SPRING 2022

The Opportunity to Pursue their Dreams

How Rigorous Instruction Prepares Students for Postsecondary Success at the Pioneer Charter School of Science II

The Boston Foundation tBf

The Pozen Prize for Innovative Schools AT THE BOSTON FOUNDATION

Rennie Center Education Research & Policy

METHODOLOGY

The Rennie Center for Education Research & Policy partnered with The Boston Foundation to examine and document the school-level practices that have enabled high growth and high academic achievement at the Pioneer Charter School of Science II, the winner of the 2021 Pozen Prize for Innovative Schools. The Rennie Center began with a review of existing literature, documenting practices that support high academic achievement in science, technology, engineering, and mathematics. Scholarly research supported the development of a research protocol, which guided site visits at Pioneer. Information presented in this case study reflects findings from a data review, school observations, interviews, and focus groups with students, community members, teachers, and administrators at Pioneer.

ABOUT THE POZEN PRIZE FOR INNOVATIVE SCHOOLS

Since 2014, the annual Pozen Prize for Innovative Schools has recognized a Boston metropolitan area innovation, pilot, or charter school that has made significant gains in student achievement. The prize was created by Boston Foundation donors Robert and Elizabeth Pozen to honor high-performing schools that have varying degrees of autonomy over school-based decisions on teaching and learning. These autonomies allow schools to experiment with innovative models, programs, and practices. Robert is a former executive of Fidelity Investments and MFS Investment Management who now serves as a Senior Lecturer at the MIT Sloan School of Management and a Senior Research Fellow at the Brookings Institution. Elizabeth is a retired psychotherapist who is now focusing on her career as a figurative artist.

Claire Kafeero arrived at the Pioneer Charter School of Science II as a 7th grader with a dream. The daughter of Ugandan immigrants who believe deeply in the power of education, college was always part of Claire's plan. At just 12 years old, Claire knew that she didn't want to go to just any college—her goal was to attend an Ivy League school.

On a video call from her freshman dormitory at the University of Pennsylvania, Claire reflected on her journey from a small charter school in Saugus, Massachusetts to one of the nation's most prestigious undergraduate business programs at UPenn's Wharton School. Though many students struggle with the academic transition between high school and college, Claire has not been overwhelmed. Speaking of her preparation at Pioneer, Claire said "there isn't a topic being presented in my classes that I haven't already seen." She credits Pioneer with preparing her for college-level rigor since she was in middle school, affirming her goals, and providing her with a "close-knit family" of teachers and peers to support her in every step of her journey to college.

Pioneer is a math- and science-focused school for students in grades 7-12. It was founded out of a deep belief that all students can achieve academic excellence and become successful professionals in today's competitive world. The school primarily serves students of color, many of whom speak a first language other than English. From the day students enroll, they are immersed in a culture of high expectations and high support. Administrators recognize that all students have unique goals and have created opportunities for extra support and acceleration depending on students' needs. According to students, the transition to Pioneer is a challenge in middle school, as academic expectations are much higher than their elementary schools. However, by the time students are upperclassmen, they recognize the opportunities created by their rigorous education.

The effectiveness of the Pioneer model is evident in the success of its students and alumni. Though the school is young, having received its charter in 2013, its graduates have gone on to attend some of the nation's most prestigious universities. Regularly outperforming state averages on standardized tests, Pioneer has been named a School of Recognition by the Massachusetts Department of Elementary and Secondary Education for the past four years—a classification given to less than 4% of the Commonwealth's schools. In addition, Pioneer was ranked fourth on the list of best high schools in Massachusetts by U.S. News & World Report. One hundred percent of students in the most recent graduating class completed MassCore, a rigorous, college preparatory course of study. The charts on the following page provide an overview of the school's enrollment and performance data.

At Pioneer, teachers and leaders recognize that high-quality instruction is critical—but insufficient—to prepare students for success after high school. The following case study explores how a Pioneer education empowers students to set ambitious college and career goals, provides rigorous instruction to make students' goals a reality, and offers individualized support to ensure that every student has the tools to succeed in a demanding environment.

