Knowledge Mobilization in the Production of Education Research: A Mixed Methods Study

Elizabeth Farley-Ripple

Stephen MacGregor

Mia Mazal

2/1/2023

R4S
Rethinking Research for Schools

Center For Research Use In Education

University of Delaware
University of Minnesota
University of Pennsylvania

Contents

Table of Figures

Table of Tables

About the Center

The Center for Research Use in Education is an Institute for Education Sciences-funded knowledge utilization center focused on rethinking research for schools (R4S). Our mission is to expand the study of research use and produce a more holistic picture of what drives it, from the production of knowledge by researchers to the application of research in schools. We also seek to identify strategies that can make research more meaningful to classroom practice.

At our center, we believe that education research is an important part of the educational process. We further believe that rigorous evidence, whether qualitative or quantitative, can foster better opportunities and outcomes for children by empowering educators, families, and communities with additional knowledge to inform better decision-making. For this reason, we seek to support strong ties between research and practice.

To learn more about our center, visit https://crue.cehd.udel.edu/ or follow us on Twitter at @UDCRUE.

Acknowledgements

The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R305C150017 to the University of Delaware. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.

The authors wish to thank those that contributed to the data collection, analysis, and writing in this report, including Samantha Shewchuk for her contributions to data collection and analysis; Darren Agboh and Horatio Blackman for supporting data preparation for case selection; and Henry May, Katherine Tilley, and Deborah Micklos for their expert reviews.

Calls to improve relationships between research and practice abound, among them efforts to help researchers to work in partnership with and communicate more effectively with policy and practice audiences, informing those that govern and design educational policies and those charged with implementation in schools and classrooms, respectively. These calls range from advocacy for participatory models of research to revisions to academic incentives that presently prioritize contributions to literature above impact on policy or practice. Most recently, the National Academies of Science, Engineering, and Medicine report, *The Future of Education Research at the Institute of Education Sciences in the U.S. Department of Education* (2022), emphasizes that the largest federal funder of education research should include knowledge mobilization among its core areas of work. The end goal of these efforts is to have a more impactful research enterprise, one that both meets the needs of and is taken up in decisions made by policymakers and practitioners.

In our work, the Center for Research Use in Education (CRUE) seeks to better understand how to strengthen the relationships between research and practice to the same ends – increasing the impact of research by better meeting the needs of policy and practice and by producing work that is useful and used in decision-making. We have approached our work with attention to bi-directionality – focusing on both decision-processes in the practice space and the role of research in them (Farley-Ripple et al., 2022a, 2022b), as well as research production and the strategies used to increase its impact (Van Horn et al, 2023). In this paper we describe our work on the latter, presenting results of a mixed methods inquiry into the knowledge mobilization practices of researchers.

Conceptual Framework and Related Literature

Our work is guided both by the overarching framework for our Center, derived from prior literature on the use of research evidence, and the literature on knowledge mobilization.

The CRUE framework

Our construct of "Depth of Production" (Van Horne et al., forthcoming) describes the complex and multidimensional ways in which the production and dissemination of research evidence is relevant, systematic, and likely to generate improvements in educational policy and practice. Attending to this complexity, the CRUE framework centers on six dimensions for understanding practices related to the production of research use: the nature of the *evidence* generated (including designs, methods, research questions), extent of broader stakeholder *participation* in the research process, efforts to support *interpretation* of research for use in policy or practice, approaches to *dissemination* (including products and mechanisms for distribution), beliefs about the how findings can inform *stages of decision-making,* and *frequency* with which these practices are engaged across

research projects. As a larger construct, depth of production is intended to help describe the potential for research to meaningfully and systematically inform educational decisions.

CRUE's framework further conceptualizes the factors that influence both research production and its use in school decision-making in terms of Dunn's (1980) differences in assumptions and perspectives between the research and practice community. These differences reflect the distance between researchers and practitioners in terms of (1) the usefulness of research products, (2) the nature and quality of research, (3) problems that research addresses, (4) the structures, processes, and incentives surrounding research production and use, and (5) the relationships between communities.

Connecting to the broader literature and recent calls in the public discourse, the CRUE framework can be understood as reflecting knowledge mobilization and associated facilitators and barriers. To understand what research production and its contexts look like when supporting stronger ties with practice, we turn to the literature on knowledge mobilization.

Knowledge mobilization

Broadly, knowledge mobilization (KMb) is the active and intentional process of sharing knowledge among research production, mediation, and use contexts (Levin, 2013). Depending on the public service sector and discipline, KMb is sometimes referred to as knowledge translation, knowledge exchange, or knowledge transfer, among other terms (Powell et al., 2017; Ward, 2017). Yet, regardless of the terminology, the underlying idea is the same: traditional, rational-linear approaches to research dissemination are often insufficient for generating meaningful change beyond academic contexts. Decades of study into KMb illustrate this idea (Davies et al., 2019; Nutley et al., 2007), and to contextualize the findings in this report, we present two nuances of KMb: (1) the extant theoretical and empirical literatures converge on common approaches to KMb and what makes some approaches more effective than others, and (2) significant barriers to KMb persist within research-producing institutions.

Knowledge mobilization: What is known?

The KMb literature is replete with frameworks and models that chart how research can achieve societal impacts. Some of the most cited examples include Kitson et al.'s (1998, 2016) PARIHS framework, Walter et al.'s (2003) continuum of research use, Graham et al.'s (2006) knowledge-to-action framework, and Ward et al.'s (2009) knowledge brokering framework. However, with the widespread attention directed to theoretical developments, a growing concern among KMb scholars and practitioners has been empirical advancements not keeping pace. The situation is such that leaders in the field recently called for KMb researchers "to resist the temptation to add to the existing confusing plethora of terms, models and frameworks" (Powell et al., 2018, p. 46). What this group of scholars proposed to stimulate empirical developments, and what has now informed the work of many others who study KMb (e.g., Beckett et al., 2018; Haynes et al., 2020; MacGregor,

2021; Malin & Hornbeck, 2022), is conceptualizing different KMb approaches according to "bundles of assumptions, actions, configurations and rationales . . . repeated patterns [called] 'archetypes'" (Davies et al., 2015, p. 111).

Davies et al.'s (2015) archetypes of KMb approaches were developed through a multi-phased process involving the synthesis of 71 published reviews related to KMb; a website analysis of the KMb activities of 186 research organizations (funders, major producers, and intermediaries) involved in health care, social care, and education; interviews and a follow-up survey with individuals from those organizations; and two stakeholder workshops to refine emerging insights. The findings from these multiple methods led to the development of eight archetypes, which they describe as follows:

- archetype A: producing knowledge (product push)
- archetype B: brokering own research to policymakers and practitioners
- archetype C: brokering wider research to policymakers and practitioners
- archetype D: advocating for the use of evidence
- archetype E: facilitating implementation of instrumental evidence by helping organisations with the change management process
- archetype F: research and implementation combined; a focus on local learning, co-production and bringing together all stakeholders
- archetype G: facilitating collaborations and networks around research evidence
- archetype H: advancing the field of knowledge mobilisation. (pp. 113-116)

In discussing the potential uses of their archetypes framework, Davies et al. (2015) are careful to note that no hierarchies of KMb approaches or specific practices should be made. They instead suggest, "the patterns of practice contained in the archetypes present different challenges, have different strengths and are likely to be appropriate in different contexts" (p. 118). Notwithstanding this note, their framework provides a useful basis for drawing several lessons about what is currently known for the various approaches in terms of their effectiveness and limitations. Indeed, they make this point in later articles (see Powell et al., 2017, 2018).

Relationships are at the heart of change efforts

The importance of relationships is perhaps the most repeatedly discussed research finding in the KMb literature. Connecting education research, practice, and policy was once treated as a linear process (i.e., archetypes A and to a lesser extent B and C), primarily involving the "push" or "pull" of research knowledge from research production into use contexts (Campbell et al., 2017; Lavis et al., 2003). In recent years, however, this unidirectional view has come under increasing scrutiny. While there are clearly instances where more traditional, linear KMb approaches can inform education policy and practice (e.g., reports of large-scale assessment data; see Rickinson et al., 2017), KMb is generally best understood as "a social process . . . [involving] effort and direction, not just random

interaction" (Cooper et al., 2009, p. 167). This conceptualization regards the individuals and groups who might use research knowledge as active agents rather than passive recipients.

In relation to Davies et al.'s (2015) framework, archetypes D through G increasingly prioritize relationships as the driving force of KMb. Research-practice partnerships (RPPs) provide an example of change efforts aligned with these archetypes. Coburn et al. (2013) describe RPPs as partnerships between education researchers and practitioners (and in some cases policymakers; see Cooper et al., 2020) that take mutualism as a core principle—what Tseng et al. (2017) later called "building two-way streets of engagement" (p. 3). As Farrell et al. (2017) reported in their study of IES funded RPPs, "trusting relationships enable partnerships to take on the work of deepening understanding of problems and engaging in joint work to impact policies and programs" (p. 31). And more than an academic exercise, the potential of RPPs to improve education systems has spurred considerable interest. The National Network of Education Research-Practice Partnerships, for example, now includes nearly 60 RPPs across the US, each espousing an understanding that improving education systems must begin with valuing the knowledge and perspectives of frontline practitioners.

Local relevance is part of research quality

A second lesson from the KMb literature is that local relevance is key to research knowledge being used in policy and practice contexts. In relation to Davies et al.'s (2015) framework, an appreciation for local relevance is germane to all eight archetypes. Whether producing traditional research products, brokering research to users, or facilitating collaborations, relevance to policy and practice is now widely considered not only a core dimension of research quality (e.g., Akkerman et al., 2021; Gutierrez & Penuel, 2014; Ming & Goldenberg, 2021; Welsh, 2021) but also "an important step toward more equitable and consequential research" (Gutiérrez & Penuel, 2014, p. 22). But what does relevance actually mean? Akkerman et al. (2021) suggest it derives from "a continuous dialogical attunement to how people, settings, and their societal landscapes meaningfully move forward" (p. 420). In more concrete terms, it means understanding not only the intentions of KMb efforts from multiple vantage points (e.g., practitioners, decision makers) but also the opportunities and constraints of the contexts under consideration. The former can be understood by answering the question, "why mobilize knowledge" (see Ward, 2017), which prompts a clear articulation of the aims of KMb efforts (e.g., developing local solutions to practice-based problems). The latter can be understood by examining both the individual and organizational enabling components of change efforts (e.g., educator skill sets, organizational structures) and system-level influences (e.g., system inter-dependencies; see Rickinson et al., 2022).

Multiple studies have recently illustrated the value of local relevance to KMb in education (e.g., Finnigan et al., 2013; Massell et al., 2012; Brown et al., 2022). In our own work on the use of research in school-based decision-making, we found that "deep users" of research prioritize

compatibility with local context, including student characteristics, available resources, and fit with school goals when vetting evidence to inform decisions (Farley-Ripple et al., 2022b). Returning to the example of RPPs, Coburn et al. (2013) underscore that part of what makes these collaborative arrangements of education researchers, practitioners, and policymakers effective is that they "are intentionally organized to investigate problems of practice and solutions for improving district outcomes" (p. 2). Simply put, if research implications are poorly contextualized for potential use contexts, the potential to achieve uptake will be limited.

Change occurs in ecosystems

A final lesson from the KMb literature, which builds upon the previous two, is that change efforts must heed the ecological nature of education policy and practice. As a progression on classic debates about the nature of research producing and using communities (e.g., Caplan's [1979] writing on the "two-communities theory"), Lenhoff et al. (2022) explain that "'thinking ecologically' about education is useful because it draws attention to interconnectedness, context, complexity, and scale" (p. 1). Such ecological thinking is represented to varying degrees in archetypes D through H of Davies et al.'s (2015) framework, and it amounts to two big ideas: (1) the complex nature of knowledge and knowing and (2) education systems are interdependent, adaptive, and dynamic. Further, Maxwell and colleagues (2022) find that failure to attend to system interdependencies and interactions can actually impede evidence use.

In tandem with the growing awareness that research use is rarely a linear process, KMb scholars and practitioners have urged for an understanding of knowledge as "situated, dynamic, contested and subject to power dynamics" (Powell et al., 2017, p. 202). The idea here is that if influencing policy and practice is held as a goal for KMb efforts, research knowledge should not be treated as having a privileged position over other types of knowledge. In practice, this means giving attention to whose knowledge is being mobilized (e.g., producers, practitioners, service users, decision makers) as well as what is being mobilized (e.g., empirical knowledge, technical knowledge, or practical wisdom; see Ward, 2017). Moreover, as Bynner and Terje (2021) explain based on their study of public service reform in Scotland, "an integrative approach to knowledge mobilisation entails negotiating different interpretations of the problem and arriving at considered judgements on alternatives and potential outcomes" (p. 87). Not only then must multiple types of knowledge be integrated to precipitate change efforts but also multiple actors and governance systems, each with specific social, economic, and political circumstances (MacGregor et al., 2022).

Barriers to KMb within research-producing institutions

The growing literature on KMb belies the challenges researchers and universities face in understanding and engaging in effective patterns of practice (Cain et al., 2018; Cooper et al., 2018; Nichols et al., 2013; Sá et al., 2011, 2012; Zuiker et al., 2019). Benneworth et al. (2018) highlighted two primary issues:

- Similar to concepts such as community engagement, KMb is conceptually vague, and it is embedded to varying extents across the teaching, research, and "third mission" activities of universities.
- Universities, as primary knowledge producers, are "extremely complex organisations," and as such, "they have major inter-institutional differences based on their missions, study programmes, size and external environment. . . . [as well as] high intra-institutional diversity due to being composed of different disciplinary communities with different norms and values" (pp. 137-138).

As a result of these issues, building capacity in KMb has, until recently, been largely an independent and ambiguous exercise for universities (Bayley & Phipps, 2019; Powell et al., 2017), with few published evaluations to inform the design or operationalization of KMb-aligned structures and functions (Camden et al., 2015; Davies et al., 2015; Ward, 2017). In the face of increasing pressure to demonstrate societal impacts, the situation resembles what Watermeyer (2016) described as a "'blind panic' as universities struggle to reconcile their role(s) in the political, cultural, social and self-evidently knowledge economies, vacillating between detached and critical scrutineers or commentators and integrated accomplices of government, industry and business" (p. 201). Simply put, efforts to build capacity and engage in KMb are constrained at all levels—individual, organizational, and systems—about how to do KMb well. Some of the most pressing challenges for the field are as follows:

- the need for more empirical research examining what approaches work across systems, sectors, and disciplines (Dwan et al., 2015; Levin, 2013);
- the gulf between KMb theory and practice (Davies et al., 2015; Nutley et al., 2019; Powell et al., 2017, 2018), with professional collaborations between KMb researchers and practitioners still relatively scarce;
- the need to "learn from a wider range of emergent literatures that show potential to enrich our understanding" (Davies et al., 2015, p. 132; see also Boaz et al., 2019);
- the lack of operational models, tools, and case examples of applying a systems lens to KMb (Best & Holmes, 2010) in addition to complexity perspectives (e.g., Glegg et al., 2019; Kitson et al., 2018; Oliver & Faul, 2018); and
- the need to explore the roles and practices of knowledge intermediaries—a position that includes knowledge brokers, boundary spanners, embedded researchers, research mediators, among many others (Kivimaa et al., 2019)—engaged in KMb efforts (Cooper, 2014; Lightowler & Knight, 2013; Powell et al., 2017), particularly those working within research institutions (Bogenschneider, 2018; Cvitanovic et al., 2018).

It is precisely these challenges that the present study seeks to address. Drawing on the CRUE's national study of research use and production in education, we present a mixed methods analysis of KMb featuring ten case studies of research projects identified through survey responses about

depth of production that are consistent with KMb practices. Through these cases, we sought to answer the following research questions:

1. In what ways is knowledge mobilized throughout the research project (from conception through dissemination)?
2. What factors support KMb in these projects?

In answering these questions, the findings from this study surface specific practices, approaches, and enabling conditions for KMb in U.S. research-producing institutions, which are useful in developing guidance for researchers, funders, institutional leadership, and other stakeholders in supporting a more intentional, impactful research-practice enterprise.

Methods

We used a mixed methods explanatory sequential design (Creswell & Plano Clark, 2019) for the purposes of triangulation and complementarity (Greene et al., 1989). Specifically, we used survey data from a national sample of education researchers to select cases with above average responses on depth of production (as described above) items from which to learn about their KMb and engagement practices. The quan-QUAL design is illustrated in Figure 1.

