Middle School Longitudinal Report

White Paper | 2024

NATIONAL MATH + SCIENCE INITIATIVE

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Providing a STEM Pathway to *All* Students

National Math and Science Initiative believes that STEM education is the greatest lever to unlock student potential, and for nearly 30 years, we've provided training, support, and resources to teachers and students nationwide to do just that. To date, NMSI's Professional Development Services have impacted more than 2.7 million students, more than 70,000 teachers, 1,800 high schools, and 44 universities.

To evaluate the impact of NMSI's Professional Development Services in middle school classrooms, we partnered with West Coast Analytics, a third-party research firm. The firm's report showed significant gains in crucial metrics, demonstrating the impact that NMSI's well-structured, sustained professional development can have on both teachers and students.

Our professional development programs are designed to:

- Increase student STEM self-efficacy and access to STEM courses
- Improve student achievement
- Decrease the college readiness gap, especially among underrepresented students and those furthest from opportunities

Investing in teacher professional development has a notable impact on students' achievement and their perception of STEM belonging—especially among underserved students.

Program Overview

NMSI Professional Development Services equip teachers with the tools to elevate expectations and foster advanced thinking and learning. Our professional development includes:

- Hands-on training
- Classroom-ready materials
- Instruction in best practices

Our coaches focus on not just what to teach, but how to deepen student understanding of key concepts. The program emphasizes research-based strategies like inquiry-based learning, instructional scaffolding for differentiated instruction, and intentional course progression to enhance academic rigor and prepare students for college and careers.

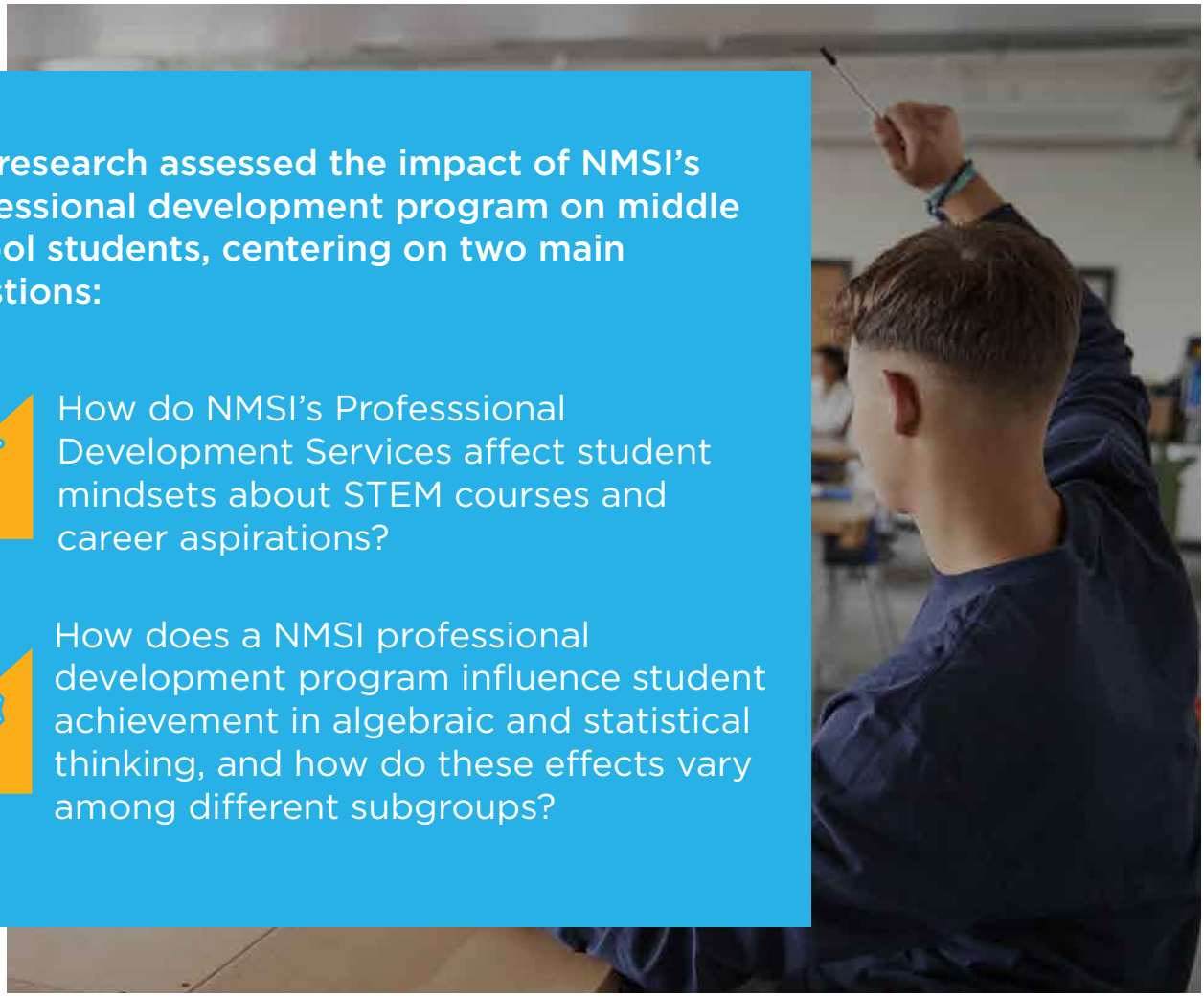
Our professional development programs are designed to help teachers practice these strategies in a supportive environment before implementing them in their classrooms. NMSI helps schools and districts throughout every step of the implementation process for our professional development programs:

NMSI Professional Development Services aims to support students who are furthest from opportunity. It's crucial to address how school systems tend to limit non-middle-class and non-white students and to foster environments that value their differences as strengths. NMSI encourages teachers to consider their students' cultures and strengths when planning lessons, using culturally responsive protocols to guide modifications and provide clear rationales for their use.

The Research Study

This study collected data from over 11,000 middle school students taught by 152 NMSI-trained teachers across three one-year cohorts over the 2021-2024 academic years. The approach utilized assessments developed in partnership with the Berkeley Educational Assessment Research Center, focusing on mathematical problem solving and reasoning with data.

The assessments focused on gauging the progress of students' mindsets about STEM and their performance in key areas of algebraic and statistical thinking.



The research assessed the impact of NMSI's professional development program on middle school students, centering on two main questions:

How do NMSI's Professsional Development Services affect student mindsets about STEM courses and career aspirations?

How does a NMSI professional development program influence student achievement in algebraic and statistical thinking, and how do these effects vary among different subgroups?

Outcomes and Impacts

Student Mindset Improvements

How do NMSI's Professsional Development Services affect student mindsets about STEM courses and career aspirations?

The report shows that students taught by NMSI-trained teachers demonstrated a significant improvement in their confidence and interest in STEM subjects, illustrating:

- Increased student perceptions of their ability to succeed in STEM courses
- Increased student interest in pursuing STEM careers
- Particularly strong gains among Black students who showed a notable rise in STEM career aspirations

The approach utilized assessments developed in partnership with the Berkeley Educational Assessment Research Center, focusing on mathematical problem solving and reasoning with data.

From the Report:

"As educational institutions and policymakers continue to seek ways to improve STEM education and close achievement gaps, the findings from this project offer valuable insights into the role of professional development in achieving these goals...[NMSI] serves as a model for other initiatives aimed at enhancing teacher effectiveness and improving student outcomes in critical academic areas."

