuals who provide data, promote greater equity and well-being, and minimize the risk of harm.

Data users must evaluate data practices to determine whether they have the potential to contribute to greater equity, as opposed to reinforcing the status quo or even causing harm to communities already most marginalized. They must question whether they are addressing the underlying structural factors that perpetuate inequities, respecting the dignity and autonomy of all individuals, and maximize benefits while avoiding harm. At the outset of any data project, decision makers should identify and communicate the funding source and funders' priorities, the types of decisions the data project will inform, the data project's stated public benefit and equity goals, whether the data project meets the needs and addresses the concerns of the intended beneficiaries, and whether the data project could lead to unintended consequences or have racial equity implications. Decisions relying on data algorithms should be closely reviewed to ensure they do not have discriminatory or other unjust impacts. Involving community members in data governance, institutional review, and advisory structures can help achieve these goals.

PRINCIPLE 2: Protect the privacy of individuals who provide data while ensuring appropriate ownership and access to information.

Data users must seek the consent of individuals and recognize them as the owners of their data. Acknowledging that data represent the lived experiences of individuals, protecting data from improper use and exposure, and returning the data to community partners are all critical to promoting equity and earning public trust. Data users must follow data privacy laws and respect data sovereignty, for example, of Native American Tribes. Data users should consult the individuals providing data to determine who can securely obtain, view, or use data and for what purposes, weighing the risks and benefits of both restricting and opening access to data. Individuals should be allowed to access their personal data, correct data about themselves, and opt out from certain uses of their data. Decisions around data access can be made by a governance body that represents individuals who provide their data, including proximate leaders who authentically represent affected communities.

PRINCIPLE 3: Disaggregate data on both outcomes and system conditions to analyze disparities, monitor progress, and guide action.

Data users must acknowledge the diversity of experiences among priority communities to uncover disparities that can be hidden in aggregate data. Data analysis may require multiple levels of disaggregation to capture the intersectional nature of individuals' lived experiences. Thus, data users must collect data on multiple relevant background characteristics, guided by a contextual and theoretical understanding of root causes to avoid perpetuating existing stereotypes and deficit narratives. The E-W Framework offers guidance on key disaggregates to consider. In addition to disaggregating outcome data, data users should break out data on E-W and adjacent system conditions (such as funding) to reveal other underlying disparities.

PRINCIPLE 4: Examine social and historical contexts to identify root causes of disparities, inform data collection and use, and develop data-driven solutions.

To address disparities along the pre-K-to-workforce continuum, data users must understand the local social and historical context behind these disparities. Data users must examine data on structural conditions; learn about relevant past policies, programs, and institutions and how they may have

promoted or perpetuated racial inequity; and understand what members of priority communities see as the barriers to achieving equitable outcomes. Direct engagement with people with lived experience is key to conducting reflective root cause analyses focused on identifying systems drivers of disparities—not symptoms—and solutions to dissolve them.

PRINCIPLE 5: Question default methods and assumptions for data collection and analysis and triangulate quantitative data with other sources.

Data users must critically examine their methods and assumptions for collecting and analyzing data to ensure they do not inadvertently reinforce historical biases, deficit narratives, and power imbalances. Quantitative methods are sometimes viewed as being inherently objective, but data users must be attentive to these risks and question their own motives and biases, where the data came from and what they might leave out, and who they see as the experts on the data. When seeking to answer questions, data users should consider triangulating quantitative methods with other approaches to inquiry, such as collecting qualitative data from interviews or focus groups to capture additional insights or designing community participatory action projects that privilege community voice and participation. Gathering multiple sources and types of information can help counter the bias in any one data source.

PRINCIPLE 6: Ensure data visualizations promote inclusion and awareness across culturally, linguistically, and racially diverse audiences.

Data users must approach visualization with thoughtful consideration to the lived experiences the data communicate and to every detail used to present that information—including labels, colors, ordering, graphics, and icons—to ensure it is accessible to multiple audiences and does not reinforce stereotypes and deficit narratives. Information on the source of the data, when and why they were collected, and who they represent should accompany visualizations. This and other contextual information (for instance, centering the structural causes behind disparate outcomes being shown, either though narrative text or additional data on system conditions) can be key to ensuring that readers do not misinterpret or misuse data visualizations.

PRINCIPLE 7: Restore communities as data experts using culturally responsive approaches to engagement and co-creation that support equitable data use.

Community partners are a vital resource for data users. As illustrated in all of the principles, engaging community members with lived experience is key to centering equity throughout the data life cycle. Data users should follow best practices for effective community engagement, which include defining clear expectations and roles at the outset of a data project; recognizing and examining the power imbalances between decision makers and community members; building in enough time for community members to engage meaningfully in the project; allocating resources to equitably compensate community members; and avoiding the risk of exploiting, tokenizing, or retraumatizing them. As much as possible, data projects should build community capacity to use data to advocate for change, for example, by co-designing projects that reflect the community's values, histories, culture, perspectives, and voice.

PRINCIPLE 1: Employ ethical behavior to respect the rights of individuals who provide data, promote greater equity and well-being, and minimize the risk of harm.

Ethical behavior requires data users to evaluate data practices to determine whether they have the potential to contribute to greater equity, as opposed to reinforcing the status quo or even causing harm to communities already most marginalized, such as Black and Indigenous people. It requires data users to consistently challenge ideas, practices, or policies that fuel systemic racism. To combat systemic racism means to challenge the notion that differences between racial groups are simply inherent, rather than understanding that racial disparities are a product of longstanding oppressive systems and policies. Data users must question whether they are addressing the underlying structural factors that perpetuate inequity, respecting the dignity and autonomy of all individuals, and maximizing benefits while minimizing the risk of harm.

Although Institutional Review Boards (IRBs) determine whether ethics are upheld in research,[xxxi] in practice IRBs are not well equipped to perform deep reviews that center the concerns of marginalized groups to advance racial equity. For example, IRBs have allowed people of color to be systematically underrepresented in clinical trials, even when they are most affected by the health conditions being studied.[1513] In addition, many data projects occur in settings with little or no ethical oversight. Data users must carefully assess data projects' potential risks and benefits to the well-being of individuals and society at large to avoid being extractive and exploitative. Data users must weigh the risks and benefits holistically, with an eye toward the groups that might be differentially affected to ensure both risks and benefits are distributed fairly, and racial equity is being promoted.

Data users should be attentive to uses of data that carry a high risk of causing harm, such as algorithms, or data-based decision tools, that may lead to discriminatory practices. Algorithms reflect the biases of the people who develop them and of the underlying data. If considering using an algorithm to inform decision making, data users must ensure transparency, assess algorithmic bias, and determine the potential positive and negative consequences of applying the algorithm in practice. Decisions based on a data algorithm should always be reviewed by humans, and affected individuals should have the ability to contest the decision. Data users should also be attentive to minimizing the amount of data collected on sensitive topics (for example, mental health) and rigorously protecting personally identifiable information.

At the outset of any data project, decision makers should identify and communicate who is funding the project and what their priorities are, the types of decisions the data will inform, the data project's stated public benefit and equity goals, whether the data project meets the needs and addresses the concerns of the intended beneficiaries, and whether the data project could lead to unintended consequences or have racial equity implications (good or bad). They must engage the groups of people whom the data project might affect to make these determinations, be responsive to their feedback, and ensure transparency.

Community engagement is especially critical if the project could have serious or disproportionate impact on marginalized groups or those facing multiple barriers. Involving multiple partners, including proximate leaders from affected communities, in data governance, institutional review, and advisory structures, can help data users ensure the project is successful in promoting equity and well-being.

[xxxi] Ethical principles of research are described in the Belmont Report, which guides human subjects' protections in research (but does not have a racial equity lens).

Ideally, community members can co-create project goals and plans with proximate leaders to ensure the data are meaningful and actionable to them and counter existing power structures. These bodies should be convened early and offer continued input and oversight throughout the data life cycle.

The importance of transparency in ethical data use

Mount Saint Mary's University, a small, private college in Maryland, made the news in 2016 after a plan to use student data to boost retention rates became public. New students would have to take a survey that the school would use to predict their likelihood of dropping out; students with a high probability would then be encouraged to unenroll before they were counted in the retention data that colleges report to the federal government. Mount Saint Mary's did not disclose to students that their survey responses could be used to encourage them to leave (Ekowo & Palmer, 2016)—a major ethical breach. In contrast, other colleges, such as Georgia State University and Temple University, have successfully used predictive analytics to improve graduation rates by involving students and staff in the process. Transparency is at the heart of using data ethically and equitably, allowing for greater oversight and accountability.

Applying this principle throughout the data life cycle

Key phases for this principle	Example applications
Context-setting	Hold listening sessions with community members to learn what types of data projects the community thinks are relevant to improve their lives. Consider the impacts of structural racism on the priority community, and listen to the stories of community members to identify ways the work could be beneficial to them. Examine the results of past data projects, including past approaches to centering equity, to identify strengths and areas for improvement.
Planning	Establish a governance or review body with representation from multiple contributing groups, including proximate leaders from affected communities. Convene this body to agree on the goals of the project, identify risks and benefits, develop mitigation strategies, and inform decisions at each phase of the data cycle. Consider formalizing a commitment to ethical data use by drafting a social impact statement[1514] that outlines how to put principles into practice.
Collection	Minimize the collection of sensitive and personally identifiable information unless it is critical to achieving the project's intended benefits. Eliminate the collection of any nonessential data to minimize burden on individuals. Individuals, especially those in marginalized communities, may perceive the collection of unnecessary personal information as over-surveillance and question whether the data collection has hidden purposes.
Access	As appropriate, securely share data with partners to reduce the burden of duplicate data collection (see Principle 2 for additional considerations on data privacy and access). Communicate policies on data storage, access, and use in lay terms.
Analysis	Clearly describe the methods and algorithms used to analyze the data, their potential for inaccuracy and bias, and how they will be used to inform decision making. Seek out and incorporate communities' interpretation of the data.

Key phases for this principle	Example applications
Reporting	Return data and research results to community members in a form they can use. Create channels to report grievances. Publicly disseminate the results of the analysis and invite others to build on the research in an ethical manner that will produce continuous benefits to the community. Accurately identify the strengths and weaknesses of the data.

Reflection questions

- Who would benefit from or be burdened by the data project? Are both benefits and burdens shared equitably?
- What are the potential risks of the project versus the risks of not proceeding with it?
- Could you modify the project to enhance positive impacts or reduce negative impacts?
- Are governance and oversight mechanisms in place? Do they include community representation?
- How will you know whether the intended benefits to the community were achieved?

Be on the lookout 

"Early warning" and other predictive indicators can be powerful tools to help E-W systems support students earlier and more effectively. However, they should not be used for increased monitoring or punitive action. Data users must be aware that biases in the inputs used to form predictions can perpetuate stereotypes and even lead to discriminatory treatment. For example, although past suspensions are predictive of high school graduation, they also reflect racial bias in school-based disciplinary actions.[1515,1516] Thus, algorithms should never override the judgment of individuals. Balancing information from the algorithm with the judgment of practitioners, students and parents, and other qualitative or contextual data can help ensure equitable outcomes are achieved.

Additional resources

- Principles for Advancing Equitable Data Practice. This brief by the Urban Institute describes the Belmont Report's ethical principles and offers examples of practices and resources to integrate the principles throughout the data life cycle with an equity lens.
- The Data Equity Framework. This framework from We All Count identifies key equity-impacting decision points in data projects and offers practical tools for developing and implementing ethical data projects that center equity.
- A Toolkit for Centering Racial Equity Throughout Data Integration. This toolkit by Actionable Intelligence for Social Policy includes chapters on "Racial Equity in Planning" and "Racial Equity in Algorithms/Statistical Tools" which describe positive and problematic practices with ethical implications, as well as citing brief case studies.
- Forum Guide to Data Ethics. This report by the National Forum on Education Statistics offers nine "canons" of data ethics in education, along with real-life examples and resources to implement these canons.