Setting Ambitious Goals through Career Connections

On a Wednesday morning in October, four students are engaged in an enthusiastic discussion in the corner of their engineering classroom. As a team, they are mapping out the design process to manufacture a desk organizer. In order to determine what they will charge for their organizer, they're researching the cost of raw materials. They hoped to build a wooden organizer, but the cost of materials is making them rethink their plan. The group discusses trade-offs. The wooden organizer will have a better aesthetic, but it will be priced higher. "I think we need to switch to plastic," one student proposes. "It needs to be affordable." Her peers agree, noting that they will sell more organizers if they appeal to a price-conscious consumer.

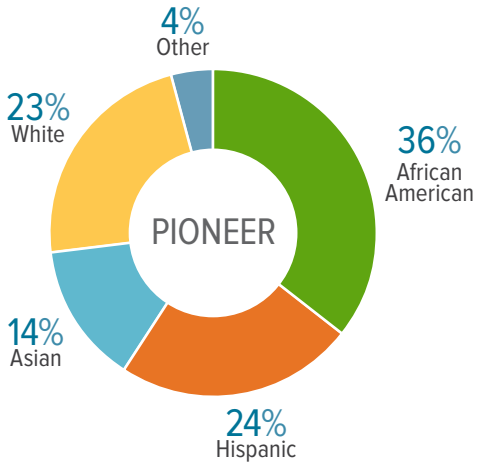
Throughout their Pioneer education, students connect to the real-world implications of their learning. In classes such as engineering and coding, they explore what day-to-day life looks like in science, technology, engineering, and mathematics (STEM) careers. According to educators, early exposure to career options motivates students to push themselves in their classes.

> "Seeing what Pioneer graduates have achieved is so important. It shows our students that their work will pay off and that there are so many possibilities for them when they leave our school."
>
> Pioneer Teacher

In addition to embedding real-world applications within core instruction, Pioneer offers a range of opportunities for students to connect with professionals to learn about the possibilities that await them after high school. For example, each year STEM professionals from the local community take over the school's gym to host a career fair for students of all grade levels. Students said that learning about career opportunities provides purpose for their learning. "It was really cool in 7th grade because I learned about things that I didn't even know were jobs," a 10th grader said. "It helped me see that putting in the effort in school is worth it." In addition to career fairs, teachers regularly invite professionals to their classes to make a connection between students' classroom learning and career possibilities.

Beginning in middle school, educators use goal-setting to instill a sense of agency in every student. During orientation, students reflect on their future aspirations and share their goals with educators. Throughout their 7th and 8th grade classes, students further refine these goals, reflecting on their strengths and the resources they have around them to achieve their dreams. This process helps students identify small, achievable steps that will lead towards ambitious educational and career goals. Once students begin high school, an emphasis on goal setting is coupled with practical college and career planning. This includes whole-class workshops to demystify the college process, as well as individualized guidance on selecting a college that represents a good academic, social, and financial fit.

