MSPinNYC2

Year Two Evaluation Report

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Introduction

The *Math Science Partnership in New York City 2* (MSPinNYC2) is a multi-year, National Science Foundation (NSF) funded initiative with the aim of transforming teaching and learning in urban secondary schools' STEM classrooms by focusing on teacher preparation and introducing pedagogical strategies centered on the *Peer Enabled Restructured Classroom* (PERC) instructional model. At its core, the PERC model uses a student-centered classroom approach in which Teaching Assistant Scholars (TAS)—in concert with the teacher—facilitate learning in small groups of math and science students. The TAS are high school students typically no more than one grade level ahead of the students enrolled in the PERC classes (i.e., the majority of the TAS are10^{th} grade students). Eligibility for a TAS position requires students to have completed the course for which they assist and to have passed the related Regents end-of-course examination. To complement and strengthen their work as teaching assistants, the TAS attend classes (referred to as "TAS classes") designed to deepen their knowledge of mathematics or science (depending on the PERC class they are teaching) and to develop their pedagogical skills in the PERC classrooms. In these classes, the TAS also receive guidance on what it means to be college-ready with instruction designed to prepare students for the application process, entrance, and success in postsecondary education.

The overarching goals of the MSPinNYC2 Project are to develop and refine the PERC model at the classroom level, and to help create the infrastructure at the school level to implement, sustain, and scale-up the PERC model throughout New York City high schools. The Project's long-term measurable outcomes include the following: (1) developing evidence of closing the achievement gap in secondary school math and science achievement; (2) improving college readiness for all students participating in the Project; and (3) providing clear evidence that school-college partnerships can build the infrastructure and the climate needed to sustain and scale-up the PERC model in high school math and science classrooms. Building on earlier NSF funded efforts, the MSPinNYC2 Project under the leadership of Dr. Pamela Mills, a Professor of Chemistry at Hunter College, the City University of New York, began implementing the PERC model in four New York City public high schools in academic year 2011-12. Researchers from the *Center for Advanced Study in Education* (CASE), City University of New York drafted this report to provide a review of the Project's second year implementation efforts.

Overview of Year Two Evaluation

Background. The evaluation activities during the first year of the Project focused on the early stages of PERC model implementation in four New York City public high schools—School 1 and School 2 in the Bronx, School 3 in Manhattan, and School 4 in Queens. The PERC model was introduced into two 9th grade Regents-level courses,[1] *Integrated Algebra* (IA) and *Living Environment* (LE), at each of these schools.[2]

Scope. The evaluation activities of the second year have focused on the continued implementation of the PERC program in the original four New York City schools, and upon the expansion and scale-up of the program in two additional content areas and two additional New York City high schools. A Chemistry course pilot took place in year one and is now a full PERC course. This year, a Physics course was pilot tested in one school.[3] This past academic year, two schools joined the program—School 5 in Brooklyn and School 6 in Queens.

The purposes of our year two evaluation activities are:

- to engage in extensive formative evaluation efforts aimed at optimizing the delivery of the PERC model in the target high schools, including the development of a variety of fidelity of implementation measures;
- to develop and pilot evaluation measures and procedures for collecting formative and summative data; and
- to report findings of student achievement (for both the TAS and PERC students) to the Project's management team as the data and findings become available.

As we explain later, our findings suggest the PERC model is well conceived and fully operational in all six high schools. As this second year comes to a close, the Project has not only maintained its presence in participating high schools, but has also expanded in terms of the number of content areas and the number of schools. This year, the Project recruited and trained over 250 TAS to deliver the PERC model in thirteen Living Environment classes, eighteen Integrated Algebra classes, and five Chemistry classes (across the six high schools). The Project continues to make critical progress in deepening the model from an operational standpoint, and in defining and measuring what it means to be college ready. An impressively large number of students (over 900)

[1] New York State Regents level courses rely on rigorous, well-defined curricula that include high-stakes, standardized, end-of-course assessments.
[2] In 2011-2012 there was an early-stage pilot PERC Chemistry class and in School 3 only the LE course was offered.
[3] In spring, 2013, an early-stage PERC Earth Science class pilot began, which is not reported in these findings.

enrolled in these courses during the 2012-2013 academic year. After two years, the Project has trained over 450 TAS and taught more than 1600 students in four subject areas.