Quan

Sample. The Survey of Evidence in Education - Research (*SEE-R*) was sent to more than 1,100 researchers across the U.S. The population sampled in this study is any researcher whose work focused on K-12 education policy and practice in the United States. Because no known sampling frame exists, the sample was drawn from a) "Education" academic departments (e.g., Schools of Education) and Education Research Centers at research universities with Very High Research Activity (R1); b) Researchers funded by the following branches of the Institute of Education Sciences (IES): the National Center for Education Research (NCER), National Center for Special Education Research (NCSER), and National Center for Educational Evaluation and Regional Assistance (NCEE); c) Researchers funded by the National Science Foundation (NSF) through the Discovery Research PreK-12 program (DRK-12) or the Innovative Technology Experiences for Students and Teachers program (ITEST); d) Regional Education Laboratories (REL) funded by the Institute of Education Sciences (IES); and e) a sample of researchers who were identified by practitioners taking the *Survey of Evidence in Education for Schools (SEE-S)* (this is referred to as the augmentation sample, as it is a supplementary sample based on a separate study).

The *SEE-R* was administered to education researchers from May 2020 through April 2021 with 341 respondents completing at least one full section of the survey (response rate of 30.6%). Table 1 illustrates the characteristics of the researchers in our sample.

Figure 1 Mixed methods diagram of research design

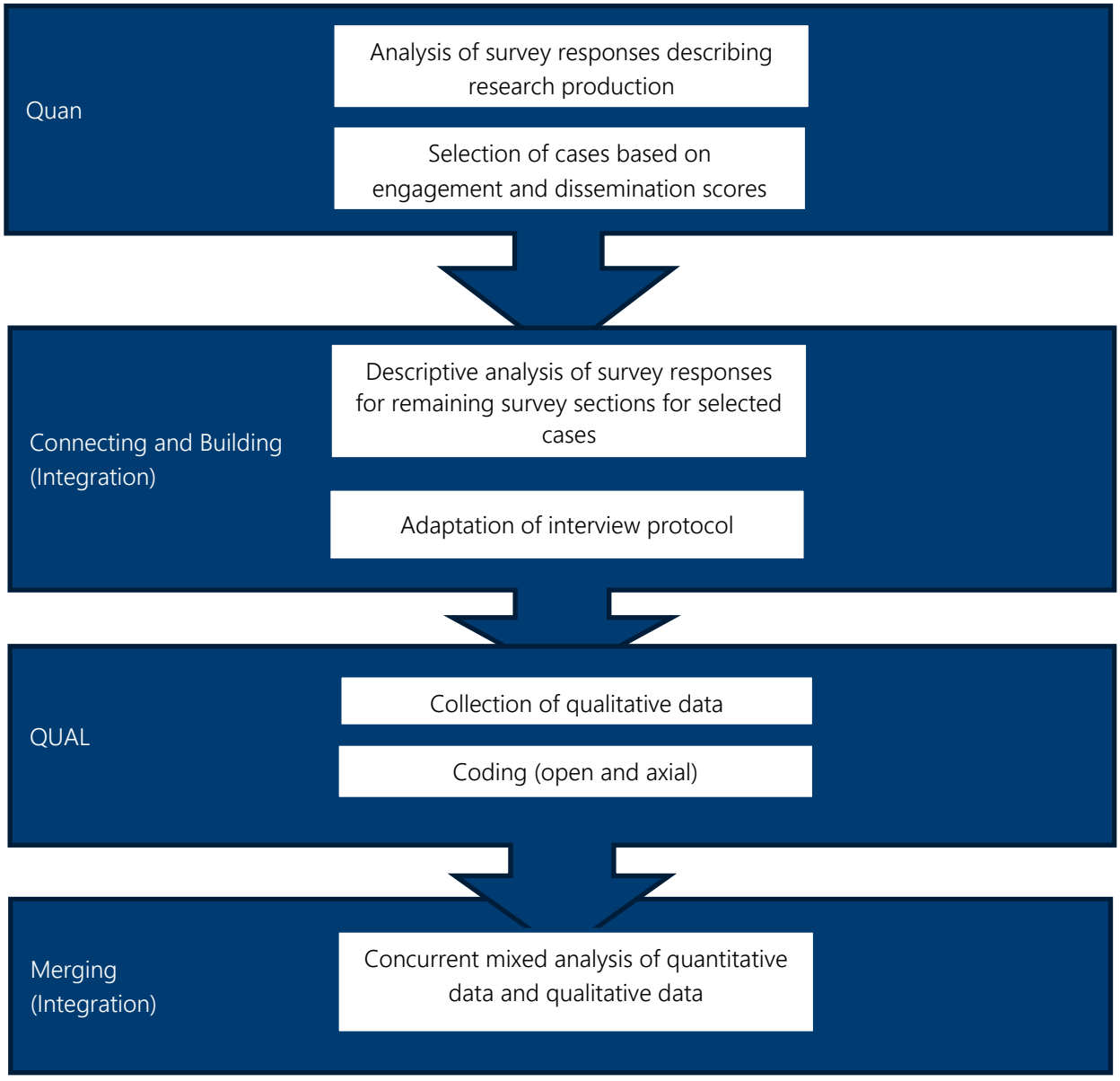


Table 1 Characteristics of participating researchers

Characteristic	*n*	%
Position		
Tenured faculty at a college/university	182	53%
Tenure-track faculty at a college/university	25	7%
Non-tenure-track faculty at a college/university	41	12%
Non-faculty researcher at a college/university	10	3%
Researcher at a non-profit organization	46	13%
Researcher at a for-profit organization	23	7%
Researcher at a school district	1	< 1%
Other researcher	13	4%
Years of Experience		
1 yr	1	< 1%
2–3 yrs	4	1%
4–6 yrs	18	5%
7–10 yrs	40	12%
11–15 yrs	80	23%
16–20 yrs	66	19%
21+ yrs	132	39%
Years at Organization		
1 year or less	16	5%
2-3 yrs	23	7%
4-6 yrs	52	15%
7-10 yrs	68	20%
11-15 yrs	67	20%
16-20 yrs	54	16%
21+ yrs	61	18%
Gender		
Male	133	39%
Female	205	60%
Prefer to self-describe	1	<1%
Prefer not to say	2	1%
Degree Attained		
Bachelor's	4	1%
Master's	10	4%
PhD	304	89%
EdD	23	6%
Race		
Black	11	3%
White	293	86%
Hispanic	13	4%
Asian	16	5%
South Asian or Pacific Islander	6	2%
American Indian or Alaskan Native	2	1%
Other/Prefer not to say	7	2%

Measures. The conceptual framework underlying the Center's work is operationalized through the *SEE-S* and *SEE-R*—a pair of instruments to capture both practitioner and researcher perspectives on research use (Figure 2). We focus in this report on the *SEE-R*. The *SEE-R* was developed using a multi-phase approach, utilizing both qualitative and quantitative methods to produce reliable and valid survey measures. Our development process included drafting blueprints of various instruments utilizing our framework, exploratory interviews, and multiple rounds of cognitive interviews and pilot testing. Preliminary psychometric evaluation of items intended to represent specific constructs were also conducted after each stage of piloting. The final survey includes five sections which correspond to our conceptual framework as well as the research questions underlying this report (Figure 2). Items are primarily closed-ended and ask respondents to indicate agreement, frequency, or degree of importance of activities, conditions, experiences, and beliefs aligned to the dimensions of our conceptual framework. Open-ended items ask respondents to convey specific details about their work, including decisions about conducting research, members of their networks, and so on. Additional details about specific items, survey development, and the psychometric properties of the instrument are available from the *SEE-R Descriptive and Technical Report* (Van Horne et al., forthcoming).

In order to select cases for the QUAL phase of this study, we focused on depth of production items most closely linked to KMb practices according to the literature: participation and dissemination. To assess "participation," we created a simple summative score capturing whether policy and practice stakeholders were engaged in problem identification, shaping research questions, conducting research, interpreting results, and disseminating findings. For "dissemination," we created a score for four aspects of the extent to which researchers mobilized knowledge through channels valued by practitioners as per Farley-Ripple et al. (2022a), dissemination. These included 1) a count of products that fit these criteria (e.g. practitioner journals, practice-focused presentations, policy briefs, curriculum, and books), 2) availability of research in undergraduate or graduate courses, 3) mobilization through government agencies (e.g. federal guidance), or 4) availability through publishers, program developers, or professional associations. (original items are presented in Appendix A). We generated a list of respondents whose score for engagement or dissemination was at least one standard deviation above the mean. This yielded a pool of 47 researchers. We purposefully selected a stratified sample that included representatives from our five sampling categories and that represented a mix of educational issues (e.g. STEM, leadership) and designs (e.g. evaluation, descriptive). We contacted ten researchers and engaged in replacement sampling based on the same criteria as needed. None of the augmentation sample researchers responded to our request (n=3), and two other researchers were unavailable. We therefore contacted 15 researchers to achieve our sample of ten for the QUAL phase of the research. Data on the participation and dissemination measures are presented in Table 2.

Figure 2 Overview of the SEE-S and SEE-R instruments

Integration: Connecting and building

Additionally, survey data were used to inform and qualitative data collection. The ten researchers' responses to items in the survey components were first compared to the full sample of SEE-R respondents to identify unique characteristics of the researchers and/or their projects, which were used as probes in the QUAL phase during interviews. For example, if a researcher's response regarding available structures to support engagement (a component of the *Gaps Between Research and Practice* section of the *SEE-R*) was notably higher than the larger sample, we specifically addressed that issue in the interview.

Table 2 Differences on sampling criteria among case study, case study pool, and non-case study respondents

	Non-case study sample (n=267)		Case Study Pool (not selected (n=37))			Case Studies (Selected, n=10)		
	Mean	SD	Mean		SD	Mean		SD
Engagement in identifying problems, research questions, conducting research								
School-based practitioners	0.97	0.99	1.22		1.06	1.30		1.16
District administrators	0.70	0.83	1.65	***	1.23	2.00	***	1.25
Intermediary organizations	1.39	1.30	1.51		1.19	1.90		1.10
Engagement in interpretation of results, dissemination of findings								
School-based practitioners	0.48	0.74	0.49		0.73	0.90		0.88
District administrators	0.40	0.66	0.78	##	0.98	1.30	***	0.82
Intermediary organizations	0.96	0.93	0.86		0.75	0.80		0.79
Dissemination focused on policy and practice								
Practice/policy-focused products[a]	5.99	2.75	6.70		2.58	6.70		2.87
Through undergraduate/graduate courses[b]	0.14	0.43	0.26		0.56	0.89	***	1.05
Through government agencies (e.g. federal guidance, WWC)[c]	0.23	0.50	0.31		0.63	0.11		0.33
Through publishers or professional associations[d]	0.15	0.38	0.49	***	0.78	0.89	***	0.93

[a] Measure is constructed by a count of 12 policy or practice focused products (range 0-12)

[b] Measure is constructed by a count of availability in undergraduate or graduate courses (range 0-2)

[c] Measure is constructed by a count of availability through federal/state guidance, a regional education laboratory, or the What Works Clearinghouse (range 0-3)

[d]Measure is constructed by a count of availability through a publisher/PD provider or professional association (range 0-2)

QUAL

Researchers participated in a semi-structured interview that lasted between 60 and 90 minutes. The interview began by focusing on the project which they reported on in the survey, including how the project came about, engagement with stakeholders throughout the process, and development and mobilization of research products from the project. The interview then turned to the larger context of the work, including the researcher's professional background, organizational context, beliefs about the relationship between research and practice, and practices as they relate to connecting with practice and practitioners. Interviews varied in terms of specific probes used, with noteworthy responses to survey items used to probe for additional detail or background information. In this way, the qualitative data provide greater detail and explanation of survey responses.

Interviews were transcribed, read, and discussed by members of the research team, leading to the development of structural codes that reflected a priori codes informed by the CRUE conceptual framework (e.g. dimensions of depth of production and hypothesized factors shaping depth) as well emergent codes aligned to our research questions and purpose (i.e., focusing on practices and factors that support those practices). Codes were then grouped conceptually and applied to all interviews. The first set of codes were applied to identify the practices and strategies used by researchers, including what the research project entailed; what stakeholders were engaged, when, and how; the types of products developed and how they were disseminated; and the intended or actual impact of the research. A second set of codes focused on factors that influenced each dimension of research practice, for example, influences on the research project, influences on engagement, and so on. A third set of codes captured influences based on an iterative process of reading and refining the categories. The three sets of codes were jointly applied by the research team, with questions and clarifications resolved through discussion and consensus.

Integration: Analysis

The research team created two matrices, one capturing research production practices (RQ1) and one capturing factors that influenced dimensions of practice (RQ2), that summarized data by researcher and then across researchers. Each cell of the matrix was composed of a summary of relevant quantitative data (quan) from the survey and a summary of qualitative data resulting from the coding process (QUAL). Data were jointly interpreted by the research team to identify patterns and themes that address our research questions, and develop integrated findings are presented narratively.

Case Summaries

Mr. Fisher[1], selected for their engagement with district administrators throughout the research process, is a professional staff member at an independent research organization. They refer to themselves as a "knowledge manager," helping the research team and multiple state and district partners to collaborate through a Regional Education Laboratory, a federally-funded system of technical assistance centers. The case focused on collaborative work identifying, revising, and implementing a school culture measure in partnership with an urban district to help the district achieve its improvement goals. Key district leaders were engaged at multiple points in the work to guide researchers' decisions, and researchers helped district leaders to understand, use, and plan for future uses of their data. Products were therefore tailored to the specific needs of the partners, including meetings, presentations, tools, training, and reports, most of which were shared directly with partners rather than publicly available.

Dr. Grayson, selected for their efforts to disseminate to policy and practice communities, is a newly-tenured faculty member at a research-intensive institution whose work adopts a participatory approach to inquiry in order to include the perspectives of teachers – a principle that reflects their own background in the classroom. The central project in the case used ethnography and case study to examine teachers' role in supporting student dialogue. Co-led with a long-term collaborator at another university, the project stemmed from collaboration with a national professional association, which facilitated the engagement of teachers as researchers on the project. Lessons learned from the work were shared in a range of formats, with many products led by or co-created with participating teachers. These included practice-focused articles and presentations at educator conferences, podcasts with the national association, and popular press pieces, as well as traditional academic publications.

Dr. Keller, selected for their efforts to disseminate to policy and practice communities, is an early-career researcher at a research-intensive university whose work is motivated by their prior experience as a classroom teacher. Supported by a federal early career grant opportunity, the project centered in this case is a development project in which they generated a multimedia intervention for vocabulary development, and through an iterative process, trialed and improved the resources with elementary teachers across the region. Although teachers were not formally engaged in the development process, Dr. Keller incorporated their feedback and practices into improvements to the intervention. Products resulting from this work included the intervention and accompanying resources for educators, which are freely available on their website, as well as

[1] Note: the survey was completed by the project PI, but that individual was unavailable for interview and recommended a colleague, Mr. Fisher, on the project.

practitioner-focused articles and presentations, social media posts, multimedia, and other strategies - all of which were created by Dr. Keller.

Dr. Diaz, also selected for their efforts to disseminate to policy and practice communities, is a senior scholar at a master's degree granting university with a long history of preparing teachers. The project featured in this case involves developing an inquiry-based science curriculum in collaboration with multiple science education intermediaries and professional associations. Funded by a federal agency, this work produced innovative digital materials to facilitate student inquiry and promote engagement and learning. Results of this work have been presented at both academic and educator-focused conferences, with an emphasis on providing professional learning opportunities for educators offered by project partners. Additionally, their work is mobilized through association and network newsletters, social media, other media such as interviews, and, importantly, through coursework in teacher education programs. Their work has reached educators in eight states and has created a community of professionals working on shared goals for science education.

Dr. Clemons, selected for their engagement with intermediaries throughout the research process, is a senior scholar at a research-intensive university whose work focuses on the impact of education policy on a range of outcomes. In this case, they shared work conducted as an affiliate of an RPP at another institution, where they led the design and evaluation of a policy intervention to support students and families in educational decision-making. The project was responsive to district and community concerns, engaged district leaders and community organizations at various points in the project, and was funded by multiple sources. Findings were published in academic journals, but also communicated in multiple forms to stakeholders and partners, through presentations, reports, and briefs. In addition to making the intervention and its associated resources available for students and families, the findings of the project influenced district policies.