DEMOGRAPHICS

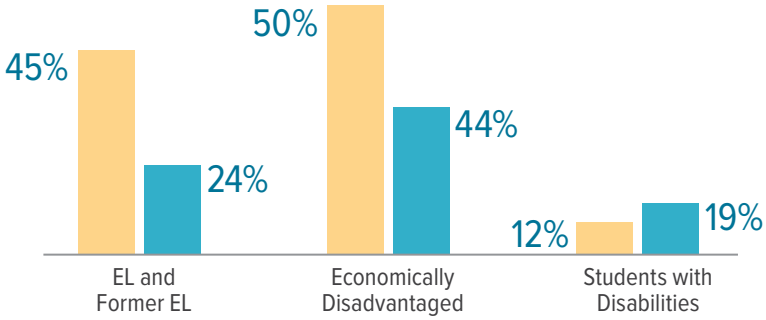


GRADES 7–12 ENROLLMENT

376

PIONEER STATE

SPECIAL POPULATIONS



PERFORMANCE

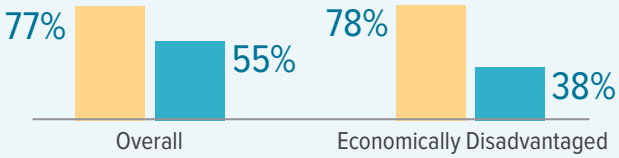
Pioneer performs in the

93rd

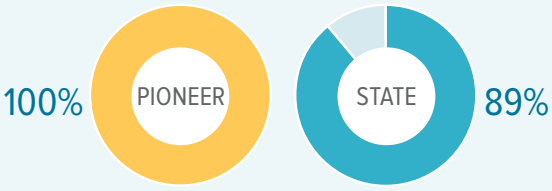
PERCENTILE

when compared to all schools in Massachusetts

ADVANCED MATH COURSE COMPLETION



2020 GRADUATION RATE



MASSCORE COMPLETION

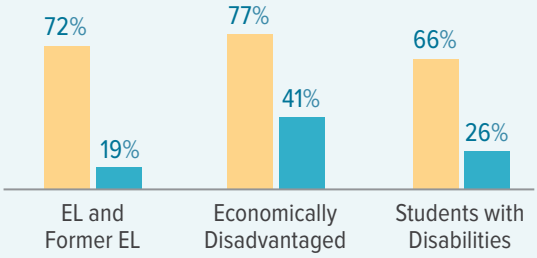
100% PIONEER **88%** STATE

2019–20 GRADUATES ATTENDING INSTITUTIONS OF HIGHER EDUCATION

OVERALL

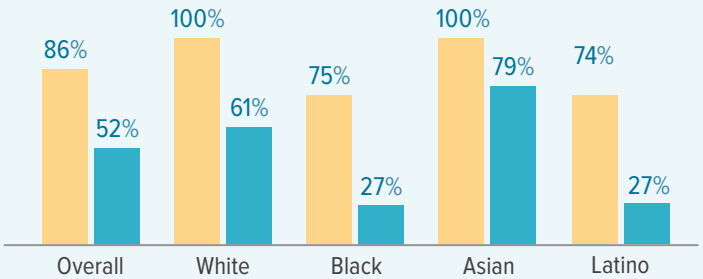
GRADE 10 MCAS ELA

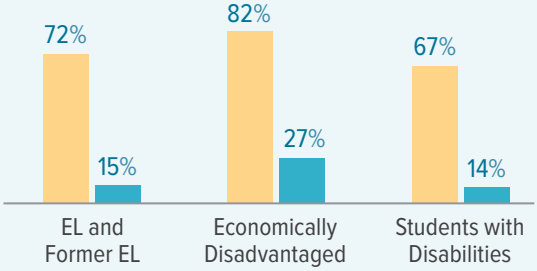
MEETING OR EXCEEDING EXPECTATIONS

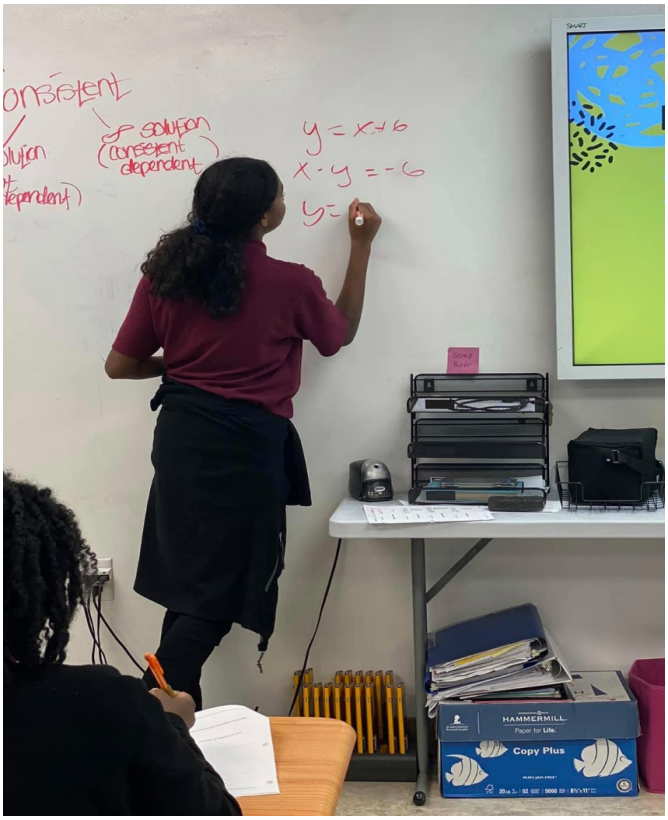


GRADE 10 MCAS MATH

MEETING OR EXCEEDING EXPECTATIONS







Pioneer administrators regularly engage alumni to share their postsecondary journeys with students. This includes hiring alumni to serve as tutors, work as full-time staff, support school vacation programming, and speak at presentations for current students. According to teachers, alumni have a powerful influence on younger students' aspirations. "Seeing what Pioneer graduates have achieved is so important," a teacher noted. "It shows our students that their work will pay off and that there are so many possibilities for them when they leave our school."

Making Students' Goals a Reality through Rigorous Instruction