- Racial Equity Considerations and the Institutional Review Board. This Child Trends blog post describes why racial equity matters in IRB submissions and offers suggestions for applying an anti-racist lens when submitting to an IRB.

PRINCIPLE 2: Protect the privacy of individuals who provide data while ensuring appropriate ownership and access to information.

Data privacy policies protect the right of individuals to maintain control over their data. They include a combination of federal, state, and local laws—including the Family Educational Rights and Privacy Act (FERPA)[1517]—and institutional policies. Most policies focus on protecting personal information—or information that is important to an individual (even if it does not personally identify them)—and regulating data access and use, thereby limiting emotional, financial, and even physical harm that can result from data privacy breaches. Although privacy considerations are critical, it is also important to understand and honor data ownership. Data users must acknowledge that data providers are data owners that consent to the use of their data.

Data privacy policies have evolved in recent years to better reflect that data systems do not "own" data more than the people whose lives are represented in them. In 2018, the European Union passed the General Data Protection Regulation,[1518] which gives European residents the right to know, access, update, erase, and restrict the types of data collected on them. Since 2020, the California Consumer Privacy Act (CCPA)[1519] requires businesses (including for-profit education service providers and for-profit universities) to obtain parent or guardian consent before collecting data from California's children and to delete data upon request, among other things (CCPA has inspired similar laws in other states). A common feature of these laws is that they grant individuals the ability to update, delete, or opt out of all or specific applications of their data at any point during or after collection. Even if not mandated by law, E-W data systems should have a clear process for accepting these requests and clear guidelines around honoring them.

Data users should consult community members to determine data access guidelines and practices, weighing the risks and benefits of both restricting and opening access to data. Data access refers to who can securely obtain, view, or use data, and for what purposes. There are legal, practical, and equity considerations for determining data access, which can range across contexts. For example, sharing administrative data with E-W system partners or researchers can increase the risk of a data breach, yet *not* sharing data can make it more difficult to understand and address a problem of practice, at least without duplicating data collection efforts that burden communities. At a minimum, communities should have access to their own data (abiding with any privacy or confidentiality rules). But access is different from ownership. To shift power dynamics and honor communities' own goals and visions, communities should have the right to govern the collection, ownership, and use of their data. This is a key principle of Indigenous data sovereignty, for example.[xxxii]

E-W data systems should establish a participatory governance structure that includes representation from the affected communities to determine which data are open, restricted, or unavailable and—as with requests from individuals about their own data—develop a clear process for accepting and approving requests from potential data users. After a project ends, data users should consider secure methods by which they can return data (for example, in aggregate form) to the communities, the data owners, to allow continued or future use of their data for other purposes.

[xxxii] See this 2018 resolution from the National Congress of American Indians: "Support for U.S. Indigenous Data Sovereignty and Inclusion of Tribes in the Development of Tribal Data Governance Principles."

The real risks of data breaches

The Government Accountability Office (GAO) discovered 99 data breaches in 281 school districts from July 2016 to May 2020. The breaches affected thousands of students and parents, exposing sensitive data such as special education records, test scores, phone numbers, and Social Security numbers. School staff, students, cybercriminals, and vendors were all responsible for various data breaches, which were both intentional and accidental. Citing the risks to students' physical, emotional, and financial well-being, the GAO recommended that schools review and follow data privacy laws, provide data security trainings, require vendors to configure data systems adhering to the Federal Trade Commission's "Start with Security Guide," or take an annual Nationwide Cybersecurity Review self-assessment.

Applying this principle throughout the data life cycle

Key phases for this principle	Example applications
Context-setting	Review federal, state, local, or Tribal data privacy laws and policies that apply. Determine whether you need memoranda of understanding, data-sharing agreements, or consent to collect or share data.
Planning	Develop a list of data elements to collect and any linked data sets, as well as how you will store data, who will have access to data, how you will use data and for how long, and what you will do with the data after analysis is complete. Establish a governance body with representation from multiple contributing groups, including proximate leaders from affected communities. Convene this body to develop clear processes and guidelines for accepting and approving requests from individuals who provided their data and potential data users.
Collection	Communicate data privacy and security processes when collecting data. Seek informed consent even if not required. Only collect data that are necessary and have been approved.
Access	Store data in a secure location that is only accessible to authorized users. Ensure storage systems have the proper protections (such as locks, encryption, and passwords). If you share data, ensure they are transmitted through secure methods. Train those with access to data on relevant laws and best practices. Practice data minimization; only give users access to the minimally necessary data elements and data sets. Ensure individuals who provide data can access, update, and delete their data upon request. Upon project completion, discard or return data as directed or previously established by individuals who provided the data.
Reporting	Maintain confidentiality of participants in reporting. Do not name individuals without permission, share a combination of data points that could lead to an individual being identified, or report data on very small sample sizes that could risk identification. Delete data when no longer in use for the intended purposes.

Reflection questions

- Beyond federal data privacy laws such as FERPA, which state, local, or Tribal data privacy laws or policies apply to you?
- What procedures have you established to enable individuals to access, update, or delete their data, if requested?
- If many people opt out of data collection, why have they done so? How can you use their feedback to inform and redesign data collection efforts to minimize conflict and harm?
- What will you do with the data after analysis and reporting? Can you share the data back with communities? How can the individuals who provided their data inform your decision?

Be on the lookout 

Data sharing between organizations can give users access to additional data elements needed to assess and address disparities and reduce the data collection burden on individuals; however, it comes with its own risks. Any time data are shared, users must follow data governance policies by establishing a memorandum of understanding or data-sharing agreement and reviewing any consent documentation to ensure data sharing is permissible. Both parties must transmit the data securely and clearly track the data lineage—where the data came from and where they're going. Never share data with third parties (whether businesses, researchers, law enforcement, or other government agencies) or use for other purposes without permission.

Additional resources

- Roadmap to Safeguarding Student Data. This Data Quality Campaign implementation road map for state education agencies overviews relevant data privacy laws and best practices for transparency, governance, and data protection procedures.
- A Path to Social Licence: Guidelines for Trusted Data Use. Data Futures Partnership offers eight guidelines for data use related to data value, protection, and choice. Although some of the guidelines are specific to New Zealand and its Tribal communities, many are universally applicable.
- A Toolkit for Centering Racial Equity Through Data Integration. The chapters on "Racial Equity in Data Collection" and "Racial Equity in Data Access" by Actionable Intelligence for Social Policy address positive and problematic policies related to data privacy, as well as cite brief case studies.
- Indigenous Data Governance: Strategies from United States Native Nations. This journal article by Russo Carroll et al. explains the concepts of Indigenous data sovereignty and governance, and describes the value and challenges of shifting authority over Indigenous data to Indigenous peoples. The article includes Tribal case studies and discusses relevant federal laws and Tribal organizations.
- Envisioning a New Future: Building Trust for Data Use. This resource, developed by the Urban Institute for the Data Funders Collaborative, describes approaches to building trust for collection and use of data, such as ways to expand and control data access and improve systems for consent and transparency. It includes a list of additional resources for data use and integration.

PRINCIPLE 3: Disaggregate data on both outcomes and system conditions to analyze disparities, monitor progress, and guide action.

Data users must acknowledge the diversity of experiences among priority communities to uncover disparities that can be hidden in aggregate data. Data analysis often starts by measuring outcomes for broad populations of individuals, but results can vary—sometimes significantly—across certain populations or groups with unique experiences and histories. Taking a passive stance in data analysis can lead data users to draw different conclusions. Without disaggregation, they may miss the opportunity to identify, address, and monitor disparities. The E-W Framework offers guidance on 25 key disaggregates data systems should collect, including race and ethnicity, gender, income level, disability status, English proficiency, and lesbian, gay, bisexual, transgender and queer or questioning (LGBTQ) status.

Though data systems must collect or link data on multiple relevant background characteristics, *which* factors are analyzed through disaggregation and *how* they are analyzed depend on the local context. Data analysis may require more than one level of disaggregation to capture the intersectional nature of individuals' lived experiences. For example, a school district might explore whether high school graduation rates differ for students with disabilities by race. In contexts with smaller populations, disaggregating across multiple levels is not always feasible as subgroup sizes grow smaller with each level of disaggregation, making it harder to reliably compare trends over time. However, data users must still consider the experiences of smaller groups, such as American Indians and Alaska Natives, and not simply default to grouping them under an "other" category that does not receive careful attention.

Decisions about how to disaggregate data should also be guided by a theoretical understanding of a problem of practice and potential root causes to avoid perpetuating existing stereotypes and deficit narratives or framing that advertently or inadvertently blame particular groups rather than systems for disparate outcomes. In addition to disaggregating outcome data, data users should break out data on E-W and adjacent system conditions to reveal other underlying disparities. For example, system conditions such as access to school support staff may be relevant to the graduation rates of students with disabilities, and these indicators should also be disaggregated further by race. However, disaggregation alone is not enough to reveal causes or solutions for inequities, as described in Principle 4 on examining social and historical contexts to identify root causes of disparities and data-driven solutions.

When "standard" disaggregation is insufficient

Data users should consider whether standard categories commonly used to disaggregate data, such as broad racial categories, may not be appropriate for all groups and contexts. For example, an analysis of census data on four-year postsecondary degree completion by race would show that more than half of Asian Americans have a bachelor's degree or higher, the highest rate among any racial group. However, this rate masks significant variation within different communities of Asian Americans: for instance, less than 15 percent of Laotian Americans obtain bachelor's degrees. Disaggregating data by both race and detailed ethnicity categories shows that certain groups of Asian Americans, including Laotian, Cambodian, Hmong, and Vietnamese Americans, experience educational attainment on par with other minoritized groups. To put these differences into context, users should also collect and disaggregate data on potential root causes that drive educational attainment for different ethnic groups, such as their reasons for immigration, generational status, neighborhood resources, or access to financial aid.

Applying this principle throughout the data life cycle

Key phases for this principle	Example applications
Planning	Work with community members to determine which characteristics to measure during data collection or to link into the data (if already available), and how to label these characteristics in data collection tools as well as eventual reporting (for example, Hispanic, Latino/a, Latinx).
Analysis	Disaggregate both outcome and systems data at multiple levels to illuminate any disparities. Include qualitative research or input from the community so that readers can contextualize disaggregated data with individuals' lived experiences and the root causes of any observed disparities.
Reporting	When reporting disparities by subgroup, connect these to the system and root causes, not people. Use data visualization to clearly communicate disparities while avoiding perpetuating deficit narratives (see Principle 6).

Reflection questions

- Who is or is not included within the categories representing the population of study?
- How can disaggregated data help us think about intersectional issues (for example, how outcomes might differ for Black boys versus Black girls)?
- Have we analyzed both outcome and structural disparities between subgroups and avoided placing blame or perpetuating stereotypes?
- When is it appropriate to compare data within versus between groups (for example, comparing outcomes for Latino high school graduates and Latino college graduates versus comparing outcomes for Latino and non-Latino college graduates)? Which comparisons would best answer your research questions and inform future action?

Be on the lookout 

Data users should tailor plans for disaggregation to each community and not simply report on mandated categories. For instance, defaulting to disaggregating data by just race and income would not provide much additional insight in a community comprised almost exclusively of Latino families

with low incomes. Depending on the community's local context and the problem of practice being considered, further disaggregation by factors such as English proficiency and newcomer status may reveal hidden disparities that systems should understand and address.

Additional resources

- Disaggregated Data: Not Just a Box Checking Exercise. This three-page brief by the Data Quality Campaign, Learning Heroes, and National Parent Teacher Association details what data disaggregation is, why it matters in K–12 education, which subgroups are required for disaggregation under the Every Student Succeeds Act, and how to communicate the value of disaggregated data to interested groups (including examples from multiple states).
- The Essentials of Disaggregated Data for Advancing Racial Equity. This Race Matters Institute blog post offers guidance on how far to go in data disaggregation, deciding which data to disaggregate, and presenting disaggregated data.
- By the Numbers: A Race for Results Case Study. This Annie E. Casey Foundation report shares two cases studies of how data users have disaggregated data to inform policies, practices, and decision making for their populations of focus.
- The Importance of Disaggregating Data. This short report by Safe Schools Healthy Students addresses the importance of disaggregating data (including examples), common disaggregates, and limitations of data disaggregation.