Dr. Blakesly, selected for their engagement with an intermediary partner throughout the research process, is a mid-career researcher at a research-intensive university with a strong commitment to doing research with impact. Their project is an evaluation of an elementary science curriculum, conducted in collaboration with the curriculum developer. The project was funded by a federal agency and was trialed in a large urban district, where Dr. Blakesly has been working with the central office to support implementation and evaluation. Because the evaluation demonstrates positive outcomes for children, the curriculum developer has a strong interest in disseminating the result to the Works Clearinghouse and state agencies so that their program can be widely adopted. Dr. Blakesly is working to support those goals, has produced policy briefs, and academic publications. While the participating district has not adopted the curriculum, Dr. Blakesly explained that the work has resulted in the curriculum being recommended in at least two states.

Dr. Ulrich, selected for their stakeholder engagement and broad dissemination, is a senior researcher who started their career in industry, and now leads educational projects in a community-based educational institution. Funded by a federal agency as well as other funding sources, the focus of the project for this case was on growing understanding and interest in computational science among students through a series of programs and evaluations of those programs. The evaluations of those programs helped Dr. Ulrich and colleagues to better understand how to improve student outcomes. The work engaged students, educators, early career scholars, and scientists, ultimately building networks of stakeholders committed to this area of work. Products from this work included traditional academic publications, but more often targeted students, educators, and industry through practitioner articles, curricula, briefs, blogs, and, importantly, events.

Dr. Dunn, selected for their practitioner engagement throughout the research process, is a mid-career researcher at a land-grant, research-intensive university. The work featured in this case was a partnership between the researcher and the local district that resulted from long-term relationship building and conversations and drew local interest from community groups as well. A local philanthropic organization with aligned political interests funded the project which explored equity-related issues and outcomes arising from historical local education policy. Because the aim of the work was to inform district policy, Dr. Dunn engaged local leaders during the research. The products generated were tailored to their needs, including briefs, reports, and presentations. In addition, interviews were held with local media. Academic articles were in development at the time of the case study. Results were influential in shaping district leaders' perceptions of the particular equity issue and ultimately influenced district policies.

Dr. Francis, selected for both their stakeholder engagement and broad dissemination, is a senior staff member at a scientific institution. They work on a range of projects, all directed at building the field around mathematics teaching and learning—in this way, Dr. Francis's case is not traditional, empirical research as in the other cases. They work at an independent research institution and are entirely soft-funded and sometimes have funding gaps that threaten the work. This particular project is funded by a federal education agency. Dr. Francis engages a wide range of stakeholders, from classroom teachers to international coalitions, to promote research that can drive classroom practice, share knowledge and practice across geographic boundaries, and to elevate the visibility of mathematics education research nationally and globally. Products that come from projects include webinars, curricula, social media, convenings, and networks that link researchers, policymakers, and practitioners. Because of the nature of the work, impact is challenging to demonstrate, but Dr. Francis designs their work with a clear theory of change for social impact.

Dr. Alvarez, selected for their district and school engagement throughout the research process, is a senior researcher at a land-grant, research-intensive university whose research features an RPP enabled by a university center that supported collaboration and engagement with local school

districts. The focal project in this case sought to develop professional learning for educators, including design, implementation, and evaluation phases. District leaders and coaches were involved throughout the project in various ways, including in an advisory board, providing feedback on the professional learning, recruiting teachers, and sharing the outcomes of the project. Dr. Alvarez's research was shared through professional development sessions and materials, as well as in local educator conferences and academic venues. In addition to improving skills among local teachers, the project resulted in multiple offshoot projects for the RPP.

Findings

Our research questions focus on how knowledge is mobilized and the factors that shape KMb. Our analysis yielded four overarching claims: 1) in all cases research centered on practice; 2) stakeholders were meaningfully engaged in varying ways throughout the research process; 3) researchers engaged in "last mile" activities (e.g. dissemination) designed to help work find its way to policymakers and practitioners; and 4) there is some evidence that research is achieving impact. We organize our findings by these claims, describing practices and factors shaping practices within each section, then synthesize across claims in our discussion of conclusions and implications.

1. Research centered on practice.

What does practice-centered research look like?

Research projects intended to address needs of policymakers and/or practitioners.

All of the research projects were born of a specific audience need, which was identified either through professional experiences in schools/districts or in response to a practice partner's need. We describe this as "practice-centered." Many of these cases originated from policy or practice requests for research support. For example, Dr. Blakesly was asked to work with a curriculum developer to evaluate their program, whereas Dr. Clemons worked in a district RPP that identified a need for an informational intervention and its evaluation. In other cases, researchers worked with members of the policy or practice community to identify shared interests or goals. For example, Dr. Alvarez fostered partnerships around professional learning to address local needs. Two others, Dr. Ulrich and Dr. Keller, designed research as a response to a specific need the researcher experienced as an educator.

A second, related dimension of researchers' intentions to address real world needs is that several of the projects focused on a *local* need—a factor we previously noted as critical to successful KMb efforts. Four of the projects were "local"—that is, they were designed and conducted specifically to

inform school, district, or community decision-making[2]. This does not mean that the issue or research findings are unimportant or irrelevant beyond the local context but rather that these cases were often closely linked to what was happening in specific communities. For example, Dr. Dunn's work was driven and ultimately supported by local interest in addressing issues of equity in their education system. Similarly, Mr. Fisher's project around measurement centered on adapting tools for the local district context and need.

Research approaches and designs were responsive to policy or practice.

In addition to the *focus* of the research, the *approaches* or *designs* adopted by researchers were responsive to needs of either the intended audience or to the policy or practice partners. Five of the cases selected could be described as design-based research, and as such, the work was by definition practice-centered. Design-based research is situated in real educational contexts, focuses on designing and testing an intervention collaboratively identified by researchers and practitioners, uses multiple methods, and develops iteratively (Anderson & Shattuck, 2012). Projects adopting this design approach focused on developing science curriculum, generating meaningful opportunities to engage in computational science, creating an informational tool for parents and students, developing a professional learning program, and promoting student dialogue in classrooms, and each engaged teachers and/or other stakeholders in developing and testing the practices explored in research.

Approaches or designs that are not inherently participatory were also understood by researchers to be responsive. Four cases involved evaluations of educational policies or practices, aimed at understanding the nature and extent of impact on educational outcomes. Researchers described these projects as providing important information to support district decisions about curriculum, implementation of educational policies, or specific practices within classrooms. Other types of research, including measurement and field building—which may feel less connected to policy and practice needs—were still described as such by researchers. For example, Mr. Fisher explained that their measurement work was initiated in response to their local partners' need to better align and use their local survey data to achieve district goals.

What factors shape the practice-centeredness of these cases?

Centering practice in the research itself requires a deep understanding of the needs of the audience. In these cases, researchers acknowledge prior professional experience in schools (three were classroom educators) and formal partnerships with local agencies as the basis for that understanding.

[2] Two were conducted in a local or regional setting but were intended for broader impact, and four were conducted nationally or internationally.

Several researchers had prior experiences as educators, which they reported to be influential in how they thought about their work and their role as a researcher. For example, as Dr. Keller explained:

> *I was a high school special ed teacher....And so as I went to pursue my doctorate,... I got there, and started to think about, okay, how am I going, how am I going to communicate with my colleagues, being teachers and those in training around these issues? You know, what do they need to know? What do they need to be able to do?*

Beyond professional experience, another notable influence on the extent to which projects were practice-centered were partnerships. Some partnerships were formal RPPs, including the projects described by Dr. Clemons and Dr. Alvarez. Others were less formal relationships that were sustained out of mutual interest and goals. For example, Dr. Grayson's project stemmed from a long standing relationship with a professional association and the work they had been doing together over time.

> *But this project kind of stemmed out of a couple of different pieces. One, it stemmed out of existing relationships that [partner] and I had, with some of these, some of the participants, some of the participants we hadn't known before. And but particularly with existing practitioner organizations.*

Many expressed strong beliefs about the importance of doing work at the intersection of research and practice. For some, these beliefs stem from their understanding of the transformative power of participatory models of research. Dr. Ulrich shared:

> *We do something called participatory design research, which is about if you bring the people that are the subjects of your research, are participants in the design of the program, that you've built, whatever you're building, whatever your, your research agenda is, the end, and they're the users of it. So you have the problem of if you want to give them an intervention or you know, a computer interface, or, you know, some application to use for something in practice. If they're not part of the development process, then you shouldn't wonder why they don't use it.*

Perhaps more simply, Mr. Fisher explains "I just really love working with folks that are considered our stakeholders or like the audience for our research. That really is just like a huge passion of mine. Just making sure that what we're doing is actionable, and not just something that it will like, live in a digital file somewhere."

For others, this belief stems from a pragmatic desire for the work to have an impact on education policy or practice. For example, Dr. Alvarez explains that it is the relationship to practice that motivates their work—a connection they attribute to their time in the classroom:

> *So given my background, as a teacher, I find the work to be very meaningful, you know, that you're working with practitioners, you're working in a way that's really collaborative, you're learning from them. They're sharing their expertise, about what's going to work on the ground, what's really needed, what's feasible, what's not feasible. And then, from an internal perspective,*

> *that's a strong incentive, because you're connected to the space and the people that you ultimately want to improve their condition.*

Similarly, Dr. Blakesly reflects on their practice:

> *…to [others], it is not at all about, like, where you publish it, or how often you're publishing it's, is it good work? And is it something that's really going to improve the lives of children? that I think has been such a primary piece to who I am as a researcher where it's like, well, if I'm not, I don't sit down. I mean, until very recently, I never really said like, is this going to help me with tenure? It's like, is this going to be impactful? Is this going to be work that I can do really well?*

Doing research that was practice-centered was made possible largely by relationships and funding, and, to a much lesser extent, the organizational contexts in which researchers were working. Relationships sometimes took the form of formal partnerships among institutions that enabled conversations about needs and collaboration to come about. Other times, brokers—people and organizations that link different actors, groups or communities to facilitate the flow and uptake of research-based information—featured strongly in bringing about relationship.

In terms of funding, some of these cases were supported by sources that directly funded program or curriculum development, RPPs, or offered great flexibility in the kind of work to be done (e.g. early career or post-doctoral fellowships). Other cases creatively pulled together multiple funding sources that supported different aspects of the work. For example, Dr. Clemons, Dr. Francis, Dr. Diaz, and Dr. Dunn all report engaging in this sort of creative patchwork of funding. For example, one grant may be used to research the effects of a particular intervention, while other sources are used to design and implement the intervention. Where multiple funding sources were acknowledged, we did note that researchers were able to secure funds from local organizations interested in creating educational change in their communities. For example, Dr. Dunn describes a local foundation as "a really natural funder, they've got an interest in [the state], they've got, you know, the politics sort of align, they've got an interest in particularly around socio economic status, like that was something that resonated with them. So yeah, …that's kind of how it came to pass."

When asked about available supports, survey responses for case study researchers (Figure 3) illustrate that many reported supportive structures were available, including research-practice partnerships, staff who specialize in communicating research to stakeholders, and researchers hired specifically for partnership work. Other supports were less frequently available, such as release time from other obligations and professional learning opportunities for communicating with policymakers or practitioners.

Figure 3 Researchers' reported availability of supports for knowledge mobilization

However, in most cases, the practice-centeredness of the research was valued by the researchers' own institution but not necessarily supported by it in tangible ways. Few mentioned their home institution as influencing their work, and Dr. Dunn reported that they didn't attempt collaborative work with practice partners until post-tenure, suggesting that even among these cases academic pressures push scholars away from practice-centered work.

Three cases however stand out as exceptions. The first is in an academic, research-intensive institution. Dr. Alvarez describes the university's emphasis on community-engaged research, which means "that kind of work gets recognized and valued." They further point out that the research infrastructure of the university is "aware of different types of collaborations and partnerships, so they are equipped to work with [school districts] efficiently." Additionally, and perhaps as a result of these conditions, there are multiple centers, including an office for community engagement, that can facilitate new partnerships and collaborations such as the one featured in this study. The two other examples come from non-academic institutions, one focused on informal learning and an independent research center. Dr. Ulrich, who works at an informal learning institution, explained that they have the flexibility to work on issues and in ways that others don't: "So we get to experiment with things that other people don't get to do. So our involvement with schools is typically sort of from that lens." Thus the institutional context enables, if not directly supports, practice-centered work. The third example comes from a REL, where Mr. Fisher explained that the work of the REL is fully supported by and consistent with the larger mission of the research center in which it is housed. They describe that being "client-centered" has become a driving force for their work, so that they are not only about doing rigorous research but also "attuned to what that's going to do for the people that we're working with and how we can utilize it." In this case, the institutional context pushes towards practice-centered research.

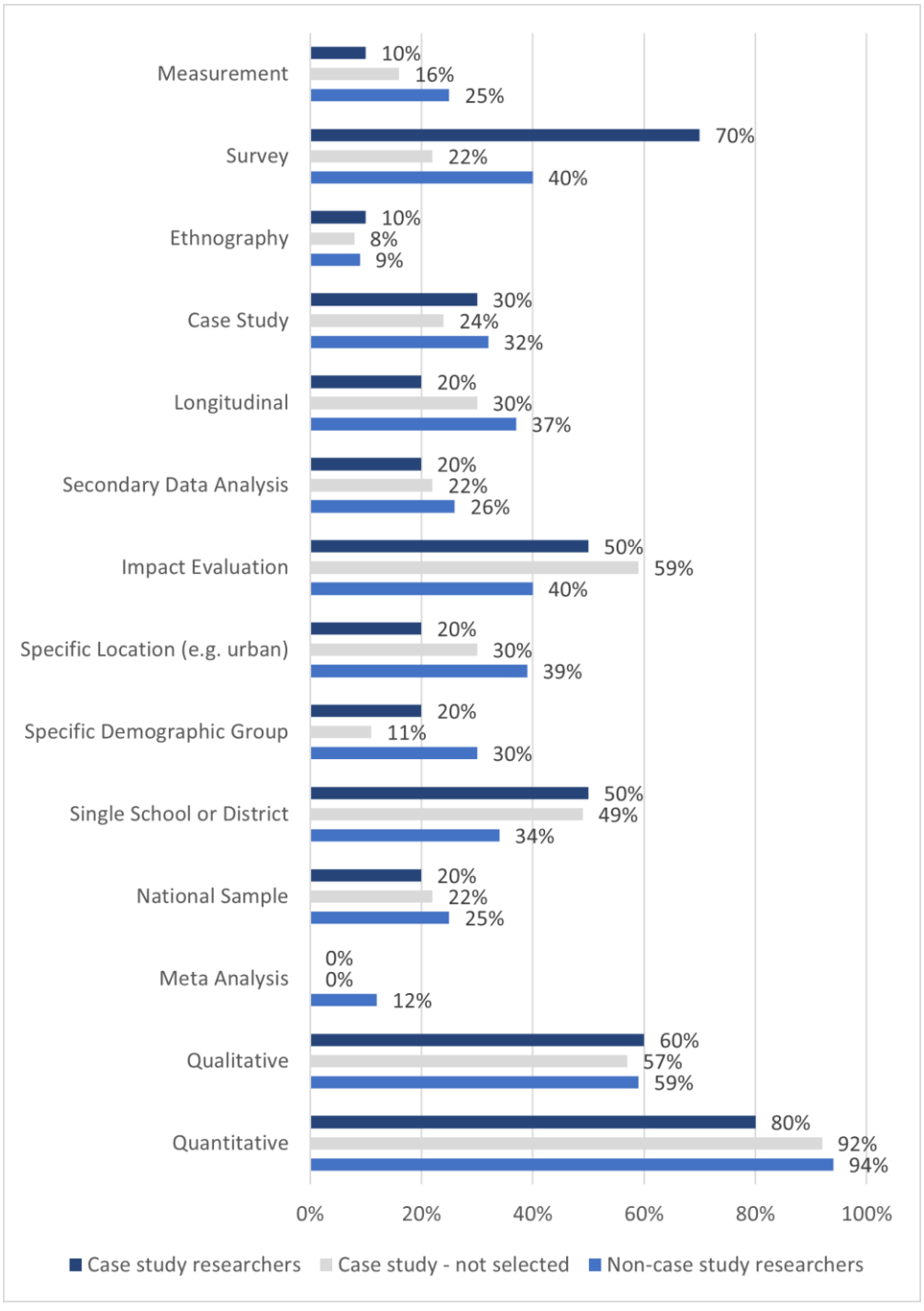
2. Stakeholders were meaningfully engaged in varying ways *throughout* the research process.