Research on college persistence and career placement in STEM fields for first-generation college students, low-income students, and students of color tells a story of deep inequity. While demand for workers in STEM occupations is growing at twice the rate of other fields, the number of Black students graduating with STEM degrees is falling.[1] Even among students with strong interest in STEM careers, academic barriers during their first year of college can cause them to transfer out of STEM majors or to leave college entirely. Pioneer's school design and instructional practices ensure that every student graduates prepared for college-level rigor in all subjects, with a particular emphasis on STEM.

The school has mapped pathways to advanced coursework that provide options for any student to accelerate their learning at any point in their academic career. Additional learning time in core subjects, made possible by the school's scheduling flexibility, allows educators to deepen instruction when students need extra support and accelerate learning when students are ready to move more quickly. Pathways to advanced coursework offer a range of on-ramps, adapting to students' varying needs at different points in their educational trajectories. Pioneer educators are committed to accelerating instruction whenever students are ready, recognizing that a student who struggles in math in 9th grade may be ready for college-level calculus by 12th grade. The following practices support acceleration.

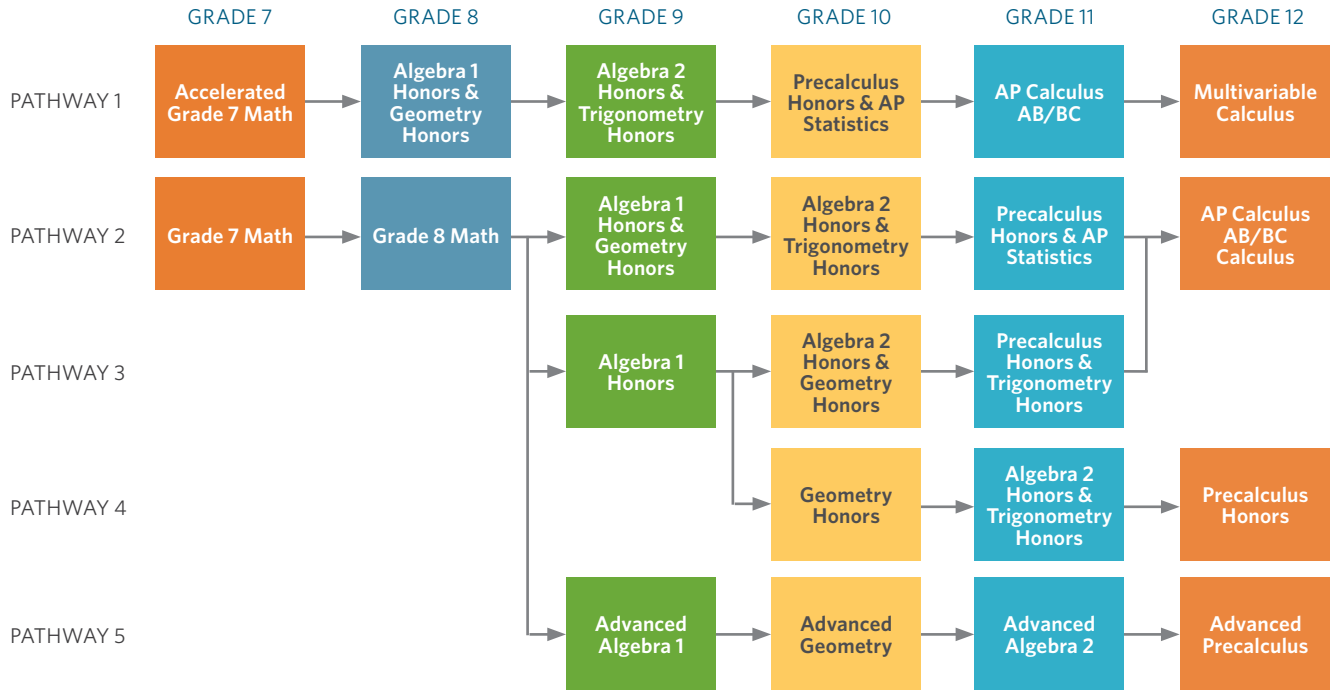
1 Pew Research Center, April, 2021, "STEM Jobs See Uneven Progress in Increasing Gender, Racial and Ethnic Diversity