PRINCIPLE 4: Examine social and historical contexts to identify root causes of disparities, inform data collection and use, and develop data-driven solutions.

To assess and address disparities along the pre-K-to-workforce continuum, data users must understand the local historical and social context behind these disparities. Root cause analysis equips decision makers with the essential contextual knowledge needed to understand how disparities are produced, not only that they exist. Too often, data users analyze data on outcomes without deeply interrogating the structural causes of the disparities they observe, such as historical events, racist and other unjust policies, misinformed interventions, and oppressive social conditions. Without an understanding of these root causes, data projects and intervention strategies can fall short of creating lasting change and may even perpetuate racist structures.

Root cause analysis is a data-driven inquiry process with three overarching steps: identify a problem, identify root causes of the problem, and identify strategies to address the root causes. Data users must spend time developing an understanding of system conditions and other contextual factors that might be contributing to disparate outcomes, pulling data and information from existing sources, if available, to avoid duplicating efforts and placing undue burden on community members. Grounding data work in historical and societal context can also involve conducting an organizational reflection, equity audit, or environmental scan. An equity audit is a study of the fairness of an institution's policies, programs, and practices.[1520] Equity audit tools can help data users critically examine policies, programs, and practices that directly or indirectly affect students or staff related to their identity. An environmental scan involves gathering information about a community and its relationships to understand the systems and institutions in place that affect how people behave, and the landscape in which the community operates.

Direct engagement with people with lived experience is key to conducting reflective root cause analyses that seek to identify systems drivers of disparities—not symptoms—and solutions to dissolve them. After an initial assessment of disparities, data users should convene groups of people with different perspectives on the problem—such as practitioners, students, and parents from priority communities—to brainstorm possible explanations that, if addressed, ought to reduce or prevent disparities in the future. Groups should prioritize potential root causes until they reach consensus on a few of the most actionable factors most likely to drive disparities. This process should not only inform the development of solutions, but also decisions about which data to collect and analyze to further validate the hypothesized root causes and monitor progress.

Involving community to identify and address root causes

Disaggregated test score data for Marguerite Montgomery Elementary School in Yolo County, California, showed that students in the school's English-only program scored significantly lower than their peers in the two-way bilingual immersion program in every grade, regardless of whether students were emerging multilingual learners. The school held multiple staff and parent engagement activities in both Spanish and English to uncover the root causes of this disparity. They found systemic disproportionalities in the students enrolled in the two programs. They also learned that the school community valued bilingualism, and that research showed that students in dual language programs did as well or better than their peers in English-only programs. As a result, the school decided to transition into a fully dual immersion model, holding planning sessions that continued to engage both staff and community members as part of a new continuous improvement cycle (California Department of Education, 2021).

Applying this principle throughout the data life cycle

Key phases for this principle	Example applications
Context-setting	Identify key historical events, policies, and processes that provide context for the observed present-day disparities. You can conduct an historical analysis through an equity audit, an environmental scan, or organizational reflection, such as a visual timeline activity that maps trends in outcome data against policies and other changes over time.
Planning	Vet research questions and data collection plans for a root cause analysis with the groups of people most affected by the identified problem of practice. Community members can provide input on whether the right problem of practice has been prioritized and which data points should be collected and from whom to explore its root causes.
Analysis	Engage multiple colleagues in dissecting the chosen problem by asking them to answer the question, "Why is this the case?" five times.[1521] Tools like a fishbone diagram[1522] or root cause tree[1523] can aid in this step. Focus on systems and structures, eliminating explanations that are not within the control of E-W decision makers, are not consistent with the available data, or cannot be tested. Reach consensus on the most likely and actionable root causes.
Reporting	Seek community reactions to and interpretation of findings to illuminate root causes not otherwise surfaced. Co-create action items—including potential data-driven solutions to address the root causes—to promote change through advocacy.

Reflection questions

- Who is affected—positively or negatively—by the disparity in question? Why? How?
- Do our analyses identify historical structures, policies or practices, and institutions involved? What social conditions contribute to the problem?
- Do our analyses go far enough, or are we attributing an equity disparity to contributing factors rather than root causes? Are there alternative explanations that fit better?
- What opportunities have we provided for community members to lead and drive contextual understandings to support project goals?

Be on the lookout 

Be careful not to mistake *contributing factors* for root causes. Contributing factors are conditions that allow the identified disparity to occur or persist. A root cause is a factor that prevents it from occurring if taken away. Removing a contributing factor (for example, expanding Advanced Placement course offerings) can improve disparate outcomes, but will not eliminate them. Addressing root causes (for example, educator bias, misplacement of Black students in noncollege preparatory courses) makes it more likely that solutions will be successful in promoting equitable change.[1524]

Additional resources

- How to Embed a Racial and Ethnic Equity Perspective in Research. This guide by Andrews et al. offers practical guidance to researchers and data users alike on how to dissect and use data through an equity lens. The authors pay particular attention to understanding the contextual and societal factors behind the issues of access and opportunity a community may face.

- Race Equity and Inclusion Action Guide. This Annie E. Casey Foundation resource provides guidance on key steps to advance and embed racial equity and inclusion in organizations. It provides questions to guide data users through a systems analysis of root causes of inequities and to identify strategies to address root causes.
- The State and District Role in Root Cause Analysis. This resource provided by the Office of Elementary & Secondary Education links to tool kits that state and district education agencies use to conduct root cause analyses while supporting school improvement efforts. It also offers guiding questions and facilitation tips for districts and states.
- How We Should Talk About Racial Disparities. This article by Spievack and Okeke discusses *why* and *how* researchers and data users can examine contextual factors to avoid perpetuating racist structures and eliminate bias in reporting.

PRINCIPLE 5: Question default methods and assumptions for data collection and analysis and triangulate quantitative data with other sources.

Data users must critically examine their methods and assumptions when collecting and analyzing data to ensure they do not inadvertently reinforce historical biases, deficit narratives, and power imbalances. Modern data collection and research methods are rooted in legacies of racial power imbalances and exploitative practices. Some lasting effects of these legacies include maintaining whiteness as the standard to which other groups are compared (for example, reporting Black-White and Asian-White gaps in outcomes) and over-relying on quantitative data, which can perpetuate stereotypes, without considering qualitative, contextual factors. Data teams that lack racial and ethnic diversity and varied life experiences, including experiences close to the community at the center of data projects, may reflect inherent biases. The makeup of data teams can lead to potentially misleading research questions, uneven power sharing, and assumptions of what data are "meaningful." By triangulating quantitative data with qualitative information and reexamining personal and institutional biases, data users can mitigate these risks.

Quantitative data alone are insufficient to illuminate the full picture of a community's experiences. Though often seen as objective, quantitative data can reflect the biases of the researchers and administrators who design data collection instruments and of the individuals who report the data (such as teachers and police). Relying solely on quantitative data can also remove pertinent institutional factors from analysis that reveal critical information. Using qualitative methods in addition to quantitative methods can more adequately capture why and how disparities exist, including root causes. Qualitative data sources include focus groups, interviews, observations, or long-form surveys. In some projects, it can be appropriate to employ community-based participatory research methods (CBPR)—one model that challenges traditional research structures. CBPR prioritizes collaboration between data users and community through equal partnership. Whatever methods data users choose, they must ensure data collection instruments are clear, unbiased, and speak to the experiences of community members by piloting questions and revising them accordingly.

The racial, socioeconomic, and cultural identities of data users implicitly influence the research questions they seek to answer, the way in which they collect data, and the methods through which they analyze and report them. Before a project begins, data teams should consider their team dynamics and characteristics and examine their individual and group implicit biases, for example, by using tools like the Implicit Association Test[1525] or an intentional reflection of how the team's experiences and motivations might differ from those of the priority population. In doing so, team members with less dominant identities should be able to opt out of potentially harmful spaces. Uncovering, acknowledging, and addressing personal and institutional biases at the outset can guide the team's approach to each phase of the data life cycle. For example, if a project involves employment data, the team can assess whether bias exists in its definition of "valid'" employment and adjust data collection or analysis plans to make the inquiry more inclusive. Exhibiting cultural competency and including a diverse team of data users with proximate experiences to the priority community increases the accuracy and ultimate benefit of the data work.

Child Trends initiative with PBS Kids

A 2019 Child Trends initiative with PBS Kids sought to develop family engagement programs in four communities. To ensure program designs were rooted in community needs, Child Trends launched a community assessment study as a first step. The team held an open discussion to consider how its experiences differed from those of the communities it planned to interview, including how bias might influence proposed interview questions. The team then repositioned interview questions to lead with the existing strengths in family engagement efforts, rather than gaps or weaknesses. Next, to challenge the norm of centering White, middle-class experiences and values as the standard for family engagement, the team employed a "360-approach" to understand the priorities in schools across the four communities. This approach involved interviews with educators, parents, and leaders of family groups. The strategy ensured the team did not just default to an approach that would not be useful to each community.

Applying this principle throughout the data life cycle

Key phases for this principle	Example applications
Context-setting	At the outset of a data project, conduct an implicit bias test or group reflection activity among the proposed team to identify individual and institutional biases and discuss ways to mitigate them throughout the project life span. To increase cultural competency, learn about the history, power structures, and systematic barriers that exist in priority communities, as well as the community's prior experiences with data collection efforts. Continue questioning biases and assumptions in each subsequent phase.
Planning	Ensure data teams reflect diverse lived experiences, and in particular the experiences at the center of the data project. Consider which type of data collection or research model the project is proposing—traditional, community-engaged, or full community partnership. Examine whether the proposed approach and metrics inject any assumptions about the partner community, or whether they place undue burden on them. Pilot all data collection instruments, both qualitative and quantitative, with community members to ensure the instruments are culturally aligned to capture accurate and reliable data.
Collection	Employ qualitative methods, such as interviews, focus groups, town halls, narratives, or long-form surveys, to triangulate quantitative methods. Gathering data through a wide variety of sources strengthens analysis and can validate, contextualize, or challenge quantitative findings.
Analysis	Carefully consider whether findings perpetuate or reinstate a negative stereotype or deficit narrative. If findings meaningfully neglect institutional or systemwide factors, consider how community input might supplement the evidence to give a fuller picture.

Reflection questions

- What assumptions are built into the proposed data collection or analysis approach?
- Is the data team reflective of and close to the community whose data are being collected? If not, has the team conducted an implicit bias exercise or group reflection?
- Have efforts to examine the disparity in question existed in the past? Can you pull from those efforts and supplement quantitative data through qualitative exploration?
- Have you piloted research instruments or data collection prompts with members of the priority community? Do the instruments reflect assumptions about the priority community? Can they be repurposed using asset-based framing?

Be on the lookout 

Publicly available quantitative data sets often report measures of compliance, such as arrest and suspension rates. These "simple" measures may be cheaper and easier to collect, but can perpetuate stereotypes and deficit narratives if not analyzed with care.[1526] Data users should think closely about the metrics they choose and consider whether they are defaulting to using data that happen to be available, even if the resulting metrics are not as meaningful for the project's goals. When possible, data users should gather input from community partners when selecting data for collection and define metrics using asset-based framing. If the project must use a "simple" measure that relies on available data, data users should supplement it with other data points, including qualitative data, to help in interpretation.