What does engagement look like in these cases?

Engagement occurs across all types of research.

In the context of design research, engagement is tightly coupled with the research process and happens throughout. Our five cases featuring design-based research feature the strongest elements of engagement from start to conclusion of the project. This is perhaps not surprising, given the nature of the design and purpose of the research. However, both in survey reports of stakeholder involvement and in interview data, there were no differences in the extent of engagement in terms of the type (e.g. approach or design) of research conducted. This suggests that while participatory designs necessarily generate engagement, engagement *can* characterize all modes of research. Notably, case study researchers' descriptions of their methods and approach in their survey were quite similar to how others described their research (see Figure 7). This seems to suggest that responsiveness to policy or practice needs is not limited to particular designs, but can be a feature of any type of research. Therefore, the specific practices of researchers highlighted in these case studies may be particularly helpful to a broad range of researchers and research projects.

Figure 4 Researchers' reports of approaches used in research projects



Engagement enhanced research questions, measures, sampling, interpretation, collaborative dissemination, and opportunities for funding.

Engagement throughout the research process was beneficial to the research in tangible ways. In several cases, this occurred in the context of doing the research. Dr. Alvarez noted that partners were instrumental in supporting data collection, which is often challenging when doing work *in* schools. They explain:

> *So some [district-level administrators] were involved, as I just mentioned, with really offering recommendations for, you know, teacher recruitment and administration, data collection, for example. And they were, and I guess, sort of a forerunner to data collection, but they really kind of communicated to teachers that this project had the support of the school district, that the school division was a partner in this work. So they kind of set the stage for how we were working with the school [districts].*

Dr. Clemons demonstrates the benefit of "[sharing] my results at multiple stages along the way to get feedback and get sense making around results and to see whether they line up with what they're seeing on the ground. And so I think it's a chance to intervene early in the research rather than later to ask new questions, or look at things a different way." Similarly, Dr. Keller acknowledged the value added of teachers' sharing their use of resources during the course of research: "But we were, we were awake enough, if that makes sense to recognize that these small permeations were occurring. And that was the sense making, that the teachers were making of it and the filter through which they were running things. And that helped us immensely once we recognized, oh, wait a minute, they're doing something here that we didn't really intend." This ultimately led to improvements to the resources to enhance usability. For example, Mr. Fisher felt that their measurement work benefitted from a collaborative, multi-step process "where we were looking both at [local] data and the literature and kind of meshing the real life with the theoretical.... so that was a good example of how we arrived at a result in a collaborative way while still really respecting the scientific process."

Other cases pointed to engagement as an important part of dissemination and advocacy. Dr. Francis shared that they engage a broad range of stakeholders in the work, including developing policy proposals, grant writing, advocacy pieces, and publications. In another case, Dr. Blakesly explains their partnership with an intermediary helped get their work recognized by national audiences. A third version of engagement when communicating findings from the work involved practice partners as co-authors or presenters. For example, Dr. Grayson notes "The teachers all presented at the [regional disciplinary conference] a couple weeks ago, and kind of in the closing keynote for that. And so they were able to kind of distribute their knowledge there, they presented for two years in a row at the [national disciplinary conference]...you know, [co-author], and I do the AERA, like the boring academic presentations." Dr. Diaz explains how they engaged practice partners in product development:

> *So one of the articles that we put out was a case study. And it was with one of our teachers and administrator and actually one of my student teachers. And even they drafted the manuscript, you know, sending it back to them and ground truthing, did we capture this accurately? So the teachers were very much involved… And that's been really important to have a true peer be able to collaborate, especially in the writing of the articles that we're creating.*

Engagement helped researchers expand and sustain the work. Several researchers reported engaging stakeholders in advocating for continued work and in finding funding. Additionally, engagement during the course of the project can help build networks that may support later efforts to grow the project. As Dr. Diaz explains, "it allowed me to connect with professionals across our [region], we're working on the same issue… And so we'll bring in about 50 professionals twice a year across the state, and just for almost like a summit. So it's from those connections, I think were really important in helping me refine the work that I was doing."

Engagement varied in terms of *who*, *why*, and *how*.

Cases featured engagement with diverse stakeholders, including district researchers; intermediary organizations; local educators, leaders, and policymakers; and both community members and parents. The targets of engagement varied by the nature of the work. For example, projects that were national or international in scope tended to engage individuals and organizations with greater reach and audience, which helps the engagement to yield broader and more diverse perspectives that inform the project and also can support opportunities for dissemination. For example, Dr. Francis, who engages in field-building, described relationships with professional societies and associations: "They share what the commission is doing among their societies and their members, and they present what they're doing to us. So is a bilateral, you know, relationship." Similarly, Dr. Ulrich noted the importance of working with "[a science consortium] which has a core of teachers across the country, people, administrators that they work with. While the teachers change, the administrators, whether they're part of a science center or a large school district, help us make those connections with teachers."

On the other hand, research conducted specifically for local partners often directly engaged those whose work they intended to influence. For example, the case featuring a REL project featured engagement exclusively with the local education agency partner. This enabled the team to be entirely responsive to the local need and make sure the work was actionable. At the same time, that engagement also helped establish what was possible through collaboration, creating a stepping stone for future projects. Other local partnerships, such as Dr. Dunn's project and Dr. Alvarez's project, featured engagement at multiple levels of the system, including teachers, school leaders, district administrators, and regional networks. This ensured the work was relevant to the local context and had buy-in across the system.

Who was engaged also appears to reflect different purposes for that engagement. For example, in designing a classroom intervention, one researcher engaged school and district leaders as part of recruitment efforts, yet engaged with classroom teachers more substantially, learning from their experiences using the intervention and incorporating their feedback into the project. This type of engagement differs from cases which reflected more of a client-focused orientation, where the work was done on behalf of a partner, or than in cases where the research was collaborative throughout (i.e. in design research). In Dr. Blakesly's case, the partner was a curriculum developer. The researcher explained engagement as a means of achieving their goals:

> *They've [the partner] been very involved. And I mean, they're really, really interested in us doing this work. And in getting a really rigorous study done of their approach…I think ESSA was a big thing for them, where then, you know, decision makers and policy people are now saying, well, what's your evidence, and then the What Works Clearinghouse, right, exists. So they both wanted to hit the What Works Clearinghouse, but then they also wanted to be able to meet standards for various states and districts.*

In being responsive to needs, Dr. Alvarez, part of a formal RPP, explained "We needed their [department of education] support, but we also really wanted their buy-in as well. So it was ultimately our decision how we designed the interventions, but we, we took seriously their input." Engagement from a client perspective tended to be with curriculum or program providers or with local education agencies, whereas engagement as collaboration tended to be at the implementation level of the education system—teachers or leaders.

Researchers use formal and informal strategies to initiate and sustain engagement.

In describing their projects and careers, researchers pointed to a diverse set of strategies for engaging with the practice community, including both formal and informal approaches. Formal strategies include:

- *Creating advisory boards comprised of practitioners*. For example, Dr. Alvarez worked across four districts, so a leader from each district became part of the advisory board.
- *Establishing formal mechanisms for practice-to-research feedback and communication.* For example, Dr. Diaz described sharing something called an "implementation journal" with teachers and researchers on the team. This journal includes a list of questions relevant to data needed as a researcher as well as questions specific to the PD team. The implementation journal allowed teams to communicate simultaneously.
- *Build relationships with professional associations*. Dr. Grayson described how their relationships "… with these national organizations, which have kind of hubs and networks…allowed us to have some buy-in and some visibility for the teachers,… that we're working with."

- *Work with doctoral students in practice or partner organizations.* Dr. Dunn explained, for instance, that they had a graduate student work in the district office for the summer where they were "able to meet, you know, all of the people and kind of talk their language and learn what the data, what data were available and getting excited with them about the sort of things that we could do." That student is now employed by the district as a data and accountability staff member.
- *Create diverse stakeholder teams*. Dr. Ulrich created teams composed of students, a teacher, and a graduate student; and teams were part of the summer program they created.
- *Add components to the project that emerge as particularly beneficial or useful for partners*. Mr. Fisher explained that extra time at the end of the project enabled them to try new strategies that normally neither the partner nor the team would have the bandwidth for but was something the partner was very interested in.

Researchers also pointed to less formal, more general approaches to successful engagement, including saying *yes* as much as possible, being respectful of time, sharing data, listening, knowing how to read the room, and being careful about word choice. Perhaps most importantly, two researchers explicitly stated that the key to meaningful engagement is "treating teachers as equals."

What factors shape engagement with practice in these cases?

Three factors emerged that seem to shape engagement: researcher factors, project factors, and organizational factors.

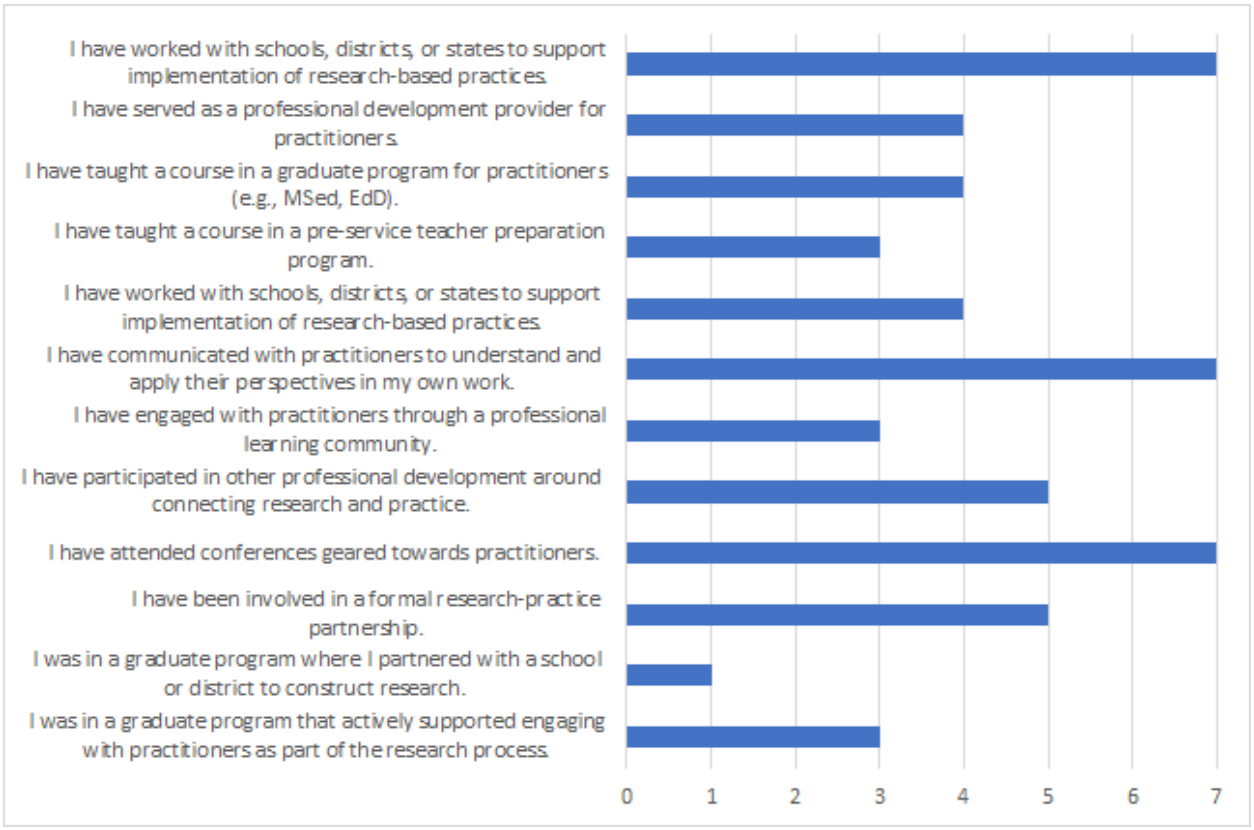
Researcher factors relate to their own knowledge and skills. Most refer specifically to learning to engage through prior experiences with mentors. Dr. Blakesley, "I think having someone believe in me, having someone take me out to meet people that had like high stakes attached to it, presenting in front of the [State Board of Education], things like that; and having a person like take me along. Hold my hand through it. Oh, it meant the world. So that's been really, really, that was very formative, I think for me." Formative experiences were not limited to individual relationships. Dr. Dunn specifically mentions their work with the Spencer Foundation: "When I was a grad student … I don't think anybody was doing stuff that they called partnership work. And so there was no sort of explicit conversation about that. But I think Spencer is always really valued, had a vision of what scholarship looks like, and how scholarship can talk to practice, which I think has helped."

Others refer to their prior experiences with engagement, how they themselves were engaged. For example, Dr. Francis explained how engagement was modeled. "I was able to get all those experiential learning opportunities because I have an outstanding professor who cares about us." Both of these sources of knowledge and skills are informal, suggesting limited *formal* support for becoming engaged scholars. Dr. Dunn confirms this: "So I've never done a part of, I don't think I've

ever done a workshop that's about doing partnership work, but I think it's very much been in the water, certainly never wasn't a part of my formal training as a PhD student or a postdoc." In fact, nearly half describe these more as a set of developed or practiced skills. Sometimes they come by trial and error. For example, Dr. Blakesly shared that early in their career, they had "no one model this for me, because all of my role models are these economists… in different fields, so I think I'm, I'm getting better at it. The first time I did this was a total fail, though. I mean, so that helped, right?" Few researchers experienced more intentional, scaffolded experiences. For example, Mr. Fisher explained how "we go through a lot of procedures to make sure that we're on the same page, and that we're meeting the client where they are, and really providing the best information that they can get in a way that's really actionable for them." On the other hand, Dr. Keller speculated that some success with engagement may simply be chalked up to "personality."

Figure 5 summarizes case study researchers' prior experiences related to engaging members of policy and practice communities for those that completed this section of the *SEE-R* survey (n=7, the other 3 case study researchers did not reach this section of the survey). Notably, the least frequently reported experience was training in graduate school, whereas the most frequent experiences were on the job.

Figure 5 Researchers' prior experiences related to engaging with policy and practice communities



In other cases, engagement was made possible by other forms of credibility. A few researchers described themselves as credible based on either feedback from practice partners, as described by Mr. Fisher, or credibility that comes from being an educator: "I feel like just my own background [as a teacher], I feel like there's a stronger ability for me to create rapport with, with the teachers and the students" (Dr. Grayson).

Figure 6 presents mean survey responses for the seven case study researchers who reported on their confidence communicating and connecting with policymakers or practitioners (1=not at all, 4=very confident) . On all items, researchers were at least somewhat confident, yet variability across items suggests there is opportunity to improve researchers' capacity to engage across communities.