Increased learning time on core instruction

A foundational element of Pioneer's rigorous program is a double block of academic instruction in particular subjects and grade levels. For example, the school's math pathway (image below) incorporates a double block in both 9th and 10th grade. Most students participate in pathway 2, which includes both algebra 1 and geometry in 9th grade, moving to algebra 2 and trigonometry in 10th grade. By taking two courses at the same time, students grasp the integration of mathematical concepts. With an extended school day and extended school year, Pioneer is able to provide more time on core instruction without sacrificing fine arts, music, physical education, and other critical enrichment courses.

"They've completed an entire typical math curriculum by the end of 10th grade," Executive Director Vahit Sevinc said. "It's tough [in 9th grade], but advanced math wouldn't be possible without it." This course sequence ensures that every student has the opportunity to complete calculus before graduating from high school. Calculus is a requirement for most math and science-related college majors. With 80% of Pioneer students completing calculus in high school, alumni are well-positioned to succeed when they get to college.

Pioneer leaders recognize that some students need extra time to master mathematical concepts. As a result, they offer higher-support courses for students who benefit from taking just one math course during the academic year. If a student elects this option, they enroll in a double block of algebra 1, geometry, algebra 2, or precalculus, depending on the grade level. With twice the instructional time, teachers slow the pace of instruction and provide differentiated support to address learning gaps. Many students take this approach for one year, and then elect to take two math courses at a faster pace the following year (as shown in Pathways 3 and 4 in the diagram below). Regardless of the pathway that students choose, Pioneer ensures that every graduating student has completed an advanced math course beyond the requirements of the Massachusetts Curriculum Frameworks.



Summer acceleration

For students seeking an added challenge, Pioneer offers the opportunity to enroll in an online math course over the summer in order to skip a class during the school year. Students who choose this option participate in asynchronous summer learning through Khan Academy. At the end of the summer, they take a proficiency test on-campus at Pioneer. If students pass, they can take a higher-level math course the following year. Roughly one-third of students choose this option to create room in their schedule for an upper-level math class during the school year, such as multivariable calculus or AP statistics.

Ensuring Student Success with Individualized Support

Jabril*, a current 11th grade student, recalls being surprised by Pioneer's academic rigor when he enrolled in 7th grade. At his elementary school, he earned high grades with little effort. Initially intimidated by the demands of his middle school classes, Jabril noticed his teachers' deep belief in his ability. His teachers' encouragement helped him recognize that he was capable of succeeding in rigorous classes. "I was used to being in a school where everyone learned at the slowest person's pace. Pioneer was a huge change and I wasn't performing well in 7th grade," he said. "My teachers told me I might not like math yet, but I was going to be really good at it."