Additional resources

- The Equitable Evaluation Framework. The Equitable Evaluation Initiative's site offers a framework of principles to align evaluation practices with an equity approach, along with a suite of resources, reflection tools, and examples to help data users apply these principles.
- Why Am I Always Being Researched?. This Chicago Beyond guide offers ways to authentically partner with and engage community members in selecting approaches and methods to data collection and analysis. The section "For Researchers" (p. 62) discusses specific probes to challenge internal and institutional biases in default methods.
- Making Racial Equity Real in Research. This resource from the Greenlining Institute outlines promising and problematic practices throughout the data life cycle. The sections "Methodologies, Data Collection and Analysis Can Perpetuate Inequities" (p. 14) and "Lack of Cultural Competency of Researchers" (p. 15) caution against pitfalls and offer promising practices when launching data collection initiatives.
- How to Embed a Racial and Ethnic Equity Perspective in Research. This Child Trends resource introduces a model for data collection through the lens of five equity principles, including that "researchers should examine their own backgrounds and biases." In addition, it offers guidance on qualitative and quantitative data collection and analysis.
- Community Based Participatory Research. Chapter 36 of this University of Kansas guide on evaluation outlines principles and practice guidance for engaging in CBPR, an alternative to traditional research.

PRINCIPLE 6: Ensure data visualizations promote inclusion and awareness across culturally, linguistically, and racially diverse audiences.

An equitable approach to data visualization ensures data do not reinforce stereotypes and deficit narratives and are accessible to multiple audiences. Data visualization refers to the graphs, icons, pictures, colors, order, and labels used to represent patterns in data. Using visual representations to portray findings has the power to distill large amounts of evidence into digestible, visual narratives. However, if done without an equitable lens, visualizations can "otherize" particular groups, reinstate bias, and obscure findings for audiences without research backgrounds. Statistics are grounded in real people and communities. Data users have the power to reflect dignity, empathy, and respect for those narratives through equitable visualization practices.

Equitable data visualization employs colors, labels, ordering, graphics, and icons in consideration of the lived experiences that data communicate to the intended audience. In addition to following federal accessibility guidelines,[1527] data users should carefully consider how visualization elements might reinforce stereotypes. For example, graduated color palettes imply a scale, so should not be used for categorical data, such as listing racial groups. Similarly, choosing a male-presenting icon to depict a school principal can reinforce a stereotype that female-presenting individuals are not suited for leadership roles. Titles and labels should use person-first language, such as "people with disabilities" instead of "disabled people." Asset-based framing can also shape how readers view statistics and the people behind them—for example, by showing the number of students "meeting benchmarks" as opposed to the number of students "below grade level." As another example, data visualizations should not default to using White students or individuals as the benchmark for other groups, but must be mindful of which comparisons are most clear and meaningful.

Equitable data visualizations must keep their audience in mind, which should include the greater community from which the data were gathered. Using overly technical and jargon-filled visualizations is not only dismissive of some audiences, but also removes data ownership from communities and puts power back in the hands of researchers and decision makers. Accessibility, however, does not imply oversimplification. Data users must ensure the reader has the context, references, and annotations needed to appropriately interpret the data. In addition to information on the source of the data, when and why they were collected, who they represent, and limitations of the data, visualizations should include narrative text or other data that put outcomes in context and illuminate the systems that create disparities.

Visualizing data in context

A 2020 ProPublica interactive report titled What Coronavirus Job Losses Reveal about Racism in America allowed readers to explore trends in employment outcomes by race, gender, age, education, and income. As users scroll down the page, they see subgroup comparisons in employment trends. Narrative text in callout boxes provides structural interpretations for the shown disparities. Rather than exclude or combine subgroups with very small sample sizes (for example, Native American men without a high school degree), the ProPublica team displayed a callout box acknowledging the missing data. At the bottom of the page, text cautions readers against comparing subgroups with small differences and discusses other possible explanations for the trends. By providing contextual information and clearly acknowledging the shortcomings of the data, this data visualization tool offered readers key information to make informed inferences.

Applying this principle throughout the data life cycle

Key phases for this principle	Example applications
Planning	Build a team with diverse lived experiences to decrease the likelihood that implicit bias might appear in data visualizations. Establish common language norms, review processes, and iterative collaboration at the outset to ensure data teams embed inclusiveness in their own processes and therefore, their products.
Analysis	Acknowledge whom the analysis or resulting visualization does *not* represent. Acknowledging which groups are missing, whether due to insufficient data or the focus of the study, leaves space for improvement in future efforts. Consider whom to include in the "other" category and whether such a category is necessary. Identify the contextual information needed to appropriately interpret the data, including any limitations.
Reporting	Ensure visualizations are accessible and are not likely to cause harm, such as by reinforcing stereotypes (consult the Urban Institute's Do No Harm Guide[1528] for specific guidance on colors, labels, ordering, graphics, and icons). Provide opportunity for feedback, allowing community members to validate or reject the narrative portrayed and confirm that the visualization is easy to interpret. Although receiving feedback from community members is not always possible, try to offer them access before publication.

Reflection questions

- Which groups or findings are readers' eyes drawn to in this visualization? Is that the focus of the analysis?
- What does the ordering or spatial organization of the data imply, even if inadvertently?
- Do the colors, pictures, or icons reinforce any stereotypes? Could this visualization cause any potential harm if interpreted incorrectly?
- Which groups are considered in the "other" category? Do they exhibit similar trends, or are you grouping them for convenience? Can you use another term instead?
- Is the visualization's message clear and easy to interpret, without requiring large amounts of text? If not, is a visualization necessary?

Be on the lookout 

Be careful to not consistently place one race or gender as the default group in visualizations. Across U.S. government surveys and data reports, including the census, "White" is listed first and coded with a "1" in data records. Using "White" as the default or the primary group in data visualizations suggests that the experience of White people represents the benchmark, or standard, to measure desired outcomes against. Altering the order in which data appear depending on the focus of the analysis can not only avoid perpetuating harmful norms, but can also convey findings more clearly and meaningfully.

Additional resources

- Do No Harm Guide. This comprehensive guide by the Data Quality Campaign offers principles, norms, and pitfalls to consider when applying equity awareness in data visualization. It includes a racial equity in data visualization checklist to keep on hand when producing data visuals.
- Reverse Engineering Data Viz for Equity. This We All Count article details how data users can test their data visualizations against an audience's understanding by using the Reverse Legend test. This technique helps assess how accessible a graphic is or how clear its message comes across to broad audiences if taken out of context.
- Designing Data Visualization with Empathy. This article by Bui argues for an empathy-centered approach to data visualization. The author highlights the focus of human-centered and person-first data use, arguing that focusing on the individual behind the data point through graphics, narrative, and context leads to stronger action.

PRINCIPLE 7: Restore communities as data experts using culturally responsive approaches to engagement and co-creation that support equitable data use.

Inequitable power dynamics between data users and communities can perpetuate the disparities that data users aim to address. However, these power dynamics are not inevitable: data users can and should proactively mitigate unintended consequences by involving communities in all phases of the data life cycle, from planning through co-creating solutions. Intentional engagement can promote mutual understanding of assets and challenges within a community, ensuring that data projects are relevant to communities, and that results can be used to drive meaningful change. Restoring communities as data experts involves more than simply offering a seat at the table. It means creating roles for community members to meaningfully impact or lead decision making, valuing their expertise as an integral part of the process, and building relationships rooted in respect to bridge data, policy, and practice.

Data users should seek to understand which communities are affected, both directly and indirectly, by the issue being addressed. In the context of E-W systems, community members might include students, families, educators, and more. Data users should further consider identifying which groups are adversely affected through an intersectional lens, such as Black students with disabilities. Then, data users should identify ways to embed community perspectives *throughout* the project, starting with its conception. Single, point-in-time engagement is typically insufficient—isolated outreach after decisions have been made may be seen as a "box-checking" exercise to nominally gather input. For example, rather than facilitate a single community listening session, data users might recruit community members with relevant lived experience for a recurring advisory council. In its most robust form, this might take the form of CBPR, in which community members actively engage as equal partners in the data project.[1529] However, no engagement model is one-size-fits-all, and community members might play a variety of roles depending on the project's scope, purpose, and timeline.[xxxiii] Building in multiple entry points and avenues for engagement or feedback is essential.

Communities, especially marginalized communities, are often burdened with data initiatives that extract information for personal and institutional gain. To build trusting and productive relationships, data users should define clear roles and expectations for engagement, while collaborating with community partners to determine preferred engagement methods (for example, is it more feasible for community members to participate virtually or in person? During the workday or in the evening? Would they prefer to provide written or verbal feedback?) and opportunities to reduce barriers to participation (for example, by providing child care for in-person activities). Community members should also be equitably compensated to ensure that the partnership is mutually beneficial, and to signal that community members' time and expertise are valued at levels commensurate with that of other experts. Data users should look for opportunities to build capacity within the community as part of the engagement (for example, through collaborative learning processes for data analysis and interpretation) to promote the community's ability to advocate for itself and drive sustained progress beyond the conclusion of the data project. Engaging community members and co-creating opportunities to honor their expert knowledge are foundational activities to successfully implement all data equity principles described in this report.

[xxxiii] See Methods and Emerging Strategies to Engage People with Lived Experience (Skelton-Wilson et al., 2020) for a discussion of various roles for individuals with lived experience, including storyteller, advisor, grantee, partner, or staff member.

Community collaboration in NYC improves student outcomes

In New York City's Community Schools model, the district provides formal support for data sharing and collaboration between school leaders and community partners. Confidential data-sharing agreements enable schools *and* communities to access secure, real-time data on attendance, behavior, and course performance. School leaders and community partners meet regularly to review data, interpret trends, and identify appropriate interventions. The city's Office of Community Schools provides training and support on meeting facilitation, which includes guidance related to inclusive decision making. A study by the RAND Corporation showed that within the first three years (2015–2018), community schools positively affected attendance, on-time grade progression, and high school credit accumulation, while reducing rates of chronic absence. Other state and district education leaders can apply lessons from New York City to promote meaningful community participation in decision making (Data Quality Campaign, 2018).

Applying this principle throughout the data life cycle

Key phases for this principle	Example applications
Context-setting	Identify what you mean by "priority communities," that is, who is directly and indirectly affected by the focal issue. Be careful not to assume that racial, ethnic, or socioeconomic diversity indicates lived experience relevant to the project. Collaborate with community members to align on what the key issues are and which perspectives to prioritize. Examine potential power dynamics between data users and communities.
Planning	Recruit members of priority communities to participate in initiative teams or advisory councils. Honor the intersectionality of collaborators' identities by recruiting individuals who have had a variety of experiences within the same community and therefore might bring nuanced perspectives on the issue or project. Establish decision-making criteria that systematically incorporate community perspectives. Use facilitation methods that promote equitable participation. For example, if facilitating a meeting involving policymakers and community partners, design activities that capture equally weighted input from all participants, such as anonymous ranked-choice voting.
Analysis	Add dimension to findings through anecdotal and contextual information from lived experiences. Engage community partners when reviewing preliminary findings to validate that data have not been misinterpreted.
Reporting	Visualize and communicate data and findings using plain language so that they are easy to interpret, accessible to communities, and can be used to drive change. Share data in a variety of formats, such as at town halls, at cultural events, and via email or webinar. Build trust with communities by providing timely access to data. For example, if a school administration is evaluating whether to include a program in its budget for the next school year, the administration must receive information before the budget is due to support data-driven decision making.

Reflection questions

- Which groups would this data project affect? Who can help validate our understanding of key groups or illuminate blind spots?
- Who can we recruit from priority communities to participate throughout the project life cycle? How will we reach them? How will we compensate them for their involvement?
- How will we systematically incorporate different groups' perspectives in decision making?
- What has the community engagement process revealed about the experiences, burdens, and benefits for different groups?

Be on the lookout 

Be careful not to exploit or tokenize lived experience. Feeling pressure to speak on behalf of an entire community can be burdensome for people. Avoid suggesting a monolithic view of "community" by incorporating a variety of perspectives and honoring the diversity of experiences within communities. For example, invite several members from the community with diverse backgrounds to serve on an advisory council, not just a single representative. To avoid exploiting lived experience, data users should also take an inclusive, human-centered, trauma-informed approach to engaging the community to mitigate the risk of retraumatizing individuals when discussing potentially sensitive topics.