Figure 6 Researchers' reported confidence engaging with members of the policy and practice communities

The second set of influences on engagement pertains to project design and structure. Projects that were conceptualized largely as design-based research foster engagement by design. Other influences relate to implementation of the project plan. One example is that technology enabled engagement, which is both a response to limited funding to support in person meetings as Dr. Grayson reported, or also as a response to the pandemic, which both Dr. Ulrich and Dr. Francis mentioned. Another aspect of project implementation relates to the hiring or designating of a

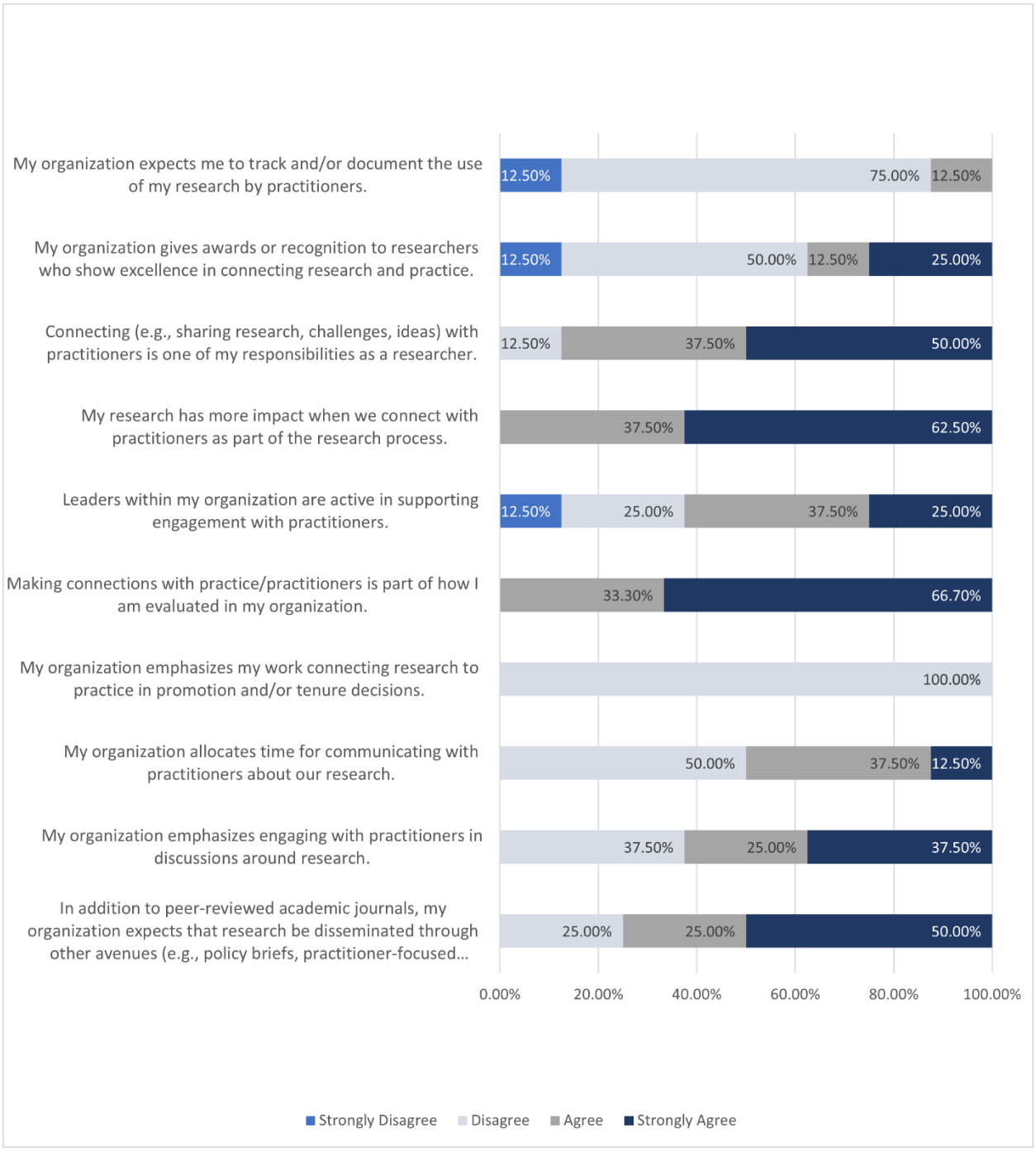
project "broker" to be the primary liaison between the research team and the practitioners or to engage policymakers in the process, depending on the project. Earlier we mentioned the placement of doctoral students in partner organizations. In the REL, a staff person, Mr. Fisher, was assigned to be the primary liaison, describing their role as "someone who is in-between, the heavy data analytics and the end stakeholder or the client,… and bridging the gap between those two parties."

The final set of factors that shaped influences on engagement related to the research institutional context, which provided structures and processes that facilitated (or constrained) relationship building and ongoing engagement. Mr. Fisher explains that in their independent research organization:

> *We've become very client-centered. That is part of our internal evaluation, as you know, as we're going through the various levels….So they really see once you get to the research level, or the researcher level, um, like they want us to be very much thinking about all partnership and kind of thinking about ways to make sure that what we're doing is really actionable and useful for our partners.*

In the case of Dr. Alvarez, housed in a land-grant institution with commitments to community engagement, "In terms of like institutional supports, at my institution, I think they're, you know, there's emphasis on community-engaged research, and collaboration and partnerships. So that kind of work, gets recognized and valued." Still, Dr. Alvarez experienced substantial support for building their RPP early on, if not explicitly during the conduct of the work. Finally, Dr. Diaz describes the funder themselves encouraged particular kinds of engagement by brokering relationships between the researcher team and practice and policy-focused organizations. Others felt less institutional support. Noted earlier, Figure 3 highlighted variability in terms of supporting structures, including few reports of release time, which may be particularly challenging given that building and sustaining relationships is time consuming work. Figure 7 provides additional insight into researchers' institutional contexts (n=7). Notably most agree with expectations for engagement but most *disagree* with incentives, rewards, and supports. For example, all respondents disagreed that their work connecting with policy or practice is emphasized in promotion or tenure decisions.

Figure 7 Researchers' reports of organizational structures and processes supporting engagement with policy and practice



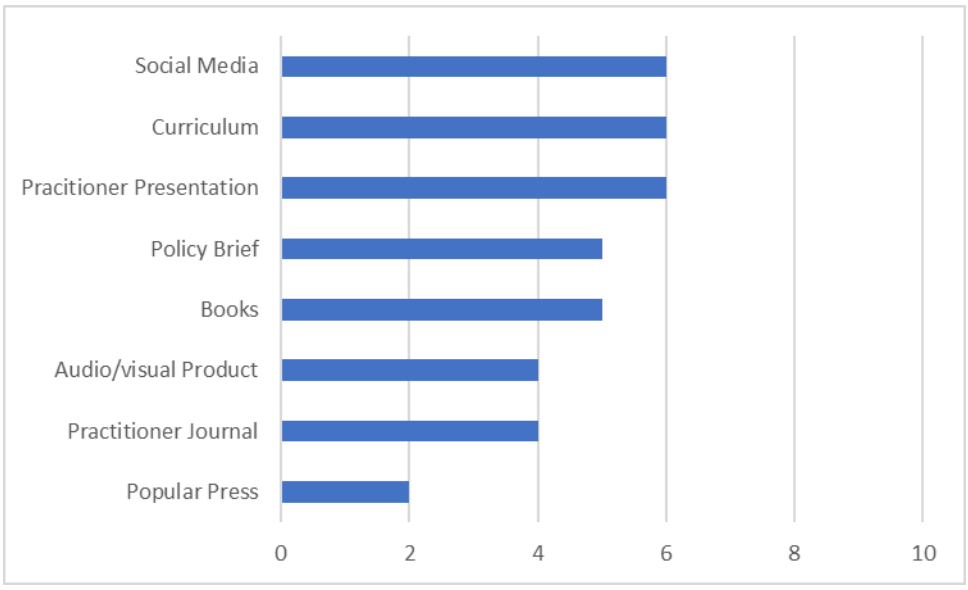
3. Researchers engaged in "last mile" dissemination and implementation activities designed to meet the needs of practitioners and policymakers

What does dissemination look like in these cases?

Researchers generated a wide range of broader-audience products in addition to traditional research products.

Noted earlier, researchers' projects originated in the needs of policy and practice and designed studies that met local, state, and national audiences. To reach these audiences, researchers strategically targeted multiple audiences when planning for dissemination and generated a wide range of products based on their findings. While all researchers reported generating academic presentations and most published in academic journals (8 of 10, with the other two in process), they *also* generated products not clearly valued for career advancement (according to Table Y). Figure 8 presents the range and frequency of various broader audience products. Further, most projects generated multiple products targeting a broader set of stakeholders, and only one case had a narrow set of products – a report and journal article. It is important to note however, that the development of products is closely tied to the audience of the work. As noted earlier, several projects were conducted to meet the needs of a specific, local audience, which may not require development of multiple products but rather a specific, usable report to partners. Therefore, we acknowledge that diversity and frequency of products must be understood in the context of a research project.

Figure 8 Researchers' reports of products generated based on their research



Importantly, researchers' broader-audience products involved steps to ensure usability. All reported that they attended to explaining technical terms and jargon as well as providing explicit conclusions and implications for practice; 90% report addressing issues that schools or districts have inquired about; and 80% reported that they had products reviewed by practitioners to ensure they were understandable.

Researchers report limited resources for dissemination to policymakers or practitioners.

Perhaps not surprisingly, the projects in these case studies had budgeted primarily for the research activities with limited funds allocated to dissemination. Overall, dissemination budgets ranged from 5% to 30% of project budgets, with a mean of 13%. Within that amount, the proportion of funds disseminating *specifically to policy/practice audiences* was wide ranging, from 10% to 90%, with a mean of 34% . Given the variable but often limited set of supports and incentives for this type of dissemination, coupled with researchers' reported confidence in this aspect of the work, the allocation of funds for dissemination for policy and practice audiences is small relative to the scope and importance of the task.

Dissemination strategies vary widely.

We found little consistency in approaches to disseminating research products in these cases, yet across all we find a set of potentially valuable strategies. This suggests both that there is no "formula" for sharing research but rather a toolbox for selecting and tailoring strategies.

First, several cases indicated that they leveraged their professional networks to share their work. This included social media, which according to Dr. Clemons, "is increasingly effective as well, because it's picked up by a really wide range of people."

Others worked strategically with brokers. Sometimes this entailed working with organizations. Dr. Grayson and their colleague leveraged relationships with national organizations, described elsewhere in this report. Dr. Blakesly also explained the power of working with an intermediary advocacy organization.

> I*'ve tried to engage by doing the usual stuff, right, like presenting at conferences or getting my work out there, which is more researcher engagement. But in that process, places like [intermediary] have asked me, Hey, come and do a post. Coming, you know, please, you know, share your work more broadly. And then I hear through channels, that districts and states have read my work because of the [intermediary] pieces. Right? So that's been really cool. I did not expect that I felt like you know…I did not think that like, practitioners and policymakers were reading [products from this intermediary].*

Dr. Keller offers an example of working through local education organizations to support implementation of their materials:

> *Yes, I can, you know, we do those [trainings] for free to disseminate what we've developed, you know, so it's sort of, and [state] has a network [of technical assistance centers]… where their whole purpose is to provide technical assistance and professional development. So I liaise with them. And they put me in touch with schools that are looking for whatever it is that we do, you know, so it's multifaceted, but strategic at the same time.*

Third, researchers reached out to professional organizations and their conferences. For example, Dr. Dunn noted the power of local conferences, "They had, they had held sort of research conference where all anybody who was sort of affiliated with the district was presenting work, sharing to district researchers were affiliated with the district we're sharing work with, with district officials, and so on." These events are a vehicle for sharing research but also for making connections for future work, as they noted. Dr. Alvarez also looks to national associations, including organizations like ASCD because, "at least locally, that's the organization that they talked about. And that organization prepares materials for practice." As noted earlier, these venues for sharing work are opportunities for continued engagement with partners through co-authored presentations, which both Dr. Grayson, Dr. Ulrich, and Dr. Diaz engage in extensively. As Dr. Grayson notes, "When we present to practitioners, we try to do it alongside. …But they, you know, having them share their work, I think, is helping other teachers see and adapt these models."

A less frequently mentioned strategy was through undergraduate and graduate courses, acknowledged by two researchers. For example, Dr. Diaz incorporates some of the tools and resources from the project (not traditional research products) into graduate education, and because of their positioning in a teaching university, has been able to mobilize research resources through their teacher education program: "But we've been working with them [district] a lot. You know, whether it's with the professional development school, a lot of the teachers in that school host my student teachers. They also work with the [intermediary], a lot of their teachers are teaching summer camps for me. So we've developed over the years a truly good working relationship."

What factors shape dissemination in these cases?

The primary influence on dissemination appears to be audience needs, which pertains to both usefulness and product characteristics. First is the idea of usefulness, which includes both relevance and timeliness. Researchers wanted their research to be useful, so they thought about issues such as alignment to educational standards, as described by Dr. Diaz, or whether or not the product would fit with the goals or abilities of the people who are going to use it, as described by Mr. Fisher and Dr. Keller. Timeliness also appeared to make research more useful; researchers who mention timeliness talked about being able to provide their audience, whether partners or practitioners, with information they could use when a decision opportunity arose. For example, Dr. Dunn shared their thinking about timing, "We've been very cautious in terms of like getting

through peer review, and there's thinking about the timing, so that it comes out at a moment where the district is not caught flat footed where it you know, it can help them and not hurt them."

A second set of audience needs pertains to product characteristics, including language, cost, accessibility, and format. This includes explicitly accounting for the end user. When asked about the importance of various characteristics of research products in the *SEE-R*, case study researchers placed the greatest importance on whether the product is *easy to understand*, *easy to access, free to access, available online*, and *provide a demonstration of findings or model strategies.* Least important were whether the findings were available in a *verbal* (e.g. presentation, meeting) format, included *graphics*, or were *syntheses of research*.

In our qualitative data, Dr. Diaz's thinking is illustrative: "What are the essential components of the [curriculum], what should it look like when it's being implemented in the classroom? And what are things teachers need to think about as they're designing their curriculum?" Researchers paid attention to the language they used in their products. They also considered whether or not products would be available on a platform that was free and easily accessible. Dr. Keller offers an example from their work: "We have to post our stuff anyway, because the teachers need access to it and putting all of your stuff on one website that's free, that they can just download it whenever they want, is actually the most efficient way to get it to them in the first place. So the fact that I can disseminate it to anybody in that same mechanism, that's a step saved. So that's always been a win for us." Researchers we interviewed also considered whether the product was presented verbally, written, given as a set of tools, or in multimedia format. In this way, technology became a supporting condition for packaging research in easily accessible ways. For example, Dr. Keller explained that prior experiences "got me thinking about the role of multimedia, for one, given its capacity to deliver a message to be used in multiple ways to be used flexibly, across different settings."

Although not frequently mentioned, it is worth noting that researchers' capacity to meet audience needs may reflect prior skills and experiences related to dissemination. A few researchers spoke to prior experiences with writing for different audiences as well as having received guidance from colleagues at their current or prior institutions. None spoke specifically about formal training around practitioner dissemination strategies. However, in the stories shared by Drs. Ulrich, Keller, and Diaz, the researcher developed a strategy for improving their ability to meet audience needs; here, they actively sought out feedback on their research products and incorporated that into the design.

In addition to usefulness, dissemination strategies reflected different goals for reach or scale of their intended impact. Several researchers were concerned with getting information out to as many people as possible who might find the information useful—which included use of platforms for quick, widespread dissemination such as social media, YouTube, and other tools. Others were less

focused on reach and scale and more focused on tailoring products to the specific partners they were serving. These different approaches to reach and scale reflected purposes and audiences for the research, and required adjustment in other aspects of their dissemination (e.g. deciding on products) to meet the needs of the specific, targeted audience. For example, Dr. Diaz explains, "I mean, honestly, it's if you really want your work to make an impact, then you have to get it into the hands of people who can impact students, and primarily, that's teachers…. so it's more than just the research finding, we are creating something that can be utilized. And so how do we make sure that the teachers have the ability to use it means you have to reach teachers."

Given that audience needs were the primary consideration when thinking about dissemination, several conditions bounded their work or set the scope of those practice-focused dissemination efforts. Perhaps the most important were relationships. Success in leveraging professional networks or working with strategic brokers appears driven by prior relationships. As Dr Grayson explains, "at this point, the relationships with [the intermediary] are good enough where I feel like [co-author] and I are regularly invited separately or together to write kind of invited pieces for different [organizational] journals." Dr. Blakesly shared more about how the networks of the program creators they worked with benefitted dissemination:

> *These programs have either like sort of long-standing or new team members to engage with policy and decision makers. Those people have then picked up my work, and then engaged, like, try to engage me in that process. … I'm giving you a very long story about like, the importance of the network, and having either a direct line to policymakers who are interested in the work you're doing, or having a person who's like a legislative liaison type person who's interested in a certain type of content area or certain type of approach, and then that person bringing my work to the table, so that my work could then be seen and have an influence.*

Relationships enabled more effective pathways from research to practice—which we might describe as brokerage—lessening the burden of active dissemination for researchers while reducing costs and expanding reach.

Another condition was funding. Although budgets for dissemination-oriented work were overall low, a couple of researchers mentioned that they built into their budget specific funds to develop practitioner focused products, and that funding was adequate to their dissemination goals. For example, Mr. Fisher reported that the REL contract (funded by IES) has specific allocations for policy- and practice-focused dissemination. Others felt that they had not adequately budgeted for practitioner dissemination and several additional products were left on the table because of this. For example, Dr. Alvarez wanted to create podcasts to showcase findings and practices, and Dr. Ulrich planned to develop a curriculum based on lessons learned—both were unable to allocate funding to those projects.