His teachers were right. By the time he reached high school, Jabril had become a strong math student. He freed up time in his schedule to take advanced math and science classes by taking an extra course over the summer. He's building his college list now and is looking for schools that offer a pre-med program. He hadn't considered a career in medicine before coming to Pioneer. The personalized support and encouragement he received from his teachers helped him envision new pathways for his future. Pioneer offers individualized support through multiple methods, as described below.

Developing strong partnerships with families is a core element of each teacher's job responsibilities, and success in this area is monitored through the school's educator evaluation process.

Family partnerships

Individualized support at Pioneer begins as soon as students enroll. Teachers and administrators view families as full partners in their children's education, and they conduct home visits to build community with families and orient them to the school's expectations. Families receive assurance that the school will communicate with them any time their child is struggling. Additionally, caretakers are encouraged to communicate regularly with their child's educators. Developing strong partnerships with families is a core element of each teacher's job responsibilities, and success in this area is monitored through the school's educator evaluation process. All Pioneer educators receive individualized feedback and guidance on effective family communication. Parents recognize that family engagement is a priority at Pioneer, and they say that educators are quick to respond to children's academic and non-academic needs.

Deja,* the mother of a current student, said that Pioneer staff have become a second family to her. She recognizes that teachers have taken the time to get to know her son as an individual. Any time she's had a concern, she's received a prompt email and follow-up phone call from Pioneer staff. When she notified the school that several members of her household had tested positive for COVID, a food delivery from Pioneer arrived at her house within two hours. "We all cried," she said, "because that's something a family would do." Deja appreciates Pioneer not only for the academic preparation that her son receives, but for the sense of community her family has at the school.

Academic supports

Staff recognize that Pioneer's academic rigor is higher than what most students are accustomed to. They have developed a robust system of academic support to ensure that no student falls behind. Each school day ends with a "Pirate Prep" period, during which students meet with teachers to receive supplemental instruction. If a teacher notices a student is struggling, their first step is to request that the student visit them during Pirate Prep. Students may also choose to visit any teacher during this time, even if they are not struggling in class. Students who don't have immediate academic needs can use the Pirate Prep block to independently complete assignments or collaborate with peers.

If a student's needs cannot be met during the Pirate Prep period, the school offers an After School Academy and a Saturday Academy. The After School Academy provides individualized and small-group tutoring every Tuesday and Thursday afternoon. Most teachers are present during this time, and staff estimate that roughly a third of the student body participates each week. While most students self-select to attend, teachers will call families to request a student's participation at the first sign that a student is falling behind.

> "At Pioneer, teachers want every individual [student] to succeed."
>
> Mira, 11th grade student

If a student hasn't mastered a concept that is necessary for their academic progression, teachers will request their attendance at the Saturday Academy. Saturday Academy runs for three hours each weekend, offering an extended time for individualized instruction. Any student can choose to attend, and many come to complete assignments collaboratively with their peers. "It's like a college study session for some of them," a teacher said. "Students will bring donuts and sit around Socratic-style doing AP test prep."

All academic support offerings at Pioneer are available to all students. Students with disabilities receive targeted support during the school day in alignment with Individualized Education Plan (IEP) services and accommodations. To the maximum extent possible, academic services are provided within the general education setting. When a student with an IEP is struggling in a course, they receive support from general education teachers through Pirate Prep, After School Academy, and Saturday Academy alongside non-disabled peers. They also receive individualized support during the school day per the terms of their IEP.

Peer supports

In addition to support provided by educators, students have the opportunity to participate in a robust peer mentoring program. Upper-grade mentors are matched with younger mentees for weekly meetings during the Pirate Prep period. Mentors often identify with the challenges that mentees are facing, including social, family, and academic issues. "I really see [my mentee] as a friend," noted Rasheed,* a 12th grade mentor. "Sometimes we just talk about how his day went. I'll give him help with personal issues, and sometimes we really go into detail if he needs homework help." When a mentee is struggling, mentors are there to provide encouragement and advice. "I was just like him at his age," Rasheed said of his mentee. "School can get hard. I want him to feel like he can trust me and see that if I can do it, he can do it too."