Additional resources

- Why Am I Always Being Researched?. This Chicago Beyond resource offers practical guidance for community organizations, researchers, and funders looking to address inequities and unintended bias in research projects.
- Methods and Emerging Strategies to Engage People with Lived Experience. This brief by Skelton-Wilson et al. discusses strategies and best practices for engaging people with lived experience in federal research initiatives and discusses how they may serve in various roles.
- Making Racial Equity Real in Research. This report by Creger, geared toward funders, researchers, and community partners, offers five key steps to establishing effective partnerships using an anti-racist approach.
- Engaging People with Lived Experience Toolkit. This step-by-step guide, developed by 100 Million Healthier Lives, includes supporting resources and examples to help data users effectively and equitably engage with community members with lived experience.
- The Spectrum of Community Engagement to Ownership. This toolkit by Facilitating Power helps data users understand and apply a spectrum of community partnership models, ranging from consultation to community ownership.

Data equity principles endnotes

[1510] Hill, H. C. (2016). *50 years ago, one report introduced Americans to the black-white achievement gap. Here's what we've learned since.* Chalkbeat. https://www.chalkbeat.org/2016/7/13/21103280/50-years-ago-one-report-introduced-americans-to-the-black-white-achievement-gap-here-s-what-we-ve-le

[1511] Faria, A. M., Sorenson, N., Heppen, J., Bowdon, J., Taylor, S., Eisner, R., & Foster, S. (2017). *Getting students on track to graduation: Impacts of the Early Warning Intervention and Monitoring System after one year.* Regional Educational Laboratory West, Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/rel/Project/388

[1512] Evgeniou, T., Hardoon, D. R., & Ovchinnikov, A. (2020). *What happens when AI is used to set grades?* Harvard Business Review. https://hbr.org/2020/08/what-happens-when-ai-is-used-to-set-grades

[1513] Strauss, D. H., White, S. A., & Bierer, B. E. (2021). Justice, diversity, and research ethics review. *Science, 371*(6535), 1209–1211. https://doi.org/10.1126/science.abf2170

[1514] Diakopoulos, N., Fridler, S., Arenas, M., Barocas, S., Hay, M., Howe, B., Jagadish, H. V., Unsworth, K., Sahuguet, A., Venkatasubramanian, S., Wilson, C., Yu, C., & Zevebergen, B. (2017). *Principles for accountable algorithms and a social impact statement for algorithms*. Fairness, Accountability, and Transparency in Machine Learning. https://www.fatml.org/resources/principles-for-accountable-algorithms

[1515] Staats, C. (2014). *Implicit racial bias and school discipline disparities: Exploring the connection*. Kirwan Institute, Ohio State Unviersity. https://kirwaninstitute.osu.edu/research/implicit-bias-school-discipline

[1516] Capatosto, K. (2017). Foretelling the future: A critical perspective on the use of predictive analytics in child welfare. Kirwan Institute, Ohio State University. http://kirwaninstitute.osu.edu/wp-content/uploads/2017/05/ki-predictive-analytics.pdf

[1517] U.S. Department of Education. (n.d.). *What is FERPA?* Protecting Student Privacy. https://studentprivacy.ed.gov/faq/what-ferpa

[1518] GDPR.EU. (2018). *What is GDPR, the EU's new data protection law?* Proton Technologies AG. https://gdpr.eu/what-is-gdpr/

[1519] Clark, J. (2020). *How does the CCPA impact education?* Edlink. https://ed.link/community/what-is-ccpa/

[1520] Mid-Atlantic Equity Consortium (2021). *Equity audit. https://maec.org/wp-content/uploads/2021/02/Preview-MAEC-Equity-Audit-2021.pdf*

[1521] District of Columbia Office of the State Superintendent of Education. (2019). *OSSE section 2 analyzing root causes*. Archived Teacher Equity Guidance and Resources. https://osse.dc.gov/node/1552426

[1522] American Society for Quality. (n.d.). *Fishbone (ishikawa) diagram.* https://asq.org/quality-resources/fishbone

[1523] Lawless, K. (2013) *Root cause analysis tree diagram.* Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Root_Cause_Analysis_Tree_Diagram.jpg

[1524] Andrews, K., Parekh, J., & Peckoo, S. (2019). *How to embed a racial and ethnic equity perspective in research.* Child Trends. https://www.childtrends.org/publications/a-guide-to-incorporating-a-racial-and-ethnic-equity-perspective-throughout-the-research-process

[1525] Moon, T. R. (2011). *Preliminary information*. Project Implicit, Harvard University. https://implicit.harvard.edu/implicit/takeatest.html

[1526] Chicago Beyond. (2018). *Why am I always being researched?* (p. 69). https://chicagobeyond.org/researchequity/

[1527] General Services Administration. (n.d.) *Section508.gov.* https://implicit.harvard.edu/implicit/takeatest.html

[1528] Schwabish, J., & Feng, A. (2021). *Do no harm guide.* Urban Institute. https://www.urban.org/research/publication/do-no-harm-guide-applying-equity-awareness-data-visualization

[1529] See Andrews et al. (2019).

Appendices

Appendix A. Source frameworks

Exhibit A.1. Source frameworks

Framework name	Authoring organization(s)	Pre-K	K–12	Postsecondary	Workforce
P-16 Framework	The Bill & Melinda Gates Foundation	✓	✓	✓	
Pathways Driver Diagram	The Bill & Melinda Gates Foundation	✓	✓	✓	
P-16 Snapshot Indicators	The Bill & Melinda Gates Foundation	✓	✓	✓	
K–12 Student Outcomes & Indicators	The Bill & Melinda Gates Foundation		✓		
K–12 Strategy Measurement Framework for Math Outcomes	The Bill & Melinda Gates Foundation		✓		
Framework for Monitoring Educational Equity	The National Academies (*American Educational Research Association, the Atlantic Philanthropies, the Ford Foundation, the Spencer Foundation, the U.S. Department of Education, the William T. Grant Foundation, and the W.K. Kellogg Foundation)*	✓	✓	✓	
Building Educational Equity Indicator Systems	The National Academies	✓	✓	✓	
Key National Education Indicators	The National Academies *(John D. and Catherine T. MacArthur Foundation, Carnegie Corporation of New York, the Bill & Melinda Gates Foundation, and the Presidents' Fund of the National Research Council)*	✓	✓	✓	✓
Monitoring Progress Toward Successful K–12 STEM Education	The National Academies (*National Science Foundation)*		✓		
Quality in the Undergraduate Experience	The National Academies (*The Lumina Foundation)*			✓	
Indicators for Monitoring Undergraduate STEM Education	The National Academies (*The National Science Foundation)*			✓	
State Indicators for Early Childhood	Project THRIVE *(The National Center for Children in Poverty at Columbia University)*	✓			
Birth to Grade 3 Indicator Framework	The Council of Chief State School Officers & Center on Enhancing Early Learning Outcomes	✓			
Getting Ready: National School Readiness Indicators Initiative	Rhode Island KIDS Count *(The David and Lucile Packard Foundation, the Kauffman Foundation, and the Ford Foundation)*	✓			
School Quality Measures	MA Consortium for Innovative Education Assessments (*University of Massachusetts Lowell)*		✓		

Framework name	Authoring organization(s)	Pre-K	K–12	Postsecondary	Workforce
CORE Districts Improvement Measures	CORE Districts Data Collaborative		✓		
Framework for Great Schools	New York City Department of Education		✓		
Building for Equity School Self-Assessment Tool	Center for Collaborative Education		✓		
Robust and Equitable Measures to Identify Quality Schools	The Urban Institute *(Jobs for the Future, the Barr Foundation)*		✓	✓	✓
From Tails to Heads: Building Momentum for Postsecondary Success	The Education Strategy Group (*Level Up)*		✓	✓	
Academic Key Performance Indicators	Council of the Great City Schools	✓	✓		
Framework for Measuring Career Pathway Innovation	The Center for Postsecondary and Economic Success (CLASP)			✓	✓
Great Public Schools Indicators Framework	The National Education Association	✓	✓		
Regional Cradle to Career Education & Workforce Partnership	The Gateways Partnership *(California State University, East Bay)*		✓	✓	✓
Partnering for Student Success—The Cradle to Career Framework	Portland State University (*Leaders Roundtable)*	✓	✓	✓	✓
Cradle to Career Data Point Definitions	WestEd	✓	✓	✓	✓
Dimensions of Equity	Alliance for Resource Equity *(Education Resource Strategies and the Education Trust)*	✓	✓		
Framework for Evaluating Impacts of Broadening Participation Projects	The National Science Foundation		✓	✓	✓
Self-Assessment Rubric for the Institutionalization of Diversity, Equity, and Inclusion in Higher Education	New England Resource Center for Higher Education *(University of Massachusetts Boston)*			✓	
Postsecondary Metrics Framework	Institute for Higher Education Policy *(The Bill & Melinda Gates Foundation)*			✓	
Higher Education in Prison Key Performance Indicator Framework	The Institute for Higher Education Policy			✓	✓
Postsecondary Data Partnership	The National Student Clearinghouse			✓	

Framework name	Authoring organization(s)	Pre-K	K–12	Postsecondary	Workforce
Equitable Value Framework	The Postsecondary Value Commission			✓	✓
The United Way Equity Framework	United Way	✓	✓	✓	✓
Job Design Framework	National Fund for Workforce Solutions				✓
WIOA Performance Indicators and Measures	U.S. Department of Labor				✓
Education and Economic Opportunity Indicators	California Race Counts	✓	✓	✓	✓
Guide to Racial and Ethnic Equity Systems Indicators	StriveTogether	✓	✓	✓	✓
Boosting Upward Mobility: Metrics to Inform Local Action	The Urban Institute (*The Bill & Melinda Gates Foundation)*	✓	✓		✓
Inclusive Economies Indicators	The Rockefeller Foundation (*Everett Program, USC Dornsife Program for Environmental and Regional Equity)*	✓	✓	✓	✓
National Equity Atlas Indicators	PolicyLink and University of Southern California Equity Research Institute	✓	✓	✓	✓