A third set of conditions pertain to institutional requirements and supports, which reflected a tension between academic incentives and the desire for impact on policy and practice. Most researchers in traditional academic institutions acknowledged that they were accountable for traditional research products and that the practitioner dissemination strategies they enacted resulted in them having to spend extra time, work harder, or spend additional funds to accomplish those goals. This is evident also in the survey data, where nearly all researchers reported that dissemination to policy and practice was expected, if not supported (see Figure 7). Even in Dr. Alvarez's case, tensions between the research-intensive and community-engaged missions were felt. They shared, "Because the institution where I am, it's an R1. And since I've been there, it's gone from high research to R1...But then it also has this commitment to community-engaged research, which is not necessarily compatible with R1 expectations, necessarily. So this is a tension that faculty walk and, you know, bubbles up in discussions. You know, what is the best time in your career to do this type of work?" Some researchers, such as Dr. Grayson, have developed a strategy for dissemination planning, for example a "one for us, one for them," though they acknowledged the sizable effort required to sustain that practice. However, a few institutions, including one academic institution, offered a number of supports, including social media support and a media center. Those cases in non-academic institutions felt that their primary goal was to disseminate widely in policy and practice and therefore did not feel that the institution constrained them at all. As Dr. Ulrich explains, "We can do those kinds of studies. And, we're an informal learning institution. So we get to experiment with things that other people don't get to do."

Across interviews, most motivation for disseminating to practitioners, irrespective of institution, was intrinsic, reflecting professional desire to make a difference, wanting to get their work out as quickly and easily as possible, liking the work they do, and building their reputation as a scholar that does important work. Mr. Fisher perhaps exemplifies this best, stating:

> *I think I am very much motivated by the thought that what I do will help people do their jobs better. I mean there's so much that goes into it, providing public services, whether that's an educator, whether that's a healthcare worker, therapist, and as someone who isn't one of those things, but someone who can support those people, but that's just a huge, that's a passion of mine. And that's really what has kept me...really energized in my work.*

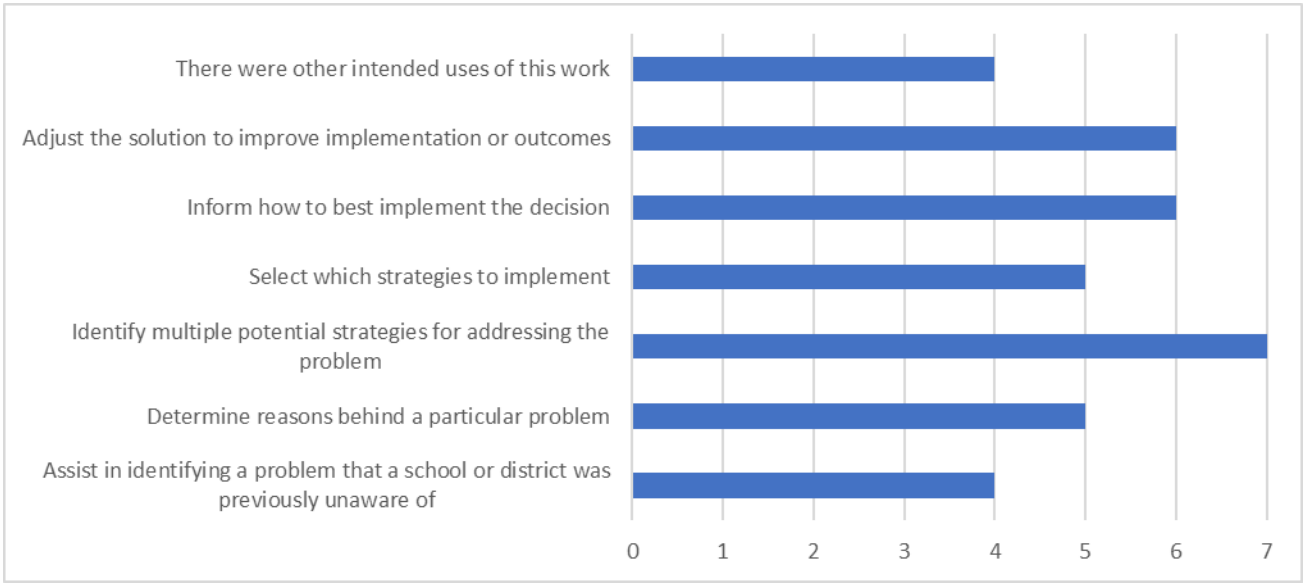
As important as intrinsic motivation is, a few researchers also noted that their work entirely depended on finding funding. Dr. Francis shared that their unit was nearly "pink-slipped" when funding didn't come through. This creates a different pressure for demonstrating the impact of work, compared to traditional academic incentives. Although not always explicit, a theme running through many of these conversations was that most of the extrinsic motivation for dissemination strategies came from institutional pressure to publish in academic journals, with little incentive for efforts to support uptake and impact except in the cases from non-academic institutions and a teaching university.

4. Researchers report emerging evidence that research is achieving impact.

Research is intended to impact multiple dimensions of decision-making and at multiple levels of the system.

Researchers reported that their work could be used to support multiple aspects of educational improvement and decision-making, as indicated by survey responses in Figure 9.

Figure 9 Researchers' resports of intended uses of their research by policy and practice communities



Cases varied widely in how they imagined their research informing decisions. One case, Dr. Grayson, felt their work addressed all six dimensions of decision making, while Mr. Fisher felt their work was best aligned to one phase - identifying problems or issues. Most cases (n=7) felt their research provided information about strategies for improvement, while the least frequently reported intended uses were to identify problems or issues to be addressed. However, no intended use was universal.

Researchers also sought to impact multiple levels of the system. Five of our cases featured research to inform specific programs or strategies at the classroom level, three were intended to inform decisions about district policy or planning, and two focused on larger system capacity for specific types of improvement.

Impact takes different forms.

Researchers reported a number of ways their research had been taken up or had influenced education, which seem to mirror various ways in which research is used in education. One of the most important ways the research in our case studies became influential was through supporting professional learning and growth, which was described in four cases. Dr. Alvarez, Dr. Grayson, Dr.

Keller, Dr. Francis, and Dr. Diaz all developed and delivered professional learning based on their work, leading to professional growth among participants. While this is of course difficult to document, interviews suggest this type of impact is occurring. For example, Dr. Diaz explains similar growth with their work:

> *One thing that we found is that, from the curriculum, when we're talking about the ability to go from what you're learning in the classroom to action, one of the things that was very crystal clear is that our[teacher] students in the study could articulate an action. But when asked if they had implemented an action, there was a disconnect there. So while they could articulate what they could do the ability to say, okay, I know what I could do, but I don't think I actually can implement it. .. So now they have experience not only talking about what they could do, but engaging in that action, and will that make an impact on their sense of self-efficacy and being able to continue that work.*

Similarly, Dr. Alvarez shared:

> *So it definitely helped to build the capacity of our [district] partners, they became more aware of like this cycle of inquiry that we were using, and that I suggested that we use based on the literature and they were already well aware of this resource, so it wasn't an upsell. But then because of their experience in the PD… they were able to do this principle piece on their own.*

A different version of this type of impact focuses on students. One of our cases provided new programs and pathways for *student* learning. Dr. Ulrich worked to design opportunities for underprivileged students to access the same opportunities as their peers, explaining, "So if any hope of really increasing inclusion, we have to completely think about this differently. … How do you get people interested?" An example of new learning pathways resulting from this work was that they "connected high school students and teachers, with labs in [cities]…providing opportunities to build connections and communities for students who typically don't get the opportunity to do so."

Another way the research impacted policy and practice communities was through creating communities of practice. Dr. Ulrich's work brought members of a wide range of disciplinary communities from all over the world together to "participate in the ways of thinking about the world that bring the social, economic and environmental into play in a way that's in together." Similarly, Dr. Diaz reported that through capacity-building work in their grant they "bring together people that are working in [issue] education across the state… So I think that group and primarily that work is promoting that [their project]…and so a lot through those conversations, really did help inform the importance of looking at that movement to action." Dr. Francis' version of professional community supports early career scholars—including undergraduates and graduates, providing mentoring, and exposing them to opportunities and supporting their advancement in the field.

The research projects featured in these cases also produced changes in perspectives or understandings about educational issues—what the broader literature on research use would consider *conceptual* use. Two cases illustrate these impacts. Dr. Dunn shared that based on their work:

> *It became clear that this was a policy that was politically toxic in the district for awhile. The policy ended in 2010 when a slate of very conservative board members ran together. And so 2010 to, you know, the middle of the 2010s, nobody wanted to talk about it. But at about this time I was meeting people, the board was kind of moving back to the left a little bit. The district knew that its schools were resegregating. And so my questions were kind of, were not unwelcome.*

At the classroom level, Dr. Grayson shares how the participatory work of his project has "fundamentally transformed" how participants understand their work, and that they are "doing incredible things, are much more aware of things, and also are kind of moving professionally in different directions or taking, like really amazing leadership as a result."

Another form of impact is through changes in policy and practice—what the larger literature refers to as *instrumental* use. In three cases, researchers described how research resulted in specific changes to policy. For example, Dr. Diaz's work is informing the development of new state science standards in the state in which they work, but also in other locations as well. Dr. Clemons reported that the local district reformed policies around school choice a year after the intervention was trialed. While the change was not a wholesale adoption of the intervention, it reflected a barrier for equitable access for children that was discovered during the course of the research, "and it was not long after that, that they did away with it altogether." In Dr. Blakesly's case, the program evaluation produced was used as supporting evidence in state agency decisions to include the program on a list of approved evidence-based programs, which ultimately had happened in at least three states at the point of our study. At the same time, the program was not adopted in the district where the work was occuring. The researcher acknowledged "I think that was the part that was surprising, I thought it would have had a bigger impact here than it has. Something I hope to maybe, you know, do better with in future work." While this case does not reflect direct program adoption, it does illustrate variations in the instrumental use of research.

Other cases point to strong potential impact on practice—though this was not documentable in our data. The work of Dr. Keller, Dr. Alvarez, Dr. Diaz, Dr. Grayson, and Dr. Ulrich all focus directly on influencing classroom practice and student experiences, particularly among educators that participated in their research or participated in dissemination activities, like workshops. Dr. Francis shared about their webinar series, "And they claim that 80 to 90% of them are implementing what they are learning… So that for me, is success." As. Dr. Keller describes from his own experience, "The biggest compliment you can ever receive is that you show up after the study period has

concluded, the honorariums are done, and you would find out that the materials that you gave to them are still in use. That's the biggest, the biggest goal."

Another form of impact in these cases is the development of tools that policymakers or practitioners can use to support planning and decision-making. Mr. Fisher explains that the partnership wasn't about "what we can do for you, it's more like, these are things that we can help you do…really just giving them the tools to do what they need….The final product is really that we leave the district with the tools that they need to do what they want to do." Multiple cases yielded such tools, including curricular toolkits to implement in the classroom, informational resources that help students and families navigate decision-making, and needs assessments to drive district improvement.

The work described in these cases ultimately resulted in *additional* projects which were intended to maintain or extend connections to practice. For example, Mr. Fisher noted how their project gained momentum for continued collaboration: "I can say that at the conclusion of our [partnership project], we then used that as a springboard to launch a second project. And so we're actually, like imminently, going to be releasing a report from that project… And we're diving even further into their [data]." Others, including Dr. Alvarez, Dr. Diaz, and Dr. Ulrich described how their work was extending into new collaborative projects with many of the same partners. In these ways, the practice-centeredness of the work—from conceptualization to impact—builds on itself to create the potential for a long-term research agenda and continued impact.

Relatedly, in at least one case, the research led to new ideas about how to reach broader audiences as well as how to help others engage in this kind of collaborative work in order to have greater impact. Dr. Grayson explains, "I can't say there's a systemic way that this has spread yet. But is it you know, [we are] thinking through a practitioner facing book that's based on some of the results from this and some of our other work in trying to be intentional about how do we spread this, the book is not about, you know, we don't imagine we're going to get rich and famous from this as much…[and] for years now, people have asked for a [participatory research] book…So now we're gonna … find, you know, a pathway for engaging teachers around the stuff that they actually want to do. And that we know is probably really valuable for the students."

Discussion and Implications

This mixed methods investigation provides important insights into KMb strategies in the production of research as well as researchers whose work has demonstrated high levels of engagement. Guided by both the CRUE conceptual framework and the broader literature on KMb, our intent is to surface research production practices with potential to inform educational decisions as well as the factors that appear to enable those practices, with the goal of informing the development of supports to achieve greater research use and impact systemwide. Below, we describe key lessons and their implications.

What have we learned about KMb in the production of research?

Any type of research can be practice-centered. Although not used in the selection of cases, the CRUE framework identifies the nature of evidence produced as a key dimension of the construct of *depth of production* and of KMb more broadly. Demonstrated across cases, researchers crafted and executed projects that were responsive to policy or practice, that engaged stakeholders from policy, practice, and intermediary communities, and that ultimately impacted policy in practice—albeit in very diverse ways. Half of our cases could be characterized as design-based research, which is inherently participatory and is often held up as an ideal mode for research that is useful and used (Anderson & Shattuck, 2012; Fishman et al., 2013). However, the other half represented a wide range of approaches, including evaluation, longitudinal research, secondary data analysis, and psychometric research, none of which are inherently participatory but into which researchers introduced strategies to increase relevance and usefulness of their work. Although this may imply the need to build researcher capacity (see below) to do so, education research broadly can become practice-centered.

There is no single model for KMb. Related to the above point, researchers in this study took up a wide range of approaches to ensuring their work was connected to practice. These approaches related to "first mile" and "last mile" strategies as well as ongoing engagement during the course of the project. First mile approaches helped researchers to situate their work in actual needs of the policy or practice communities. Most often this happened through pre-existing relationships and partnerships, including formal RPPs between research institutions and local education agencies, though several researchers drew on prior experiences as an educator. Engagement throughout the process was enacted through a range of strategies that ranged from governance (e.g. an advisory board) to data collection (e.g. journaling on implementation). Similarly, "last mile" or dissemination practices also varied widely, with researchers developing a diverse set of research products for broad audiences.

Evidence of multiple approaches to KMb are consistent with our earlier discussion of archetypes (Davies et al., 2015), which was careful to note the lack of hierarchy (one approach being "better" than another") but recognized that approaches have different challenges and strengths, as well as vary in their appropriateness to a given context. Our findings highlight the ways in which the approaches taken up in each case reflect the specific conditions of the research—whether in the context of an RPP, how products were designed for end users, and who was engaged in the research process and how. Findings are unable to point to the effectiveness of any particular strategy or any particular combination of strategies, but as is evident in our section on impact, the approaches used across cases offer a promising toolbox for future research.

Knowledge mobilization strategies can improve the quality of research. Cases illustrate the ways in which centering practice throughout the work benefitted the project. First, engagement with policy and practice communities often shaped the problem and/or research questions, which contribute

directly to the relevance of research for actual problems of practice as well as the utility of findings for end users. Second, engagement provided insights and feedback that shaped the design of interventions or curricula as well as the interpretation of findings as they relate to policy or practice. Third, engagement facilitated the sharing of findings, whether the development of useful products or mobilization of those findings through policy or practice partners and their networks. Ultimately, the benefits of engagement appear to influence reported impacts and outcomes of the work.

This evidence about the value of incorporating KMb practices within the production of research can be understood as improving the *quality* of the research. Although criteria such as internal and external validity are widely held criteria for evaluating quality, there have been several calls to reframe our understanding of quality with a far more explicit focus on relevance, as we noted in the review of KMb literature (see Akkerman et al., 2021; Gutierrez & Penuel, 2014; Ming & Goldenberg, 2021; Welsh, 2021). Findings from this project point to specific improvements in relevance and usefulness, which ultimately suggest increased potential for positive impact on policy or practice, illustrating a broader conceptualization of quality.