The organization of this report is straightforward; we begin by describing the methods and techniques used to conduct the evaluation, and then go on to provide additional detail on the schools, teachers, and students participating in the Project during the 2012-2013 academic year (the second year of the Project). The third section provides data and outcomes about the summer program held in 2012. The fourth section provides data and findings about the following: 1) the PERC and TAS curriculum; 2) the professional development for the teachers and the TAS during the second year of the Project; 3) the fidelity of implementation activities and measures and; 4) the academic performance of the TAS and PERC students from the first year of the Project, including program impact. Our report closes by summarizing our findings, offering recommendations to the Project's management, and identifying next steps for the evaluation efforts in year three.[4]

Our evaluation used an observational design and a mixed methods approach, relying on both qualitative and quantitative data and other information to study the salient components of the PERC model, student achievement, and program implementation and scale-up. The following brief description provides an overview of our evaluation efforts during this second year:

- Members of the CASE evaluation team attended Project management and other planning meetings throughout the year; in collaboration with the Project's research team, the Evaluation team established procedures for analyzing student achievement data (for the students enrolled in the PERC classes as well as for the TAS).
- Through interviews, surveys and online logs, we collected feedback and comments from the PERC teachers on their teaching strategies, and on their need for curriculum planning and professional development.
- We gathered and analyzed self-report data from the TAS about the teaching and tutoring activities in which they engaged during the PERC classes.
- The CASE team conducted a series of classroom observations and teacher interviews throughout the 2012-13 academic year.

[4] The data in this report were collected through the end of May, 2013.

- The CASE team reviewed the curricula developed for the Integrated Algebra, Living Environment, Physics, Chemistry PERC classes, and for the TAS classes offered across the participating high schools.

Database Development

Over the past year, we worked in collaboration with CUNY's College Now Program and the New York City Department of Education (the DOE). We spent significant time and effort to development a comprehensive, validated, and well documented set of databases to support our evaluation of the *MSPinNYC2* Project. These databases have two primary strands: an annual series of data files for evaluating the academic performance of the PERC and TAS participants, and a longitudinal group of data files designed to track the academic performance of each cohort of TAS and PERC students across their high school career and beyond.

PERC participants' data, for example, are stored by year to facilitate quick analysis (see Figure 1). The TAS participants' data are also stored by year and combine cohorts (see Figure 2). This data structure allows the Evaluation Team to compare and follow TAS performance on Regents exams, course schedules, and academic performance across the life of the program.

Figure 1. Annual Data Collection for PERC Participants

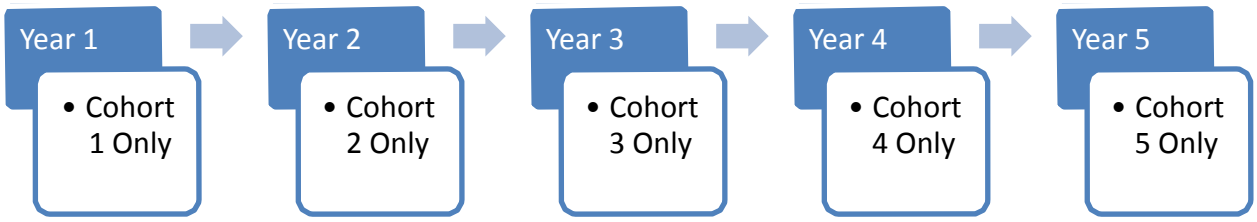
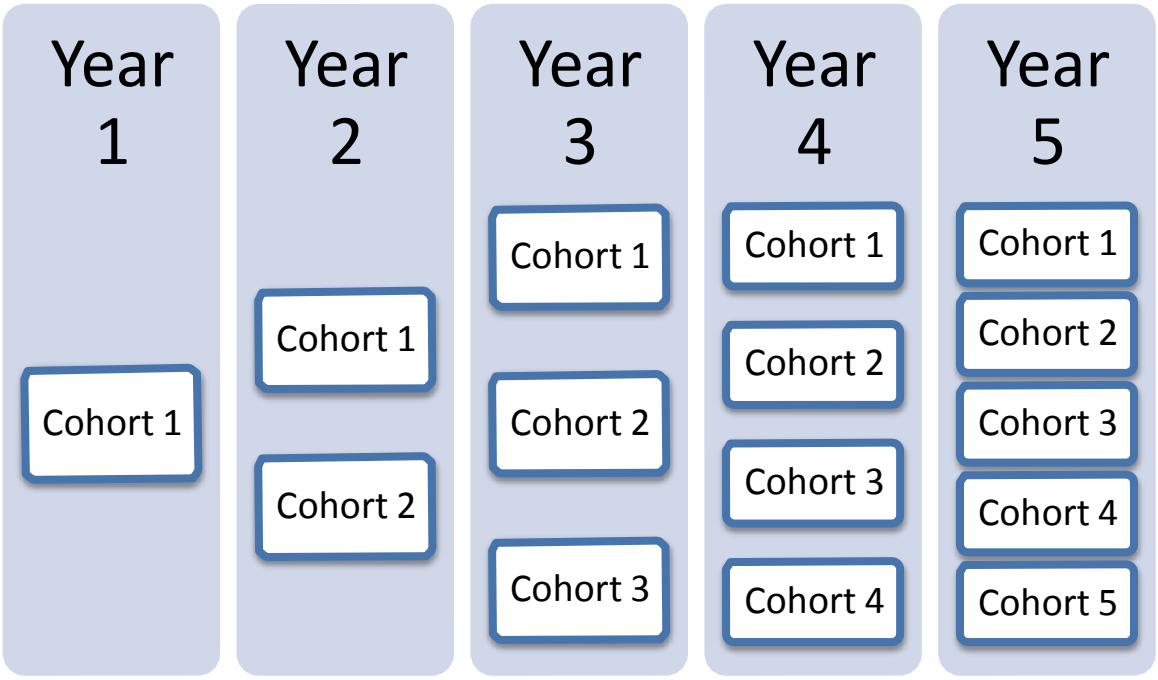