Appendix B. Crosswalk to source frameworks

Exhibit B.1. Crosswalk to source frameworks

	Indicator	P-16 Framework	Pathways Driver Diagram	P-16 Snapshot Indicators	K-12 Student Outcomes & Indicators	K-12 Strategy Measurement Framework for Math Outcomes	Framework for Monitoring Educational Equity	Building Educational Equity Indicator Systems	Key National Education Indicators	Monitoring Progress Toward Successful K-12 STEM Education	Quality in the Undergraduate Experience	Indicators for Monitoring Undergraduate STEM Education	State Indicators for Early Childhood	Birth to Grade 3 Indicator Framework	Getting Ready: National School Readiness Indicators Initiative	School Quality Measures	CORE Districts Improvement Measures	Framework for Great Schools	Building for Equity School Self-Assessment Tool	Robust and Equitable Measures to Identify Quality Schools	From Tails to Heads: Building Momentum for Postsecondary Success	Academic Key Performance Indicators	Framework for Measuring Career Pathway Innovation	Great Public Schools Indicators Framework	Regional Cradle to Career Education & Workforce Partnership	Partnering for Student Success—The Cradle to Career Framework	Cradle to Career Data Point Definitions	Dimensions of Equity	Framework for Evaluating Impacts of Broadening Participation Projects	Self-Assessment Rubric for Diversity, Equity, and Inclusion in Higher Education	Postsecondary Metrics Framework	Higher Education in Prison Key Performance Indicator Framework	Postsecondary Data Partnership	Equitable Value Framework	The United Way Equity Framework	Job Design Framework	WIOA Performance Indicators and Measures	Education and Economic Opportunity Indicators	Guide to Racial and Ethnic Equity Systems Indicators	Boosting Upward Mobility: Metrics to Inform Local Action	Inclusive Economies Indicators	National Equity Atlas indicators
Outcomes and Milestones	Enrollment in quality public pre-K	X		X			X	X	X				X		X							X		X		X	X												X	
	Kindergarten readiness: language and literacy	X		X			X	X	X				X	X	X									X			X													
	Kindergarten readiness: cognition	X		X			X	X	X				X	X	X									X			X													
	Early grades on track					X								X		X										X														
	Consistent attendance	X		X	X		X	X	X					X			X			X		X		X			X												
	Positive behavior	X		X	X									X			X			X		X		X															
	Math and reading proficiency in grade 3	X		X		X	X	X	X				X		X	X	X					X		X		X	X							X					
	6th grade on track				X																																			
	8th grade on track				X												X																							
	Math and reading proficiency in grade 8	X		X	X	X	X		X							X	X					X				X	X							X					
	Successful completion of Algebra I by 9th grade					X														X		X		X			X												
	9th grade on track				X																	X																		
	Grade point average	X			X		X	X												X	X		X	X					X			X							
	Math and reading proficiency in high school	X			X		X										X			X						X	X												
	College preparatory coursework completion	X																		X				X															
	Early college coursework completion	X	X		X		X	X												X	X	X		X			X												
	SAT and ACT participation and performance		X	X	X															X				X	X		X												
	FAFSA completion	X	X	X	X																X																		
	College applications		X		X																X						X												
	High school graduation			X			X	X	X							X	X			X		X		X	X	X	X									X		X		
	Selection of a well-matched postsecondary institution		X		X															X	X																		
	Senior summer on track				X																X																		
	Postsecondary enrollment directly after high school graduation	X	X	X	X		X	X	X							X				X	X			X		X	X				X	X	X		X					
	First-year credit accumulation	X			X																						X				X		X							
	First-year program of study concentration	X	X		X																										X									
	Gateway course completion	X	X		X				X			X									X						X				X		X							
	Postsecondary persistence		X	X					X			X				X										X				X	X	X							
	Transfer (if applicable)	X							X			X								X					X		X			X	X	X							
	Postsecondary certificate or degree completion		X	X					X			X				X				X			X		X	X	X		X		X	X	X		X		X			
	Enrollment in graduate education																										X			X		X								
	Graduate degree completion										X																			X										
	Kindergarten readiness: social-emotional development	X							X				X	X	X											X			X											

	Indicator	P-16 Framework	Pathways Driver Diagram	P-16 Snapshot Indicators	K-12 Student Outcomes & Indicators	K-12 Strategy Measurement Framework for Math Outcomes	Framework for Monitoring Educational Equity	Building Educational Equity Indicator Systems	Key National Education Indicators	Monitoring Progress Toward Successful K-12 STEM Education	Quality in the Undergraduate Experience	Indicators for Monitoring Undergraduate STEM Education	State Indicators for Early Childhood	Birth to Grade 3 Indicator Framework	Getting Ready: National School Readiness Indicators Initiative	School Quality Measures	CORE Districts Improvement Measures	Framework for Great Schools	Building for Equity School Assessment Tool	Robust and Equitable Measures to Identify Quality Schools	From Tails to Heads: Building Momentum for Postsecondary Success	Academic Key Performance Indicators	Framework for Measuring Career Pathway Innovation	Great Public Schools Indicators Framework	Regional Cradle to Career Education & Workforce Partnership	Partnering for Student Success: The Cradle to Career Framework	Cradle to Career Data Point Definitions	Dimensions of Equity	Framework for Evaluating Impacts of Broadening Participation Projects	Self-Assessment Rubric for Diversity, Equity, and Inclusion in Higher Education	Postsecondary Metrics Framework	Higher Education in Prison Key Performance Indicator Framework	Postsecondary Data Partnership	Equitable Value Framework	The United Way Equity Framework	Job Design Framework	WIOA Performance Indicators and Measures	Education and Economic Opportunity Indicators	Guide to Racial and Ethnic Equity Systems Indicators	Boosting Upward Mobility: Metrics to Inform Local Action	Inclusive Economies Indicators	National Equity Atlas indicators
Outcomes and Milestones	Kindergarten readiness: approaches to learning						X	X	X				X		X									X			X												
	Kindergarten readiness: perceptual, motor, and physical development												X	X	X									X			X												
	Self-management	X												X			X			X												X						
	Growth mindset	X														X	X																					
	Self-efficacy								X								X			X												X		X				
	Social awareness								X					X			X			X												X						
	Cultural competency								X							X				X												X						
	Civic engagement								X							X				X				X	X							X			X	X	X	X	
	Social capital								X																							X					X	
	Mental and emotional well-being															X																X				X		
	Physical development and well-being														X	X				X												X			X	X	X	
	Successful career transition after high school						X	X	X							X				X	X			X		X												
	CTE pathway concentration		X																	X	X		X				X										
	Industry-recognized credential								X																									X				
	Participation in work-based learning		X						X														X				X										
	Digital skills	X																		X																	
	Communication skills																			X																	
	Higher-order thinking skills								X					X		X				X												X		X				
	Minimum economic return																														X		X				
	Student loan repayment																														X						
	Employment in a quality job	X	X						X		X									X						X				X	X			X				X
	Economic mobility																																X			X		X	
	Economic security																																X	X		X	X		
E-W System Conditions	Access to quality public pre-K	X					X	X	X				X	X											X		X	X	X								X		
	Access to full day pre-K	X							X																		X											
	Access to child care subsidies												X		X																			X				
	School-family engagement								X					X		X	X	X	X	X				X	X			X								X		
	Equitable discipline practices	X					X	X									X		X	X				X			X								X		
	Access to full-day kindergarten													X											X			X										
	English learner progress	X															X			X							X										
	Teacher credentials						X	X	X				X	X	X	X				X					X								X				X		
	Teacher experience						X	X												X																		
	Educator retention																			X					X													
	Classroom observations of instructional practice								X					X		X		X	X	X					X				X									
	Student perceptions of teaching	X					X	X						X		X	X			X					X													

	Indicator	P-16 Framework	Pathways Driver Diagram	P-16 Snapshot Indicators	K-12 Student Outcomes & Indicators	K-12 Strategy Measurement Framework for Math Outcomes	Framework for Monitoring Educational Equity	Building Educational Equity Indicator Systems	Key National Education Indicators	Monitoring Progress Toward Successful K–12 STEM Education	Quality in the Undergraduate Experience	Indicators for Monitoring Undergraduate STEM Education	State Indicators for Early Childhood	Birth to Grade 3 Indicator Framework	Getting Ready: National School Readiness Indicators Initiative	School Quality Measures	CORE Districts Improvement Measures	Framework for Great Schools	Building for Equity School Assessment Tool	Robust and Equitable Measures to Identify Quality Schools	From Tails to Heads: Building Momentum for Postsecondary Success	Academic Key Performance Indicators	Framework for Measuring Career Pathway Innovation	Great Public Schools Indicators Framework	Regional Cradle to Career Education & Workforce Partnership	Partnering for Student Success: The Cradle to Career Framework	Cradle to Career Data Point Definitions	Dimensions of Equity	Framework for Evaluating Impacts of Broadening Participation Projects	Self-Assessment Rubric for Diversity, Equity, and Inclusion in Higher Education	Postsecondary Metrics Framework	Higher Education in Prison Key Performance Indicator Framework	Postsecondary Data Partnership	Equitable Value Framework	The United Way Equity Framework	Job Design Framework	WIOA Performance Indicators and Measures	Education and Economic Opportunity Indicators	Guide to Racial and Ethnic Equity Systems Indicators	Boosting Upward Mobility: Metrics to Inform Local Action	Inclusive Economies Indicators	National Equity Atlas indicators
E-W System Conditions	Teachers' contributions to student learning growth																																								
	Effective program and school leadership															X		X	X	X				X				X		X											
	Institutions' contributions to student outcomes										X					X																						X		
	Access to college preparatory coursework	X																	X					X																
	Access to early college coursework	X					X	X											X	X				X																
	Equitable placement in rigorous coursework					X																		X				X												
	Access to quality, culturally responsive curricula									X				X		X			X	X				X				X		X		X					X			
	Expenditures per student								X					X						X				X				X			X						X			
	Access to early intervention screening												X											X																
	School safety						X	X	X					X		X	X			X				X				X												
	Inclusive environments	X										X				X	X	X	X					X					X	X					X			X		
	Representational racial and ethnic diversity of educators					X	X	X				X							X									X		X							X			
	School and workplace racial and ethnic diversity						X	X				X																X												
	School and workplace socioeconomic diversity						X	X																				X										X		X
	Access to health, mental health, and social supports						X	X	X				X						X	X				X				X									X			
	Access to college and career advising	X					X													X								X												
	Access to in-demand CTE pathways		X																	X			X	X																
	Unmet financial need	X							X																X						X						X			
	Cumulative student debt																								X						X									
	Expenditures on workforce development programs																																							
	Access to jobs paying a living wage																								X												X	X	X		X
	Access to ongoing career skills development								X														X												X					
Adjacent System Conditions	Childhood experiences						X		X				X		X																							X		
	Health insurance coverage												X		X									X											X			X			
	Food security																																				X	X		X	
	Access to affordable housing																																				X	X	X		X
	Access to technology	X							X																												X	X		X	
	Access to transportation																																					X	X	X	X
	Exposure to neighborhood crime						X																														X	X	X		
	Neighborhood economic diversity						X												X																				X	X	X
	Neighborhood racial diversity						X																															X	X		X
	Neighborhood juvenile arrests																																				X	X	X		

Appendix C. Indicator review criteria

Exhibit C.1. Indicator review criteria

Criterion	Definition	Low (1)	Medium (2)	High (3)
Actionable	There is significant potential for improvement in addressing equity gaps, and data for the indicator can be available on a regular, frequent basis—at least annually.	Evidence of limited gaps by either race/ethnicity or socioeconomic status (backed by data) OR data cannot reasonably be collected and reported on at least annually.	Some evidence of equity gaps by race/ethnicity and/or socioeconomic status (all right if little/no data, gaps are likely) AND data can reasonably be collected and reported on at least annually.	Evidence of significant equity gaps by race/ethnicity and/or socioeconomic status (backed by data) AND data can reasonably be collected and reported on at least annually.
Predictive	Theory and/or research suggest a strong association between the indicator and economic mobility and security (or milestones along the way) for priority groups.	No theory or research suggests a strong connection between indicator and North Star (or another milestone strongly associated with North Star).	Theory OR research suggests a strong connection between indicator and North Star (or another milestone strongly associated with North Star).	Theory AND research consistently show a strong connection between indicator and North Star (or another milestone strongly associated with North Star).
Meaningful	The indicator is considered meaningful by priority communities.	The indicator does not appear in any frameworks/resources vetted by community members.	The indicator appears in one or two frameworks/resources vetted by community members.	The indicator appears in three or more frameworks/resources vetted by community members.
Feasible	Data to measure the indicator are widely available or feasible to collect at reasonable cost in relation to the indicator's value for addressing equity gaps.	The cost/burden of collecting data exceeds its value for addressing equity gaps.	Data are not currently collected regularly but could be collected and shared at reasonable cost/burden OR data are currently collected regularly but are not widely available due to structural (data management) or legal (privacy) barriers.	Data are collected regularly and are widely available OR data are collected regularly and *could* be made widely available without significant structural (data management) or legal (privacy) barriers.
Valid for disaggregation	There is credible evidence about the validity and reliability of data to measure the indicator for priority student groups, allowing for disaggregation.	Data are not collected consistently across different groups OR there likely are concerns about data quality or validity issues for particular groups (if relevant); instruments are not recommended for all populations.	Data are collected consistently across different groups, BUT there are potential concerns about data quality or validity issues for particular groups (if relevant); unclear whether instruments have been validated with diverse populations.	Data are collected consistently across different groups AND there are no concerns about data quality or other issues for particular groups (if relevant); instruments have been validated with diverse populations.

