



EVALUATION OF ENpowered STEM ACHIEVEMENT PROJECT SUMMARY

THE PROJECT

This project was funded through a *Department of Education*, Education Innovation and Research (EIR) Program early-phase grant awarded to **Project SYNCERE** in 2019.

PRG served as the external evaluator for the grant and designed an implementation and impact evaluation of ENpowered Games, a middle school engineering curriculum designed to spark interest and engagement in STEM among students from historically underrepresented communities in Chicago Public Schools.

THE PROGRAM

The ENpowered program aims to increase student interest, engagement, and achievement in STEM topics by exposing them to engineering education in an engaging way that provides hands-on experience and opportunity for mastery. Project SYNCERE has developed frameworks to implement ENpowered as either an in- or after-school program with students across Grades 3 through 12.

This grant focused on the implementation and evaluation of the ENpowered Games for Middle School Model, as offered to students in Grades 6 through 8 during the regular school day. The 10-week classroom curriculum is taught by two Project SYNCERE co-instructors who lead students through the Engineering Design Process (EDP), core engineering principles, and hands-on, problem-solving activities. All lessons incorporate problem-based learning and focus on solving a real-world technical challenge, such as the need to automate residential energy usage or reduce accidents in autonomous vehicles.

At least once during the semester, professionals from the Chicago STEM business community accompany the co-instructors to classrooms to talk about their careers, including the pathway they took from middle school onward. At the end of the semester, students come together to compete in the ENpowered Games competition to showcase what they learned throughout the semester and complete a series of timed engineering design challenges.

THE EVALUATION

PRG conducted an impact and implementation evaluation of ENpowered during the 2021-24 school years. The impact study was a quasi-experimental design that employed propensity score weighting techniques to compare change in outcomes (difference in differences) among students who participated in ENpowered with those of similar students who attended non-program schools and classes.

Program impact was estimated using end-of-course grades in math and science courses during the semester of implementation. All data were collected from Chicago Public Schools.

SETTING

- 19 middle schools in Chicago Public Schools

PARTICIPANTS

- 1,016 students in Grades 6–8
- 77% identified as Black
- 21% identified as Hispanic/Latino/a
- 76% were eligible for free/reduced-priced lunch

IMPLEMENTATION

- ENpowered Middle School Model
- 10-week curriculum led by 2 Project SYNCERE co-instructors
- Includes guest speakers and culminating competitive event

ENGINEERING DESIGN PROCESS



DESIRED OUTCOMES



Improved course performance in science



Improved course performance in math

STUDY FINDINGS

Implementation Evaluation

PRG conducted a mixed-methods implementation evaluation that assessed the degree to which the ENpowered Games program was implemented as intended each year and gathered teacher and student perspectives on the ENpowered Games program.

Overall, teachers reported being satisfied or very satisfied with the different features of classroom and competition programming. When asked what they thought students resonated with most about the competition, teachers pointed to the opportunity for students to demonstrate their learned skills and succeed in the engineering challenges at the Games. Teachers also noted that their students enjoyed “seeing other students like them” competing and succeeding at the Games. When asked how they thought a program like ENpowered could be impactful for middle schoolers, teachers noted that the program offers valuable exposure to and “builds their confidence that they are competent” in the engineering field.

At the end of programming and across grade levels, three-quarters of students reported that they would recommend the ENpowered program to other students (78%) and would participate again (77%). Students reported that their favorite aspects of the program focused on the competition challenges and the classroom activities involving building, coding, or programming their projects.

In terms of implementation fidelity, all schools implemented the 10-week classroom curriculum during all three school years. A staffing shortage during one year resulted in some classes only having one instructor from Project SYNCERE. In addition, the ENpowered Games event was held at the end of the semester in all three school years.

Impact Evaluation

Impact estimates did not support the hypotheses that offering the ENpowered program would improve students’ course performance in science and math. Students in both the treatment and comparison conditions demonstrated similar improvements in math and science over the course of the spring semester (semester of implementation).

IMPLEMENTING TEACHER FEEDBACK

“ENpowered exposes middle school students that may not otherwise be exposed to STEM. The program has inspired some of them to consider STEM careers. This [is] huge because they can now make more informed decisions about the electives they will take in high school and the majors they will choose in college. Prior to ENpowered, many of them were intimidated by the mere mention of STEM.”

-Sixth grade science teacher

FINDINGS



No impact on performance in science



No impact on performance in math

CONCLUSIONS

- Impact findings indicate that offering the ENpowered program to middle school students did not significantly improve students’ final grades in math or science at the end of the implementation semester compared with a similar sample of comparison students.
- Qualitative feedback from both teachers and students suggests that ENpowered appealed to both groups and has the potential to broaden students’ perspectives on career pathways.
- Future work should continue to examine how programs like ENpowered can have long-term effects on student motivation and interest in pursuing STEM-focused activities and careers beyond middle school.

See PRG’s full evaluation report at [this link](#).

Questions? Contact education@policyandresearch.com

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