Values—and the relationships they enable—matter. Our findings affirm conclusions described in our discussion of KMb literature, which demonstrate the importance of relationships in supporting the production and use of policy and practice relevant research. Though achieved in a number of ways across cases presented here, one of the underlying factors in the success of the research presented here is relationships. Sometimes these relationships were built and sustained through formal, long-term partnerships, while others were limited to the project or even a phase of the work. But it is important to be clear about the nature of relationships in these cases. In each case, researchers demonstrated what Rickinson and Edwards (2021) refer to as *relational expertise*. Relational expertise "involves eliciting and acknowledging what matters to others, while being explicit about what matters for oneself and coming to agree on a long-term vision of what is important for everyone" (p. 512). Common across cases was a sense of respect that ensured policy, practice, or intermediary engagement was equally valued, or even prioritized, along with the knowledge and expertise of the researcher. Researchers spoke earnestly about how they valued the importance of policy and practice perspectives in their work, the effort they committed to building relationships and ensuring meaningful engagement, the importance they ascribed to their work being meaningful to policymakers and practitioners, and the credit partners and participants deserved for the end results. These values appear to underlie researchers' success in establishing and sustaining productive relationships with partners, resulting in a kind of credibility for both the researcher and their work that facilitates the conduct and impact of their research. These findings are perhaps not surprising but add additional nuance to our understanding of the relational features (Rickinson & Edwards, 2021) of evidence use matter for supporting the production of relevant and useful research.

Research may be practice-centered in spite of but not because of the larger research enterprise. In framing this study, we noted that the KMb literature consistently supports that efforts to promote stronger links between research and practice attend to the ecological nature of education policy and practice (e.g. Maxwell et al., 2022). Findings from this study provide support for an ecological perspective, noting the influence and interactions among individual, institutional, broader professional, and community contexts in which the research projects were situated. However, looking across cases, we found that factors shaping KMb activities of researchers varied widely and provided no evidence of systemic supports. Researchers' individual knowledge, skills, and prior experiences appear serendipitous—attributed to the modeling of a particularly influential advisor or an experience they had as an educator—with few describing specific opportunities in their doctoral training. At the institutional level, researchers reported a substantial disconnect between what is expected and what is incentivized, rewarded, and supported with tangible resources. Few institutions had strong supports to engage practice and policy communities—such as dedicated communication staff, researchers and leaders with expertise in working across boundaries, or research-practice partnerships—while others made do on their own time and resources. This variability is consistent with our broader sample of *SEE-R* respondents, confirming that as a system, the research enterprise is not organized to support KMb in the production of research. Perhaps as a result, KMb practices are largely dependent on individuals or teams of researchers with values and capacity to engage in KMb.

Additional work conceptualizing KMb in the production of research is needed. Finally, findings helped us to understand the strengths and weaknesses of our conceptual framework. First, we learned about the utility of the CRUE conceptual framework in identifying and understanding KMb practices. Second, we found depth of production dimensions of participation and dissemination as operationalized in the *SEE-R* to be a useful way of identifying cases of strong KMb. Findings also suggest that other dimensions of depth of production, such as evidence and stage of decision-making may not be as productive as our cases varied widely on those dimensions yet were consistently engaging in KMb practices. As a result, depth of production may not fully align with approaches to KMb, though further applications and comparisons are needed. Third, findings illustrate how the cases engaged in what CRUE conceptualized as *depth of production*, yet they also demonstrate the inter-relatedness of dimensions of depth and the difficulty of observing and making independent claims about each. For example, we found that all cases generate evidence centered on practice, irrespective of design or methods, yet we also found that the practice-centeredness of research also related to other dimensions of depth, such as who participated in the process. This interconnectedness was particularly true when considering how the framework conceptualized factors influencing production of research. Researcher perspectives on the usefulness of research products, the nature and quality of research, and the extent to which research addresses problems of practice were inherently connected and appear to strongly reflect individuals' beliefs and values. Nonetheless, findings do offer evidence that these factors do shape

research production, though a more nuanced conceptualization of the relationship among factors should be explored through future research.

What does this mean for understanding, supporting, and improving knowledge mobilization in the production of research?

These lessons lead us to three overarching recommendations for strengthening the capacity of our research enterprise for KMb.

Because at present, KMb is driven more by the researcher rather than the institutions in which they work, first and foremost, *there needs to be formal, systemic attention to KMb, with particular attention to supporting practice-centered research, in doctoral training and in developing and supporting practicing researchers*. This could include coursework in participatory models of research, apprenticeships with engaged mentors and advisors, and applied research opportunities (fellowships, internships) with educational agencies, all targeted at ensuring researchers enter the profession having had the opportunity to develop skills and knowledge for engaging diverse stakeholders and have a solid grounding in the needs of those communities. These preparatory experiences may also support the development of values and dispositions that elevate practice and policy-based knowledge and perspectives, promoting more equitable and productive relationships and redressing traditional hierarchies of knowledge which have posed historical barriers to collaboration across communities.

However, preparing researchers to enter into positions that fail to value or tangibly support engaged research is problematic. Echoing many prior calls, *our findings suggest a need for much stronger institutional alignment between espoused values and those actually supported by structures, processes, and incentives*. For example, widespread recognition of the value of engaging practice partners must be coupled with recognition of the time and effort required to be successful, which should be accounted for in workload and in criteria for career advancement. To some degree this is an institutional challenge, particular to academic institutions, which have historically rewarded contributions to the literature rather than social impact. Expansion and revision of promotion and tenure guidelines is possible and can change the nature of the work conducted by faculty (Gamoran, 2022). However, isolated changes at the institutional level will not address the systemic need for reform, which may require policy or funding levers to ensure broad participation. Other nations have attempted such reform to promote the relevance and social impact of research, to varied ends (e.g. Gunn & Mintrom, 2021; O'Connell, 2019; Shewchuk & Cooper, 2018). In Canada, for example, the Research Impact Canada network has brought together over 23 universities and research organizations to interrogate how institutions and KMb professionals can jointly foster change in traditional academic structures and processes (e.g. MacGregor et al., 2022). Lessons learned from these experiences can be instrumental in designing new policy here in the U.S. Relatedly, the larger field can support large-scale change by developing and sharing advancements in institutional policies, including strategies for documenting engaged or partnership research, new

language for promotion and tenure guidelines, mentoring programs for faculty researchers, and both process and impact evaluation of KMb initiatives. The study and sharing of such practices has the potential to re-shape how institutions support research production.

As a related recommendation related to the funding of education research, the cases represented in this study include federally funded research as well as research that is partially funded or funded by local philanthropic organizations, which means at least some resources are available to support the different forms of engagement and dissemination we have described earlier. We acknowledge that several funding sources have contributed to not only widespread engagement in practices consistent with KMb, but to the knowledge base on how to engage in that work, including but not limited to the Spencer Foundation, the National Science Foundation, the William T. Grant Foundation, and the Institute of Education Sciences. However, the research enterprise cannot be sustained or improved through these grant schemes alone and continued, coordinated work is necessary.

Additionally, researchers reported very limited funding dedicated to those tasks and widely varying strategies for accomplishing those goals. This presents an opportunity for funding agencies to influence how research is conducted, disseminated, and, accordingly, its potential for impact. Following Cooper and colleagues' (2017) call, *funders individually or even collectively can advance this work by clarifying and guiding KMb activities of researchers, move beyond "fund and forget" to promote capacity building and infrastructure, and to ensure funding is allocated to KMb and related activities*. Furthermore, it is worth noting that those researchers whose scholarship is not supported by external funding—which is a substantial portion of the research community—are poorly represented in this study due to the nature of the Center's approach to sampling. Given that funding figured into each aspect of the KMb practices described here, it is likely that there are substantially greater challenges to engagement in those cases. Substantial attention should be paid to developing funding sources that create institutional, local, regional, and national capacity.

Findings also lead us to recommend efforts to more readily and explicitly promote models of engaged research, which may fall under many names or umbrellas, from KMb to research-practice partnerships to engaged scholarship to collaborative education research. Our data suggest that researchers' experience with different modes of engagement and different approaches to research vary widely and that they are learning from others and from doing. Some weren't sure how to describe or characterize their research other than in a traditional design (e.g. evaluation). In addition to formal preparation and institutional support, the field would benefit from developing language and models that can unite researchers across disciplines and that can be a foundation from which to build. Substantial work, for example, has been done to establish continuous improvement research (Peurach et al. 2022), design-based implementation research (Fishman et al. 2013), and research practice partnerships (Coburn et al., 2013; Farrell et al., 2021) as approaches that lead to meaningful collaboration between research and practice as well as evidence-informed

improvement. Yet other approaches to research are also available and, as demonstrated here, there are many ways to approach KMb within research production. Much of the knowledge about how to do this work remains implicit or tacit, existing only within research teams or communities of practice, rather than made widely available through publications, tools, resources, professional learning and more, products which incidentally are not clearly valued in career advancement but should be given the potential to contribute to the transformation of the field. Networks, professional associations of researchers, publishers and journal editors, even funders are well positioned to create space and opportunity for the field to grow, formalize, and institutionalize these models and practices.

Last, we assert that further research on KMb practices in education is needed. This area of work has received far greater attention in other sectors (e.g. health), and recent calls for more explicit focus on KMb in research and practice have been made (e.g. NASEM, 2022). Our findings highlight the need for the testing and adaptation of KMb frameworks in the context of the U.S. education system and for the need to generate greater evidence about models, practices, and outcomes that can both inform researchers' practice as well as broader system-wide initiatives to improve the production and use of research in the service of improving the education system for all students.

References

Akkerman, S. F., Bakker, A., & Penuel, W. R. (2021). Relevance of Educational Research: An Ontological Conceptualization. *Educational Researcher, 50*(6), 416–424. https://doi.org/10.3102/0013189X211028239

Anderson, T., & Shattuck, J. (2012). Design-based research: A decade of progress in education research?. Educational researcher, 41(1), 16-25.

Bayley, J. E., & Phipps, D. (2019a). Building the concept of research impact literacy. *Evidence & Policy, 15*(4), 597–606. https://doi.org/10.1332/174426417X15034894876108

Beckett, K., Farr, M., Kothari, A., Wye, L., & le May, A. (2018). Embracing complexity and uncertainty to create impact: Exploring the processes and transformative potential of co- produced research through development of a social impact model. *Health Research Policy and Systems, 16*(1), 1–18. https://doi.org/10.1186/s12961-018-0375-0

Benneworth, P., Ćulum, B., Farnell, T., Kaiser, F., Seeber, M., Šćukanec, N., Vossensteyn, H., & Westerheijden, D. (2018). *Mapping and critical synthesis of current state-of-the-art on community engagement in higher education*. Institute for the Development of Education.

Best, A., & Holmes, B. (2010). Systems thinking, knowledge and action: Towards better models and methods. *Evidence & Policy*, *6*(2), 145–159. https://doi.org/10.1332/174426410X502284

Boaz, A., & Nutley, S. (2019). Using evidence. In A. Boaz, H. Davies, A. Fraser, & S. Nutley (Eds.), *What works now? Evidence-informed policy and practice*. Policy Press.

Bogenschneider, K. (2018). Positioning universities as honest knowledge brokers: Best practices for communicating research to policymakers. *Family Relations*, 2018, 1–16. https://doi.org/10.1111/fare.12339

Brown, C., MacGregor, S., Flood, J., & Malin, J. (2022). Facilitating research-informed educational practice for inclusion. Survey findings from 147 teachers and school leaders in England. *Frontiers in Education, 7*, 1–17. https://doi.org/10.3389/feduc.2022.890832

Bynner, C., & Terje, A. (2021). Knowledge mobilisation in public service reform: Integrating empirical, technical and practical wisdom. *Evidence and Policy, 17*(1), 75–91. https://doi.org/10.1332/174426419X15757178659704

Cain, K., Shore, K., Weston, C., & Sanders, C. B. (2018). Knowledge mobilization as a tool of institutional governance: Exploring academics' perceptions of "going public". *Canadian Journal of Higher Education, 48*(2), 39–54. https://doi.org/10.47678/cjhe.v48i2.188072

Camden, C., Shikako-Thomas, K., Nguyen, T., Graham, E., Thomas, A., Sprung, J., Morris, C., & Russell, D. J. (2015). Engaging stakeholders in rehabilitation research: A scoping review of strategies used in partnerships and evaluation of impacts. *Disability and Rehabilitation, 37*(15), 1390–1400. https://doi.org/10.3109/09638288.2014.963705

Campbell, C., Pollock, K., Briscoe, P., Carr-Harris, S., & Tuters, S. (2017). Developing a knowledge network for applied education research to mobilise evidence in and for educational practice. *Educational Research, 59*(2), 209–227. https://doi.org/10.1080/00131881.2017.1310364

Caplan, N. (1979). The two-communities theory and knowledge utilization. *The American Behavioral Scientist*, 22(3), 459–470. https://doi.org/10.1177/000276427902200308

Coburn, C. E., Penuel, W. R., & Geil, K. E. (2013). *Research-practice partnerships: A strategy for leveraging research for educational improvement in school districts*. William T. Grant Foundation. http://wtgrantfoundation.org/

Cooper, A. (2014). Knowledge mobilisation in education across Canada: A cross-case analysis of 44 research brokering organisations. *Evidence & Policy, 10*(1), 29–59. https://doi.org/10.1332/174426413X662806

Cooper, A., Levin, B., & Campbell, C. (2009). The growing (but still limited) importance of evidence in education policy and practice. *Journal of Educational Change, 10*, 159–171. https://doi.org/10.1007/s10833-009-9107-0

Cooper, A., Rodway, J., & Read, R. (2018). Knowledge mobilization practices of educational researchers across Canada. *Canadian Journal of Higher Education/Revue canadienne d'enseignement supérieur*, *48*(1), 1-21. https://doi.org/10.7202/1050839ar

Cooper, A., Rodway, J., & Read, R. (2018). Knowledge mobilization practices of educational researchers across Canada. *Canadian Journal of Higher Education, 48*(1), 1–21. http://journals.sfu.ca/cjhe/index.php/cjhe

Cooper, A., Shewchuck, S., & MacGregor, S. T. E. P. H. E. N. (2017). *Social Science Funding Agencies' Promotion and Support of Knowledge Mobilization and Research Impact: An International Study*. RIPPLE Research Report.

Cooper, A., Shewchuk, S., & MacGregor, S. (2020). A developmental evaluation of research-practice partnerships and their impacts. *International Journal of Education Policy and Leadership, 16*(9), 1–32. https://doi.org/10.22230/ijepl.2020v16n9a967

Cvitanovic, C., Löf, M. F., Norström, A. V., & Reed, M. S. (2018). Building university-based boundary organisations that facilitate impacts on environmental policy and practice. *PLoS ONE, 13*(9), 1–19. https://doi.org/10.1371/journal.pone.0203752

Davies, H. T., Powell, A. E., & Nutley, S. M. (2015). Mobilising knowledge to improve UK health care: Learning from other countries and other sectors – a multimethod mapping study. *Health Services and Delivery Research, 3*(27). https://doi.org/10.3310/hsdr03270

Davies, H., Boaz, A., Nutley, S., & Fraser, A. (2019). Conclusions: Lessons from the past, prospects for the future. In A. Boaz, H. Davies, A. Fraser, & S. Nutley (Eds.), *What works now*? *Evidence-informed policy and practice*. Policy Press.

Dwan, K. M., Mcinnes, P., & Mazumdar, S. (2015). Measuring the success of facilitated engagement between knowledge producers and users: A validated scale. *Evidence & Policy, 11*(2), 239–252. https://doi.org/10.1332/174426414X14165029835102

Farley-Ripple, E.N., Van Horne, S., Tilley, K., Shewchuk, S., May, H., Micklos, D.A., & Blackman, H. (2022a). *Survey of Evidence in Education for Schools (SEE-S) Descriptive Report.* Center for Research Use in Education, University of Delaware. https://www.research4schools.org/see-s-descriptive-report/

Farley-Ripple, E.N., Tilley, K., Mead, H., Van Horne, S., & Agboh, D. (2022b). *How is evidence use enacted in schools? A mixed methods multiple case study of "deep use" schools?* Center for Research Use in Education, University of Delaware. http://www.research4schools.org/how-is-evidence-use-enacted-in-schools-a-mixed-methods-multiple-case-study-of-deep-use-schools/

Farrell, C. C., Davidson, K. L., Repko-Erwin, M., Penuel, W. R., Herlihy, C., Potvin, A. S., & Hill, H. C. (2017). *A descriptive study of the IES Researcher–Practitioner Partnerships in Education Research Program: Interim report* (No. 2; Technical Report). National Center for Research in Policy and Practice. http://ncrpp.org/assets/documents/RPP-Technical-Report_Feb-2017.pdf

Farrell, C. C., Penuel, W. R., Coburn, C., Daniel, J., & Steup, L. (2021). Research-practice partnerships in education: The state of the field. *William T. Grant Foundation*.