Figure 2. Longitudinal Data Collection for TAS Participants



Data files and variables. In collaboration with the New York City Department of Education (NYC DOE) and CUNY's Program College Now the Evaluation Team was able to collect all the relevant student data. The Project Staff collects the rosters twice a year (fall and spring), and they are used to populate the database. The resulting database includes demographic information about students, NYS Regents scores, and other academic performance data.

A complete and well-documented codebook is under development. This document will describe the database and curating process used to maintain the quality and accuracy of the data. The codebook will contain information pertaining to the outcome variables, data cleaning, maintenance, and the recoding of variables.

Security. CUNY's College Now program shares data with the CASE evaluation team via a secure *sharefile* portal hosted by CUNY. A secure file hosting service using the Advanced Encryption Standard (AES-256) houses the databases and allows access only to authorized members of the CASE team. The secure server transmits data to the researchers and evaluators via 256-bit SSL (Secure Sockets Layer) encryption, an industry standard for maintaining secure databases. Only key CASE evaluators have access to the file hosting server. A predetermined nine digit open source identity system (OSIS ID) assigned by the DOE upon entry into the New York school system is used to track student-level participants without using identifiers or other sensitive personal information.

Conclusion

The *MSPinNYC2* management has done outstanding work this second year, and has successfully implemented the PERC instructional model in a relatively large number of 9th grade math and science classes across six urban high schools in New York City. This is remarkable given that peer facilitated, group-centered instructional interventions at the secondary school level have a long history of being difficult to implement, particularly in urban schools. The project has also scaled up, increasing the number of classes it offered this second year by 50%. In addition, our preliminary analyses suggest that the program positively impacts college readiness and subject area Regents exam scores for the TAS. Other preliminary analyses suggest that LE PERC students are more likely to out-perform non-program students on the LE Regents exam. The careful planning, hard work, and engineering required to have implemented the program and generated these results have to be acknowledged as a major accomplishment. In this light, and in the context of the formative data generated this year, we want to take this opportunity to highlight aspects of the initiative that may benefit from further discussion and consideration—some fine-tuning as the project goes to scale. We outline these areas next.

Schools and Teachers

As the project continues to grow, it may be that some schools and teachers may be a better fit for the PERC program as compared to others. The selection of teachers who believe that students can learn and that they can learn from one another and schools that are willing to implement the program fully will likely further the success of the program. Therefore, identifying "target" schools and teachers within those schools that will "buy-in" to the model will be helpful. Marketing materials not only serve to "sell" potential target schools but also inform schools about the nature of the program. This, in turn, can improve compliance with key parts of the program, such as the "sit-rate" of the TAS with regard to their subject area Regents exam. We realize that is not always simple to control school environments, as they are complex places with many constraints and needs that can take precedence over an instructional program.

Curricula

As the project continues to expand and go to scale, it is important to continue to keep up with the need for curricular development. While great strides have been made this year, curricula continue to need to be developed as the Project expands its course offerings. The curricula is a central driver of the project model and is an also an important selling point for potential participant schools. The Project leadership wisely delegated the oversight of IA curriculum to a content specialist. That has been an effective approach as relying solely on the teachers is too great a burden for them. In addition, our data suggest that the teachers continue to need guidance on how to train and utilize the TAS. Certainly, a good portion of this guidance can be in the form of curricular materials for the TAS class. Therefore, the Project leadership may want to consider the prioritization and allocation of resources accordingly to meet these goals.

Teacher and TAS Training

While feedback for the professional development workshops and the coaching is highly favorable from both teachers and students, there remain key behaviors and competencies that are under-developed. Optimizing the training of the teachers and the TAS can in turn generate powerful program effects such as increasing fidelity across classrooms and enhancing the program model. In addition, there are untapped opportunities for employing other training approaches, such as video tools for modeling and reflection. Going forward, we also recommend the Project management team consider reflecting on the extent to which the year-long PD agendas and sessions need to be more closely tied to the *PERC Targeted Behaviors Framework*. That is, should the PD sessions drill deeper and more extensively into focusing on best practices for operating all the components of the PERC model and how it can be adapted to other courses in math and science. The continued identification of "best practices" in exemplary PERC and TAS classrooms can help to drive the nature and scope of this training.

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