Criterion	Definition	Low (1)	Medium (2)	High (3)
Comparable	Data for the indicator can be measured comparably across time and place.	Data are unlikely to be measured comparably across time and place.	Data can be measured comparably across time, and place BUT are likely to be measured inconsistently across contexts (e.g., states).	Data can be measured comparably across time and place AND can be measured consistently across contexts (e.g., states).
Minimizes unintended consequences	The indicator is difficult to "game" to make a district, school, or other institution appear more equitable and not likely to create perverse incentives.	The indicator is not difficult to game OR is likely to create perverse incentives across different uses.	The indicator is difficult to game, BUT could potentially create perverse incentives depending on how it is used (e.g., high-stakes accountability).	The indicator is difficult to game AND is unlikely to create perverse incentives across different uses.

Appendix D. Sources for literature review on data equity

Exhibit D.1. Sources for literature review on data equity

Title	Author(s)	Description	Phase of the data life cycle
Test Scores are Only a Symptom (2021)	Lashawn Richburg-Hayes (William T. Grant Foundation)	Outlines how researchers and data collectors can leverage historical and societal contexts to improve policy recommendations and strengthen findings.	Context Setting, Planning
Equity Principles for Data and Research Investments	Bill & Melinda Gates Foundation	Describes guiding principles for the Bill & Melinda Gates Foundation's K–12 team to consider when designing, executing, and disseminating findings from research investments.	Context Setting, Planning, Access
7 Steps to Advance and Embed Race Equity and Inclusion within your organization (2014)	Annie E. Casey Foundation	Offers seven steps for foundations and organizations to incorporate equity into their processes, programs, and institutional culture.	Context Setting, Collection, Analysis
How RAND Applies an Equity Lens to Research and Analysis (2021)	Rihanna C. Rogers, Anita Chandra, et al. (RAND)	Describes how RAND seeks to bring an equity research lens to projects examining issues of social justice ranging from mass incarceration to anti-Asian violence.	Context Setting, Collection, Analysis
Measuring the Unmeasurable: Racism by the Numbers (2020)	Paul Thomas	Explores how statistical analysis falls short of fully uncovering racial inequities in America using the example of police brutality.	Context-setting, Analysis
Racial Equity Toolkit: An opportunity to operationalize equity (2016)	Julie Nelson and Lisa Brooks (Government Alliance on Race and Equity)	Offers a set of questions to assess equitable practices in proposals and programmatic implementation.	Planning
A Path to Social License: Guidelines for Trusted Data Use (2017)	Data Futures Partnership	Offers guidelines for government agencies, NGOs, and companies to foster transparent use and collection of personal data.	Planning, Collection
Executive Order on Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (2021)	Biden Administration	Emphasizes the need for all federal agencies to place racial equity at the forefront of funding initiatives, policies, and internal procedures.	Planning, Analysis
Ten Simple Rules for Big Data Research (2017)	Zook, M., Barocas, S., boyd d, Crawford, K, Keller, E., Gangadharan, S.P., et al. (Council for Big Data, Ethics, and Society)	Presents "10 simple rules" to address complex ethical issues when using big data in social science research and how to minimize potential harm.	Planning, Analysis, Reporting
Data Equity Framework (2021)	We All Count	Breaks down data work into seven stages. In each stage, the framework offers practical tools to help make key decisions with equity as the end goal.	Planning, Collection, Analysis, Reporting

Title	Author(s)	Description	Phase of the data life cycle
A Handbook of Data Collection Tools: Companion to "A guide to measuring advocacy and policy"	Jane Reisman, Annie Gienapp, Sarah Stachowiak (Annie E. Casey Foundation)	Provides examples and practicable methods for data collection in program and policy evaluation.	Collection
Why Disaggregating Data by Race is Important for Racial Equity (2020; 2016)	Annie E. Casey Foundation	Summarizes the importance of disaggregating data by race.	Collection, Analysis
Using Data to Advance Racial Equity (2020)	Edutopia	Describes ways educators can embed equity into their collection and analysis of student or classroom data.	Collection, Analysis
Guiding Principles and Values for Digital Civil Society (2015)	GrantCraft	Outlines three guiding ethical principles for digital civil society: consent, privacy, and default openness.	Collection, Access
Four Principles to Guide Civil Society's Use of Digital Data (2019)	Stanford Center on Philanthropy and Civil Society	Discusses four principles of digital data use (permission, privacy, openness, and pluralism) and instructs data users on how to ethically handle digital data.	Collection, Access, Reporting
Moving Toward Equity Data Review Tool (2014)	American Institutes for Research	Offers a tool designed for state education agency staff to identify available and relevant equitable access metrics with the goal of identifying and addressing root causes to equity gaps.	Collection, Analysis, Reporting
Building blocks for advancing racial equity (2021)	Race Matters Institute	Describes five building blocks to advance racial equity in your department, organization, community, or network, including using a structural lens and disaggregating data.	Analysis
Five Principles for Creating Equity by Design (2015)	Center for Urban Education	Provides guidance for higher education institutions to embed racial equity in their institutional policies and goals.	Analysis
6 steps to Equitable Data Analysis (2019)	Andrew Knips (Edutopia)	Provides six steps towards a more equitable and culturally proficient data analysis: research identity, preempt implicit bias, frame and challenge, set intentions, pick the right data, and strategically sort.	Analysis
Policy Equity Assessment (2021)	Diversitydatakids (W.K. Kellogg Foundation and the Robert Wood Johnson Foundation)	Assesses the equitable nature of policies through targeted questions across three stages of policy development: logic, capacity, and research.	Analysis
By the Numbers: Using disaggregated data to inform policies, practices, and decision-making (2016)	Annie E. Casey Foundation	Offers case studies and findings illuminating the importance of disaggregating data in social policy research and advocacy.	Analysis
Four Principles to Make Advanced Data Analytics Work for Children and Families (2020)	Annie E. Casey Foundation	Outlines a set of principles to help data users distinguish between useful, acceptable, and harmful applications of advanced analytics tools in social programs and policy.	Analysis

Title	Author(s)	Description	Phase of the data life cycle
Advancing Better Outcomes for all Children: Reporting Data Using a Racial Equity Lens (2008)	Annie E. Casey Foundation	Describes basic features of data presentation using a racial equity lens, as part of the Race Matters Toolkit	Analysis, Reporting
Applying Racial Equity Awareness in Data Visualization (2020)	Jonathan Schwabish and Alice Feng (Urban Institute)	Examines how data users can bring an equity lens to data visualization, including the intentional choice of titles, colors, icons, and organization of data.	Analysis, Reporting
Communicating Inequities in a way that goes beyond identification (2021)	Jillian McKoy (Boston University School of Public Health)	Summarizes guiding questions, tools, and resources to enable data users to improve how they collect and implement data to eliminate structural racism and promote racial equity, as part of a Racial Equity Data Road Map.	Analysis, Reporting
Principles for Advancing Equitable Data Practice (2020)	Marcus Gaddy and Kassie Scott (Urban Institute)	Describes the Belmont Report's ethical principles and offers examples of practices and resources to integrate the principles throughout the data life cycle with an equity lens.	All phases
A Toolkit for Centering Racial Equity throughout Data Integration (2020)	Hawn Nelson, A., Jenkins, D., Zanti, S., Katz, M., Berkowitz, E., et al. (Actionable Intelligence for Social Policy)	Provides actionable guides and positive practices to center equity in all phases of the data life cycle. Cites case studies exemplifying a racial equity focus in each phase.	All phases
Why Am I Always Being Researched? (2018)	Chicago Beyond	Offers guidance to community organizations, researchers, and funders on how to re-shape seven inequities in research: access, information, validity, ownership, value, accountability and authorship.	All phases
Urban Institute Guide for Racial Equity in the Research Process (2020)	Urban Institute	Describes lessons learned through internal discussions at the Urban Institute on how to better center racial equity in research practices and norms.	All phases
Making Racial Equity Real in Research (2020)	Hana Creger (Greenlining Institute)	Offers a how-to guide for research institutions and funders, researchers, and community partners can practice partnership-based research.	All phases
A framework for centering racial equity throughout the administrative data lifecycle (2020)	Amy Hawn Nelson and Sharon Zanti (University of Pennsylvania)	Presents a framework and site-based examples of "Work in Action" where agencies acknowledged and compensated for harms and bias baked into data and practice.	All phases
Results-based accountability for racial equity (2018)	Erika Vernabei (Equity & Results, LLC)	Examines results-based accountability and how community leaders, partners, and government staff can leverage a community centered, racial equity lens as a foundation for achieving desired accountability measures.	All phases

Appendix E. Indicators related to evidence-based practices

Evidence-based practices are informed and supported by rigorous evidence demonstrating consistent, positive impacts on individual outcomes. These practices may also be related to system conditions—for example, implementing an evidence-based practice may improve a related system condition, or may be enabled by a related system condition already in place. Below (Exhibits E.1-E.4), we have identified examples of relevant Outcomes & Milestones and Education-to-Workforce (E-W) System Conditions indicators that are related to the evidence-based practices highlighted in the E-W Framework. These suggested mappings are illustrative, and do not imply causal relationships. Rather, they are intended to help framework users make connections between indicators and evidence-based practices that may be related in their contexts.

Exhibit E.1. Indicators related to evidence-based early learning practices

	Outcomes & Milestones indicators	E-W System Conditions indicators
Teacher coaching and professional development	• Kindergarten readiness across five domains: **1.** Language and literacy **2.** Cognition **3.** Social-emotional development **4.** Approaches to learning **5.** Perceptual, motor, and physical development	• Access to quality public pre-K • Classroom observations of instructional practice
Skill-based curricula	• Kindergarten readiness across five domains: **1.** Language and literacy **2.** Cognition **3.** Social-emotional development **4.** Approaches to learning **5.** Perceptual, motor, and physical development	• Access to quality public pre-K • Classroom observations of instructional practice
Social skills training	• Kindergarten readiness: **1.** Social-emotional development **2.** Approaches to learning	• Access to quality public pre-K • Classroom observations of instructional practice
Parent programs	• Kindergarten readiness across five domains: **1.** Language and literacy **2.** Cognition **3.** Social-emotional development **4.** Approaches to learning **5.** Perceptual, motor, and physical development	• School-family engagement • Access to health, mental health, and social supports

Exhibit E.2. Indicators related to evidence-based K–12 practices

	Outcomes & Milestones indicators	E-W System Conditions indicators
Response to Intervention	• Early grades on track • Math and reading proficiency in grade 3 • 6th grade on track • Math and reading proficiency in grade 8 • 9th grade on track • Grade point average • Math and reading proficiency in high school	• Teachers' contributions to student learning growth • Institutions' contributions to student outcomes
High-impact tutoring	• Early grades on track • Math and reading proficiency in grade 3 • 6th grade on track • Math and reading proficiency in grade 8 • 9th grade on track • Grade point average • Math and reading proficiency in high school	• Institutions' contributions to student outcomes
Out-of-school programs (such as summer programs)	• Early grades on track • Math and reading proficiency in grade 3 • 6th grade on track • Math and reading proficiency in grade 8 • 9th grade on track • Grade point average • Math and reading proficiency in high school	• Institutions' contributions to student outcomes
High-quality curricula	• Early grades on track • Math and reading proficiency in grade 3 • 6th grade on track • Math and reading proficiency in grade 8 • 9th grade on track • Math and reading proficiency in high school	• Access to quality, culturally responsive curricula • Classroom observations of instructional practice
SEL curricula and programs (such as growth mindset interventions)	• Consistent attendance • Positive behavior • High school graduation • Self-management • Social awareness • Self-efficacy • Growth mindset • Cultural competency • Mental and emotional well-being	• Equitable discipline practices • Access to health, mental health, and social supports