Outcomes and Impacts

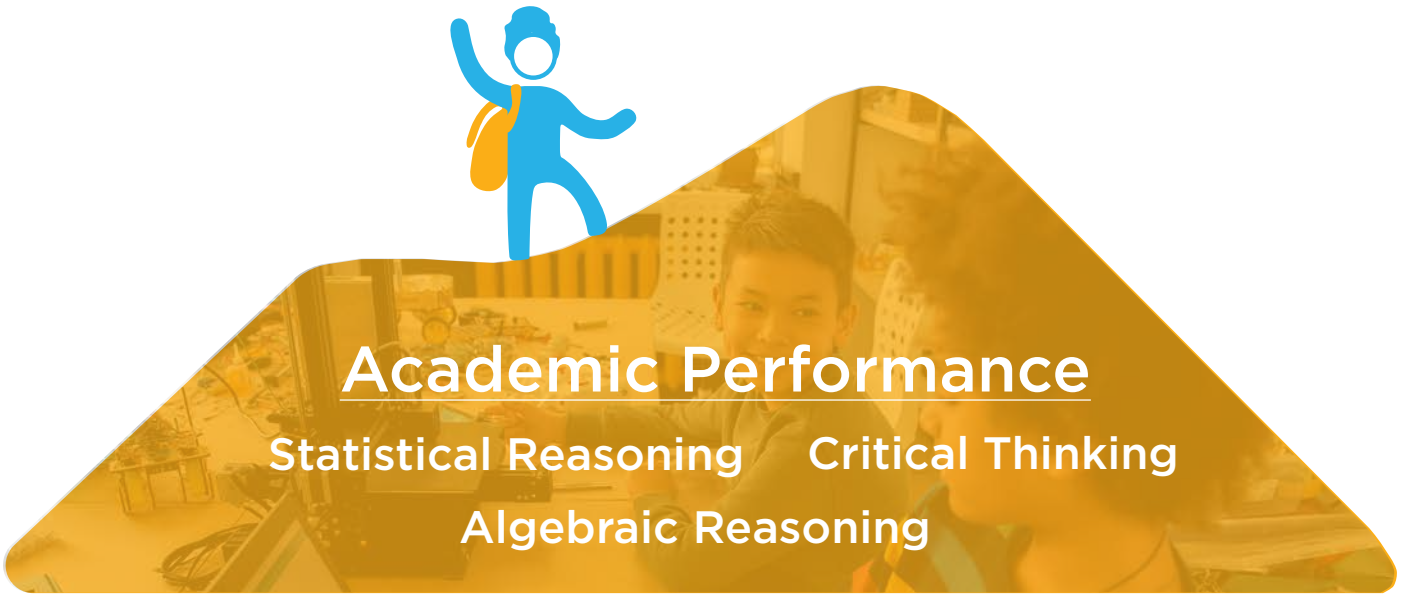
Academic Performance Gains

How does a NMSI professional development program influence student achievement in algebraic and statistical thinking, and how do these effects vary among different subgroups?

The report relied on **DDM** (Data-based Decision Making) and **PSM** (Problem Solving using Math) assessment measures to evaluate students' skills in statistical and algebraic reasoning, respectively. Both measures are integral for assessing the effectiveness of the professional development program in enhancing students' readiness for college-level coursework and careers in STEM by measuring their growth in these key areas over time.

There were measurable improvements in algebraic and statistical reasoning among students taught by NMSI-trained teachers, including:

- Particularly pronounced gains in algebraic reasoning, with students improving their problem-solving skills significantly over the academic year
- Consistent improvements in academic performance across gender and ethnic boundaries, indicating the program's effectiveness in supporting a diverse range of students



Outcomes and Impacts

Inclusivity and Impact on Underrepresented Students

The program was particularly effective in supporting underrepresented groups, including female, Black, and Latine students, who demonstrated academic gains similar to their peers. This underscores the potential of NMSI's Professional Development Services to close achievement gaps and its effectiveness in helping educators implement culturally responsive education within their classrooms, meeting students where they are and taking their backgrounds, culture, and individual strengths into account.

From the Report:

"NMSI not only helps to close achievement gaps but also fosters an inclusive learning environment where all students have the opportunity to excel in STEM fields."

Empowering Teachers, Inspiring Students

The study highlights the importance of investing in ongoing teacher training to build a pipeline of students who are excited about STEM careers and ready for college-level coursework . By providing teachers with hands-on, practice-based professional development, NMSI's Professional Development Services make a real difference in student outcomes.

As schools look for ways to boost STEM education and close achievement gaps, these research results show how vital professional development is to these efforts. The success of the program exemplifies how to enhance teacher effectiveness and improve student outcomes in key academic areas.

To learn more about NMSI and how we support students by supporting teachers, visit the Professional Development for Teachers page on our website.

To see the full results of the study, download the full Middle School Longitudinal Report.

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