Executive Summary

Design2Learn:
Implementation and Impact Study

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Housed at NYU Steinhardt, the Research Alliance for New York City Schools is an independent, nonpartisan research center that conducts rigorous studies on topics that matter to the City’s public schools. We strive to advance excellence and equity in education by providing evidence about the policies and practices that promote students’ development and academic success.
Design2Learn: Implementation and Impact Study

Executive Summary
Design2Learn (D2L) is an afterschool program aimed at increasing science interest, engagement, and achievement among middle school students who historically have been underrepresented in STEM. The D2L model, designed and implemented by ExpandED Schools, uses three core strategies to foster students’ interest and engagement in science: 1) collaborative teaching between an in-school science teacher and two afterschool educators, 2) curricular bridging, which connects in-school science instruction with afterschool activities, and 3) design-based learning, which emphasizes hands-on activities and inquiry-based instruction.

To support implementation of the program, ExpandED Schools and its partner, the New York Hall of Science (NYSCI), provided participating educators with a week-long professional development (PD) institute in the summer, occasional Saturday workshops, strategic planning sessions, and regular on-site coaching throughout the school year. D2L was designed as a three-year intervention, serving students in 6th through 8th grade.

In 2016, the U.S. Department of Education Investing in Innovation (I3) program awarded ExpandED Schools a development grant to support the design and study of D2L. The Research Alliance for New York City Schools served as the external evaluator of the program and conducted a randomized control trial to assess the impact of D2L on key student outcomes. As part of this study, we randomly assigned 32 afterschool programs to offer D2L or be part of a control group that offered their usual science programming. Using mixed methods, we examined D2L’s implementation, as well as its impact on students’ interest and engagement in science, their attendance, and their science grades.

Key Findings

• Overall, study findings showed strong fidelity of implementation for the key program inputs. Of the 15 sites that implemented D2L, 14 fully participated in the PD offered, and all 15 sites participated in strategic planning and instructional and programming coaching sessions as expected.

• D2L sites implemented the three key pillars of the model—collaborative teaching, curricular bridging, and design-based instruction—at fairly high levels, and overall program quality was rated highly.

• Differences between D2L and the control site activities were small. Control sites also offered students engaging science activities, and the program quality was rated similarly. Students in control sites experienced the same amount of curricular bridging as their D2L peers, but less exposure to design-based instruction and educator collaboration.

• Both D2L and control sites offered fewer than the 72 hours of afterschool activities expected per year. On average, D2L sites offered 46 hours of activities per year, and control sites offered 63 hours per year.
• Student attendance overall was low, and D2L students attended slightly less frequently than their control peers. On average, D2L students attended about 32 hours of programming, and control students attended about 34 hours of afterschool programming. Few students participated in the afterschool program for more than one year, despite the expectation that they would attend for three consecutive years.

• D2L had no effect on students’ interest and engagement in science, perseverance, or critical thinking behaviors, as measured by student surveys. It also had no effect on students’ academic outcomes (science grades, school attendance).

Summary and Conclusions
The D2L model was motivated by the need to build students’ science skills and interest in the middle grades—a vulnerable time when science achievement and interest tend to sharply decline, particularly for students who are underrepresented in STEM. Though the program inputs were executed as intended (ExpandED and NYSCI provided, and sites participated in, professional development and supports), and D2L sites seemed to implement the three pillars of the model as designed (design-based instruction, collaboration and co-teaching with in-school educators, and connections to the in-school curriculum), there were some substantial challenges and issues that likely influenced the results. First, our data suggest the control sites were also implementing high-quality science activities characterized by the three pillars of D2L, at least to some extent. Second, both D2L and control sites offered, and students attended, far fewer hours of activities than expected, and D2L student attendance was slightly lower than their control peers. Further, very few students participated in the afterschool programming for three years (6th through 8th grade) as intended. Together, these findings suggest that there may not have been a substantial difference between the D2L and control experiences, and students may not have received adequate exposure to the intervention to influence students’ interest and engagement in science or science achievement.

The findings from this study raise important questions about and directions for future research on afterschool interventions designed to increase student interest and achievement in science. First, the difficulty in recruiting and retaining middle grade students for both the D2L and control sites suggests the issue was not unique to D2L or a result of the D2L offerings. Prior research indicates that attracting students in this age range to afterschool programs is a widespread problem that can only be overcome with aggressive recruitment efforts (Grossman, Raley, & Walker, 2005). Future studies should explore whether better recruitment and retention strategies could attract and retain middle grade students, resulting in more consistent and sustained participation. Future research might also explore the efficacy of shorter-term and more flexible and informal experiences in the middle grades. Additionally, these findings raise the question of whether this multi-year intervention might be better suited for elementary-aged students, whose afterschool attendance is often more reliable because of parents’ needs for childcare.

Second, our findings raise questions about how much exposure to D2L activities students would have to receive to make a difference in their science interest and skills. As designed, D2L was expected to expose students to about 200 hours of designed-based activities connected to the
in-school science curriculum over three years (approximately 72 hours per year). However, we found that D2L students attended for only 32 hours in a year on average, and generally for only one year. That amount totals only 15 percent of the expected exposure. Would more exposure to D2L have led to impacts on the hypothesized student outcomes? Or, is there a flaw in the theory underlying the model’s design? Given the importance of science literacy to succeed in 21st-century society and careers, and the imperative to address equity issues raised by the underrepresentation of students in STEM, it is essential to conduct further research to answer these questions and understand the mechanisms that lead to increased interest and achievement in science.
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