	Outcomes & Milestones indicators	E-W System Conditions indicators
Intensive, individualized support for students off track on Early Warning Indicators	• Positive behavior • Consistent attendance • Early grades on track • 6th grade on track • 8th grade on track • 9th grade on track • Grade point average • High school graduation	• Institutions' contributions to student outcomes • Access to health, mental health, and social supports
Small, personalized learning communities	• 6th grade on track • 8th grade on track • 9th grade on track • High school graduation	• Inclusive environments
Accelerated postsecondary pathways	• Completion of college preparatory coursework • Completion of early college coursework • High school graduation • Selection of a well-matched postsecondary institution • Senior summer on track • Postsecondary enrollment directly after high school graduation • Postsecondary certificate or degree completion	• Access to college preparatory coursework • Access to early college coursework • Access to college and career advising
Career pathways	• High school graduation • Minimum economic return • Employment in a quality job • Successful career transition after high school • CTE pathway concentration • Participation in work-based learning	• Access to in-demand CTE pathways • Access to college and career advising
Financial aid advising and hands-on assistance	• FAFSA completion • Postsecondary enrollment directly after high school graduation	• Unmet financial need • Cumulative student loan debt
Enhanced college advising	• SAT/ACT participation and performance • FAFSA completion • College applications • Selection of a well-matched postsecondary institution • Senior summer on track • Postsecondary enrollment directly after high school graduation	• Access to college and career advising

Exhibit E.3. Indicators related to evidence-based postsecondary practices

	Outcomes & Milestones indicators	E-W System Conditions indicators
Co-requisite support	• First-year credit accumulation • Gateway course completion • Postsecondary persistence	• Institutions' contributions to student outcomes

	Outcomes & Milestones indicators	E-W System Conditions indicators
Comprehensive, integrated advising	• FAFSA completion • First-year credit accumulation • First-year program of study concentration • Gateway course completion • Postsecondary persistence • Transfer (if applicable) • Postsecondary certificate or degree completion • Mental and emotional well-being • Participation in work-based learning	• Access to college and career advising • Access to health, mental health, and social supports • Expenditures per student
Mentoring and coaching	• First-year credit accumulation • First-year program of study concentration • Gateway course completion • Postsecondary persistence • Transfer (if applicable) • Postsecondary certificate or degree completion • Self-management • Growth mindset • Self-efficacy • Social awareness • Social capital • Communication skills • Higher-order thinking skills	• Access to college and career advising • Representational racial and ethnic diversity of educators • Inclusive environments
Financial incentives for students	• First-year credit accumulation • First-year program of study concentration • Gateway course completion • Postsecondary persistence • Transfer (if applicable) • Postsecondary certificate or degree completion	• Unmet financial need • Cumulative student loan debt • Expenditures per student
Digital learning	• First-year credit accumulation • First-year program of study concentration • Gateway course completion • Postsecondary persistence • Transfer (if applicable) • Postsecondary certificate or degree completion • Digital skills	• Access to quality, culturally responsive curricula • Expenditures per student

	Outcomes & Milestones indicators	E-W System Conditions indicators
SEL curricula and programs (such as self-regulated learning)	• First-year credit accumulation • Gateway course completion • Postsecondary persistence • Postsecondary certificate or degree completion • Self-management • Growth mindset • Self-efficacy • Social awareness • Cultural competency • Mental and emotional well-being	• Access to quality, culturally responsive curricula • Access to health, mental health, and social supports
Contextualized or integrated basic skills instruction in occupational training	• Successful career transition after high school • CTE pathway concentration • Industry-recognized credential • Participation in work-based learning • Communication skills • Higher-order thinking skills	• Access to in-demand CTE pathways • Expenditures on workforce development programs • Access to ongoing career skills development
Intentionally designed career pathway programs	• Postsecondary certificate or degree completion • Successful career transition after high school • CTE pathway concentration • Industry-recognized credential • Participation in work-based learning • Employment in a quality job	• Access to in-demand CTE pathways • Access to college and career advising • Expenditures on workforce development programs Access to ongoing career skills development

Exhibit E.4. Indicators related to evidence-based workforce practices

	Outcomes & Milestones indicators	E-W System Conditions indicators
Employer partnerships with CTE programs	• Successful career transition after high school • Industry-recognized credential • Participation in work-based learning • Employment in a quality job	• Expenditures on workforce development programs • Access to ongoing career skills development • Access to jobs paying a living wage
Youth workforce development programs	• Successful career transition after high school • Participation in work-based learning • Minimum economic return • Employment in a quality job	• Expenditures on workforce development programs Access to ongoing career skills development • Access to jobs paying a living wage
Sector-oriented job training programs	• Successful career transition after high school • Industry-recognized credential • Participation in work-based learning • Minimum economic return • Employment in a quality job	• Expenditures on workforce development programs • Access to ongoing career skills development • Access to jobs paying a living wage

Appendix F. Indicators related to essential questions

As discussed in the introductory chapter of this report, data users should begin with *essential questions* when identifying which indicators to prioritize for data collection and analysis. Below we outline 20 essential questions which can be used as a starting point for conversations around data and equity, alongside select relevant indicators from the E-W framework.

Exhibit F.1. Indicators related to essential questions

Essential questions		Adjacent System Conditions indicators	
1	**Do students and families have access to adequate public supports and neighborhood conditions to enable them to succeed academically and in the workforce?**	• Childhood experiences • Health insurance coverage • Food security • Access to affordable housing • Access to technology • Access to transportation	• Exposure to neighborhood crime • Neighborhood economic diversity • Neighborhood racial diversity • Neighborhood juvenile arrests

	Essential questions	Outcomes & Milestones indicators	E-W System Conditions indicators
2	**Are eligible children enrolled in quality, full-day pre-K programs?**	• Enrollment in public pre-K	• Access to quality pre-K • Access to full day pre-K • Access to child care subsidies
3	**Are children demonstrating kindergarten readiness across the five learning domains?**	• Enrollment in public pre-K • Kindergarten readiness across five domains: **1.** Language and literacy **2.** Cognitive ability **3.** Social-emotional development **4.** Approaches to learning **5.** Perceptual, motor, and physical development	• Access to quality pre-K • Access to full day pre-K • Access to child care subsidies • School-family engagement • Teacher experience • Classroom observations of instructional practice
4	**Do students have access to quality, full-day kindergarten?**	• Early grades on track	• Access to full-day kindergarten
5	**Are students demonstrating satisfactory academic progress, consistent attendance, and positive behavior to be considered on track in the early grades?**	• Kindergarten readiness across five domains: **1.** Language and literacy **2.** Cognitive ability **3.** Social-emotional development **4.** Approaches to learning **5.** Perceptual, motor, and physical development • Early grades on track	• Access to full-day kindergarten • Equitable discipline practices • Teacher credentials • Teacher experience • Access to quality, culturally responsive curricula • Classroom observations of instructional practice • Teachers' contributions to student learning growth

	Essential questions	Outcomes & Milestones indicators	E-W System Conditions indicators
6	**Do students have access to quality school environments including quality curricula and instruction, experienced teachers, effective leaders, and adequate funding?**	• Early grades on track • 6th grade on track • 9th grade on track • High school graduation	• Teacher credentials • Teacher experience • Classroom observations of instructional practice • Student perceptions of teaching • Teachers' contributions to student learning growth • Effective program and school leadership • Institutions' contributions to student outcomes • Access to quality, culturally responsive curricula • Expenditures per student
7	**Are there populations of students that disproportionately experience exclusionary discipline practices that disrupt their educational experience?**	• Consistent attendance • Positive behavior	• Equitable discipline practices • School safety • Inclusive environments
8	**Are students meeting reading and math benchmarks in grades 3 and 8?**	• Early grades on track • Math and reading proficiency in grade 3 • 6th grade on track • 8th grade on track • Math and reading proficiency in grade 8	• Teacher credentials • Teacher experience • Classroom observations of instructional practice • Teachers' contributions to student learning growth • Effective program and school leadership • institutions' contributions to student outcomes
9	**Are teachers and schools making sufficient contributions to academic growth for students?**	• Early grades on track • Math and reading proficiency in grade 3 • 6th grade on track • 8th grade on track • Math and reading proficiency in grade 8 • 9th grade on track • Grade point average • Math and reading proficiency in high school	• English learner progress • Teachers' contributions to student learning growth • Institutions' contributions to student outcomes

	Essential questions	Outcomes & Milestones indicators	E-W System Conditions indicators
10	**Do students attend schools with safe, inclusive, and supportive environments that support their social, emotional, mental, and physical development and well-being?**	• Self-management • Growth mindset • Self-efficacy • Social awareness • Cultural competency • Social capital • Mental and emotional well-being • Physical development and well-being	• School-family engagement • Equitable discipline practices • School safety • Inclusive environments • Representational racial and ethnic diversity of educators • School and workplace racial and ethnic diversity • School and workplace socioeconomic diversity • Access to health, mental health, and social supports
11	**Are students demonstrating satisfactory academic progress, consistent attendance, and positive behavior to be considered on track for high school graduation?**	• Consistent attendance • Positive behavior • 8th grade on track • Math and reading proficiency in grade 8 • 9th grade on-track • Grade point average • Math and reading proficiency in high school	• Equitable discipline practices • Teacher credentials • Teacher experience • Classroom observations of instructional practice • Teachers' contributions to student learning growth • Institutions' contributions to student outcomes • Access to quality, culturally responsive curricula
12	**Do students have access to and complete rigorous and accelerated college preparatory coursework?**	• Successful completion of Algebra I by 9th grade • College preparatory coursework completion • Early college coursework completion • SAT and ACT participation and performance	• Access to college preparatory coursework • Access to early college coursework • Equitable placement in rigorous coursework • Access to quality, culturally responsive curricula • Access to college and career advising
13	**Are students taking the necessary steps to apply to college after high school with sufficient counseling support?**	• SAT and ACT participation and performance • FAFSA completion • College applications • Social capital	• Access to college and career advising
14	**Are students graduating from high school on time and successfully transitioning into further education, training, or employment?**	• High school graduation • Senior summer on track • Postsecondary enrollment directly after high school graduation • Successful career transition after high school • CTE pathway concentration • Participation in work-based learning	• Access to college and career advising • Access to in-demand CTE pathways • Expenditures on workforce development programs • Access to jobs paying a living wage

	Essential questions	Outcomes & Milestones indicators	E-W System Conditions indicators
15	**Are there quality pathways for students who pursue career training that lead to employment in quality jobs?**	• CTE pathway concentration • Participation in work-based learning • Transfer (if applicable)	• Access to in-demand CTE pathways • Expenditures on workforce development programs • Access to ongoing career skills development
16	**Are students matriculating to well-matched postsecondary institutions that successfully graduate their students with credentials of value?**	• Selection of a well-matched postsecondary institution • Senior summer on track • Postsecondary enrollment directly after high school graduation • Postsecondary persistence • Postsecondary certificate or degree completion • Minimum economic return	• Institutions' contributions to student outcomes • Access to college and career advising • Unmet financial need • Cumulative student debt
17	**Do students attend postsecondary institutions that provide adequate financial aid and that are adequately funded to offer a quality educational experience?**	• Student loan repayment	• Expenditures per student • Unmet financial need • Cumulative student debt
18	**Are students experiencing sufficient early momentum in postsecondary education to be on track for on-time completion?**	• First-year credit accumulation • Gateway course completion • Postsecondary persistence • Transfer (if applicable)	• Access to college and career advising • Unmet financial need
19	**Are students completing credentials of value after high school that set them up for success in the workforce?**	• Postsecondary certificate or degree completion • Industry-recognized credential • Social awareness • Cultural competency • Civic engagement • Social capital • Digital skills • Communication skills • Higher order thinking skills • Minimum economic return • Student loan repayment	• Institutions' contributions to student outcomes • Cumulative student debt
20	**Are students gaining access to quality jobs that offer economic mobility and security after high school or postsecondary training and education?**	• Employment in a quality job • Economic mobility • Economic security	• Access to jobs paying a living wage • Access to ongoing career skills development

Mathematica Inc.

Princeton, NJ · Ann Arbor, MI · Cambridge, MA
Chicago, IL · Oakland, CA · Seattle, WA
Tucson, AZ · Woodlawn, MD · Washington, DC

Mathematica®
Progress Together

mathematica.org

EDI Global, a Mathematica Company

Operating in Tanzania, Uganda, Kenya, and the United Kingdom