Conclusion

As schools across the Commonwealth seek to accelerate instruction in response to the extended disruption of the COVID-19 pandemic, Pioneer's model offers critical practices to consider. When students arrive at Pioneer in 7th grade, they come from a wide range of elementary schools and have vast differences in academic preparedness. In order to ensure that all students succeed in Pioneer's rigorous classes, the school has created several structures for individualized support both during and outside of the school day. Academic rigor is coupled with a strong focus on agency and goal-setting, empowering each student to define their own purpose for challenging themselves academically. "We ask students to really push themselves, and they're willing to do it because they see the end goal," a teacher noted. "In the end, it's really about giving them the opportunity to pursue their dreams."

Looking back at her five years as a Pioneer student, Mira*, a current junior, can see the product of her effort. She arrived at Pioneer reluctantly in 7th grade. Her mother enrolled her after hearing about the school's success from a family member. She wasn't sure if she wanted to go to college, and she didn't want to leave her friends from elementary school. "At my old school I could kind of blend in. My teachers were there for the full class but not really for the individual. At Pioneer, teachers want every individual [student] to succeed." If Mira struggled to understand something in class, her teachers noticed. They'd ask her to meet with them during Pirate Prep for tutoring and they would check in to see how she was doing. She started to take advantage of the different supports the school offered, and she began to excel in her classes. Next year, she will apply to engineering programs both within and outside Massachusetts. Mira has advice for other students like her: "You should come here with an open mind and one that's ready to learn… If people take advantage of all the outlets provided for them, they could really go beyond anything they ever thought they would be."

Discussion Questions

1. What does Pioneer's story demonstrate about the importance of relevant, real-world instruction on increasing students' career aspirations in STEM fields?
2. Research shows that taking advanced math courses in high school makes students more likely to complete a math- or science-focused major in college. What can school and district leaders learn about flexible pathways to advanced mathematics from Pioneer's model?
3. Research shows that many classrooms lack grade-appropriate assignments, and many teachers do not expect students to perform at grade level. What can be learned from Pioneer's story about the importance of individualized goal-setting, family connections, and peer connections in acclimating students to rigorous instruction?
4. Many schools are looking to accelerate learning in core subjects to address missed instruction due to the COVID-19 pandemic. What can schools and districts learn from Pioneer's model of individualized instruction through Pirate Prep, After-School Academy, and Saturday Academy?

Research conducted and brief produced by the Rennie Center for Education Research & Policy

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Support for this project generously provided by The Boston Foundation.

Acknowledgments

The Rennie Center would like to express its gratitude to the students, teachers, and administration at the Pioneer Charter School of Science II. We were inspired by your commitment to learning about each student's dreams and providing every student with the unique support they need to succeed in rigorous coursework. We are especially grateful to Executive Director Vahit Sevinc for his willingness to open Pioneer's classrooms to our team, and for sharing the school's learnings with us. To the many teachers, students, and families with whom we met – we are deeply grateful for your willingness to share your stories and experiences with us. We have learned a tremendous amount from your work. We would also like to express our gratitude to the team at The Boston Foundation—particularly Antoniya Marinova—for her ongoing partnership and for her commitment to scaling effective practices across Massachusetts schools.

About the Rennie Center

The Rennie Center's mission is to improve public education through well-informed decision-making based on deep knowledge and evidence of effective policymaking and practice. As Massachusetts' preeminent voice in public education reform, we create open spaces for educators and policymakers to consider evidence, discuss cutting-edge issues, and develop new approaches to advance student learning and achievement. Through our staunch commitment to independent, non-partisan research and constructive conversations, we work to promote an education system that provides every child with the opportunity to be successful in school and in life. For more information, please visit www.renniecenter.org.

Suggested Citation

Rennie Center for Education Research & Policy. (April 2022). The Opportunity to Pursue their Dreams: How Rigorous Instruction Prepares Students for Postsecondary Success at the Pioneer Charter School of Science II. Boston, MA: Rennie Center for Education Research & Policy.

*Names have been changed to protect participant confidentiality