Fenwick, T. (2008). Considering 'Knowledge Mobilization'in Educational Research: What knowledge, what mobilities, what responsibilities?. *Educational Insights*, *12*(2).

Finnigan, K.S., Daly, A.J. and Che, J. (2013), Systemwide reform in districts under pressure: The role of social networks in defining, acquiring, using, and diffusing research evidence. *Journal of Educational Administration, 51* (4), pp. 476-497. https://doi.org/10.1108/09578231311325668

Fischman, G. E., Anderson, K. T., Tefera, A. A., & Zuiker, S. J. (2018). If mobilizing educational research is the answer, who can afford to ask the question? An analysis of faculty perspectives on knowledge mobilization for scholarship in education. *AERA Open*, *4*(1), https://doi.org/10.1177/2332858417750133

Fishman, B. J., Penuel, W. R., Allen, A. R., Cheng, B. H., & Sabelli, N. O. R. A. (2013). Design-based implementation research: An emerging model for transforming the relationship of research and practice. *Teachers College Record*, *115*(14), 136-156.

Gamoran, A. (2023). Advancing Institutional Change to Encourage Faculty Participation in Research-Practice Partnerships. Educational Policy, 37(1), 31–55. https://doi.org/10.1177/08959048221131564

Gaussel M., MacGregor, S., Brown, C., & Piedfer-Quêney, L. Climates of trust, innovation, and research use in fostering evidence-informed practice in French schools. *International Journal of Educational Research, 109*. https://doi.org/10.1016/j.ijer.2021.101810

Glegg, S. M. N., Jenkins, E., & Kothari, A. (2019). How the study of networks informs knowl- edge translation and implementation: A scoping review. *Implementation Science, 14*(1), 1–27. https://doi.org/10.1186/s13012-019-0879-1

Gontcharov, I., Kobayashi, K., & Grenier, A. (2021). Knowledge mobilization for an engaged researcher. In *Knowledge, Innovation, and Impact* (pp. 33-42). Springer, Cham.

Graham, I. D., Logan, J., Harrison, M. B., Straus, S. E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation: Time for a map? *The Journal of Continuing Education in the Health Professions*, *26*(1), 13–24. https://doi.org/10.1002/chp.47

Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational evaluation and policy analysis*, *11*(3), 255-274.

Gunn, A., & Mintrom, M. (2021). Where evidence-based policy meets research impact. *Australian Journal of Public Administration, 80*(3), 544-553.

Gutierrez, K. D., & Penuel, W. R. (2014). Relevance to practice as a criterion for rigor. *Educational Researcher, 43*(1), 19–23. https://doi.org/10.3102/0013189X13520289

Haynes, A., Rychetnik, L., Finegood, D., Irving, M., Freebairn, L., & Hawe, P. (2020). Applying systems thinking to knowledge mobilisation in public health. *Health Research Policy and Systems, 18*, 1–19. https://doi.org/10.1186/s12961-020-00600-1

Heilig, J. V., & Brewer, T. J. (2019). Making the Case for Academia's Engagement in Knowledge: Mobilization and Purposeful Public Scholarship in Social Media. *Critical Questions in Education*, *10*(2), 81-91.

Jacobson, N., Butterill, D., & Goering, P. (2004). Organizational factors that influence university-based researchers' engagement in knowledge transfer activities. *Science Communication*, *25*(3), 246-259.

Kitson, A. L., & Harvey, G. (2016). Methods to succeed in effective knowledge translation in clinical practice. *Journal of Nursing Scholarship, 48*(3), 294–302. https://doi.org/10.1111/jnu.12206

Kitson, A., Brook, A., Harvey, G., Jordan, Z., Marshall, R., O'Shea, R., & Wilson, D. (2018). Using complexity and network concepts to inform healthcare knowledge translation. *International Journal of Health Policy and Management, 7*(3), 231–243. https://doi.org/10.15171/ijhpm.2017.79

Kitson, A., Harvey, G., & McCormack, B. (1998). Enabling the implementation of evidence based practice: A conceptual framework. *Quality in Health Care, 7*(3), 149–158. https://doi.org/10.1136/qshc.7.3.149

Kivimaa, P., Boon, W., Hyysalo, S., & Klerkx, L. (2019). Towards a typology of intermediaries in sustainability transitions: A systematic review and research agenda. *Research Policy, 48*, 1062–1075. https://doi.org/10.1016/j.respol.2018.10.006

Lavis, J. N., Ross, S., McLeod, C., & Gildiner, A. (2003). Measuring the impact of health research. *Journal of Health Services Research & Policy, 8*(3), 165–170. https://doi.org/10.1258/135581903322029520

Lenhoff, S. W., Singer, J., & Gottfried, M. (2022). Thinking ecologically in educational policy and research. *Peabody Journal of Education, 97*(1), 1–5. https://doi.org/10.1080/0161956X.2022.2026715

Levin, B. (2013). To know is not enough: Research knowledge and its use. *Review of Education, 1*(1), 2–31. https://doi.org/10.1002/rev3.3001

Lightowler, C., & Knight, C. (2013). Sustaining knowledge exchange and research impact in the social sciences and humanities: Investing in knowledge broker roles in UK universities. *Evidence & Policy, 9*(3), 317–334. https://doi.org/10.1332/174426413X662644

MacGregor, S. An overview of quantitative instruments and measures for impact in co-production. *Journal of Professional Capital and Community, 6*(2), 163–183. https://doi.org/10.1108/JPCC-06-2020-0042

MacGregor, S., Malin, J. R., & Farley-Ripple, E. N. (2022). An application of the social ecological systems framework to promoting evidence-informed policy and practice. *Peabody Journal of Education, 97*(1), 112–125. https://doi.org/10.1080/0161956X.2022.2026725

Malin, J. R., & Hornbeck, D. (2022). Historical knowledge mobilisation in a post-factual era in the United States. *Evidence & Policy, 18*(3), 502–523. https://doi.org/10.1332/174426421X16328406523829

Massell, D., Goertz, M. E., & Barnes, C. A. (2012). State education agencies' acquisition and use of research knowledge for school improvement. *Peabody Journal of Education, 87*(5), 609-626.

Maxwell, B., Sharples, J., & Coldwell, M. (2022). Developing a systems-based approach to research use in education. *Review of Education*, *10*(3), e3368.

Merga, M. K. (2021). The academic labour of knowledge mobilization: What scholarly publishers need to know. *Learned Publishing*.

Ming, N. C., & Goldenberg, L. B. (2021). Research worth using:(Re) framing research evidence quality for educational policymaking and practice. *Review of Research in Education*, *45*(1), 129-169.

Mosher, J., Anucha, U., Appiah, H., & Levesque, S. (2014). From research to action: Four theories and their implications for knowledge mobilization. *Scholarly and Research Communication*, *5*(3).

Nägel, L., Bleck, V., & Lipowsky, F. (2023). "Research findings and daily teaching practice are worlds apart" – Predictors and consequences of scepticism toward the relevance of scientific content for teaching practice. *Teaching and Teacher Education, 121*. https://doi.org/10.1016/j.tate.2022.103911

Nichols, N., Phipps, D. J., Provençal, J., & Hewitt, A. (2013). Knowledge mobilization, collaboration, and social innovation: Leveraging investments in higher education. *Canadian Journal of Nonprofit and Social Economy Research, 4*(1), 25–42.

Nutley, S. M., Walter, I., & Davies, H. T. O. (2007). *Using evidence: How research can inform public services*. Policy Press.

Nutley, S., Boaz, A., Davies, H., & Fraser, A. (2019). New development: What works now? Continuity and change in the use of evidence to improve public policy and service delivery. *Public Money & Management, 39*(4), 310–316. https://doi.org/10.1080/09540962.2019.1598202

O'Connell, C. (2019). Examining differentiation in academic responses to research impact policy: mediating factors in the context of educational research. *Studies in Higher Education, 44*(8), 1438-1453.

Oliver, K., & Faul, M. V. (2018). Networks and network analysis in evidence, policy and practice. *Evidence & Policy, 14*(3), 1–11. https://doi.org/10.1332/174426418X15314037224597

Peurach, D. J., Russell, J.L., Cohen-Vogel, L., & Penuel, W.R. (Eds.)(2022). *The Foundational Handbook on Improvement Research in Education*. Rowman & Littlefield.

Phipps, D. (2011). A report detailing the development of a university-based knowledge mobilization unit that enhances research outreach and engagement. *Scholarly and Research Communication*, *2*(2).

Powell, A., Davies, H. T. O., & Nutley, S. M. (2018). Facing the challenges of research-informed knowledge mobilization: "Practising what we preach"? *Public Administration, 96*(1), 36–52. https://doi.org/10.1111/padm.12365

Powell, A., Davies, H. T., & Nutley, S. M. (2018). Facing the challenges of research-informed knowledge mobilization:'Practising what we preach'?. *Public Administration*, *96*(1), 36-52.

Powell, A., Davies, H., & Nutley, S. (2017). Missing in action? The role of the knowledge mobilisation literature in developing knowledge mobilisation practices. *Evidence & Policy, 13*(2), 201–223. https://doi.org/10.1332/174426416X14534671325644

Rickinson, M. (2017). Communicating research findings. In D. Wyse, N. Selwyn, E. Smith, & L. E. Suter (Eds.), *The BERA/SAGE Handbook of educational research* (2nd ed., pp. 973–997). SAGE. https://doi.org/10.4135/9781473983953.n49

Rickinson, M., & Edwards, A. (2021). The relational features of evidence use. *Cambridge Journal of Education*, *51*(4), 509-526.

Rickinson, M., Cirkony, C., Walsh, L., Gleeson, J., Cutler, B., & Salisbury, M. (2022). A framework for understanding the quality of evidence use in education. *Educational Research, 64*(2), 133–158. https://doi.org/10.1080/00131881.2022.2054452

Sá, C. M., Li, S. X., & Faubert, B. (2011). Faculties of education and institutional strategies for knowledge mobilization: An exploratory study. *Higher Education*, *61*(5), 501-512.

Sá, C., Faubert, B., Edelstein, H., & Qi, J. (2012). Understanding how organisations use the internet to mobilise knowledge: Findings from the field of education. *International Journal of Management in Education, 6*(1/2), 1–21. https://doi.org/10.1504/IJMIE.2012.043998

Sá, C., Li, S. X., & Faubert, B. (2011). Faculties of education and institutional strategies for knowledge mobilization: An exploratory study. *Higher Education, 61*, 501–512. https://doi.org/10.1007/s10734-010-9344-4

Shewchuk, S., & Cooper, A. (2018). Research impact, the 'new academic capital': An environmental scan of research impact indicators and resources for the humanities and social sciences across 32 countries. *Journal of Social Sciences, 14*(1), 55-64.

Tachino, T. (2012). Theorizing uptake and knowledge mobilization: A case for intermediary genre. *Written Communication*, *29*(4), 455-476.

Tseng, V., Easton, J. Q., & Supplee, L. H. (2017). Research-practice partnerships: Building two-way streets of engagement. In Social Policy Report (No. 4; 30). *Society for Research in Child Development*. http://www.epi.umn.edu/mch/resource-research-practice-partnerships-building-two-way-streets-of-engagement/

Van Horne, S., May, H., Shewchuk, S., Tilley, K., Farley-Ripple, E.N., & Micklos, D.A. (forthcoming). *Survey of Evidence in Education for Researchers (SEE-R) Descriptive and Technical Report.* Center for Research Use in Education, University of Delaware.

Walter, I., Nutley, S., & Davies, H. (2003). *Research impact: A cross sector review*. University of St. Andrews, Research Unit for Research Utilisation.

Ward, V. (2017). Why, whose, what and how? A framework for knowledge mobilisers. *Evidence & Policy, 13*(3), 477–497. https://doi.org/10.1332/174426416X14634763278725

Ward, V. L., House, A. O., & Hamer, S. (2009). Knowledge brokering: Exploring the process of transferring knowledge into action. *BMC Health Services Research, 9*, 1–6. https://doi.org/10.1186/1472-6963-9-12

Watermeyer, R. (2016). Impact in the REF: issues and obstacles. *Studies in Higher Education, 41*(2), 199–214. https://doi.org/10.1080/03075079.2014.915303

Welsh, R. O. (2021). Assessing the quality of education research through its relevance to practice: An integrative review of research-practice partnerships. *Review of Research in Education, 45*(1), 170–194. https://doi.org/10.3102/0091732X20985082

Zuiker, S. J., Piepgrass, N., Tefera, A., Anderson, K. T., Winn, K., & Fischman, G. (2019). Advancing Knowledge Mobilization in Colleges of Education. *International Journal of Education Policy and Leadership*, *15*(1), n1.

Appendix

SEE-R Items Used to Identify Case Study Sample

Were any of the following involved in any aspects of the research process? For example, this could include shaping the research question(s), interpreting results, etc.

Stem Option	Response Option
School-based practitioners	Yes / No
District-level administrators	Yes / No
PTA or parents/guardians	Yes / No
State/Federal staff	Yes / No
Education program developers, researchers, or consultants	Yes / No
Education public interest organizations	Yes / No
Funding organizations	Yes / No
Community organizations	Yes / No
Other	Yes / No
Other (please specify) - Text	Yes / No

In which aspects of the research process did these individuals participate?

Stem Option	Response Option (selected or not selected)
School-based practitioners	Problem identification; Shape research questions; Conduct research; Interpret results; Reporting and disseminating results; I don't know
District-level administrators	Problem identification; Shape research questions; Conduct research; Interpret results; Reporting and disseminating results; I don't know

PTA or parents/guardians	Problem identification; Shape research questions; Conduct research; Interpret results; Reporting and disseminating results; I don't know
State/Federal staff	Problem identification; Shape research questions; Conduct research; Interpret results; Reporting and disseminating results; I don't know
Education program developers, researchers, or consultants	Problem identification; Shape research questions; Conduct research; Interpret results; Reporting and disseminating results; I don't know
Education public interest organizations	Problem identification; Shape research questions; Conduct research; Interpret results; Reporting and disseminating results; I don't know
Funding organizations	Problem identification; Shape research questions; Conduct research; Interpret results; Reporting and disseminating results; I don't know
Community organizations	Problem identification; Shape research questions; Conduct research; Interpret results; Reporting and disseminating results; I don't know
Other (Piped Text)	Problem identification; Shape research questions; Conduct research; Interpret results; Reporting and disseminating results; I don't know

Which of the following strategies did you use to disseminate the research findings?

Stem Option	Response Option
Books/book chapters	Yes / No
Peer-reviewed academic journals	Yes / No
Peer-reviewed practitioner journals/periodicals	Yes / No
Presentation at an academic conference	Yes / No

Presentation at a practitioner conference or professional development workshop	Yes / No
Other scholarly products (e.g., research/evaluation reports)	Yes / No
Targeted government/policy materials (e.g., policy briefs)	Yes / No
Curriculum materials	Yes / No
Interview with the media (or response to written inquiry)	Yes / No
Social media posts	Yes / No
Audio/Visual Products	Yes / No
Popular press, written products	Yes / No
Email/Mailing lists	Yes / No
Other	Yes / No
Other - Text Entry	Text Entry

Please select the ways through which people can currently access the findings from your research study: (check all that apply).

Stem Option	Response Option
A general web search (e.g., Google, Yahoo)	Checked / Not Checked
The What Works Clearinghouse	Checked / Not Checked
A library or research database	Checked / Not Checked

A Regional Education Lab or Comprehensive Center	Checked / Not Checked
My organization’s or my own professional website	Checked / Not Checked
The funding organization's website (please specify)	Checked / Not Checked
The funding organization's website (please specify) - Text	Checked / Not Checked
Another foundation's website	Checked / Not Checked
Another foundation's website - Text	Text Entry
Another research organization's website (please specify)	Checked / Not Checked
Another research organization's website (please specify) - Text	Text Entry
A public interest or advocacy group	Checked / Not Checked
A publisher, program, or professional development provider	Checked / Not Checked
An undergraduate course for pre-service educators	Checked / Not Checked
A graduate course for practitioners	Checked / Not Checked
A professional organization	Checked / Not Checked
Federal or State departments of education	Checked / Not Checked
A school-district (e.g., website, staff, program or curriculum materials)	Checked/Not Checked
Other (please specify)	Checked / Not Checked
Other (please specify) - Text	Text Entry

I'm not sure	Checked / Not Checked