# Program Evaluation Data Collection Protocols

## Prepared for the Center for Teaching and Learning

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The following document outlines a research design to support the Center for Teaching and Learning in evaluating its existing Progressive Science and Math Initiatives across schools and districts in New Jersey. In addition, this document provides a detailed description of the district data that will be necessary to carry out the evaluation.

HR HANOVER RESEARCH

# REQUIRED DATA FOR PMI-PSI EVALUATION

## OVERVIEW

The following document outlines the data required to evaluate the Center for Teaching and Learning's (CTL) Progressive Math Initiative (PMI) and Progressive Science Initiative (PSI) in school districts within the state of New Jersey. CTL provides research-based and technology enabled instructional programs to promote student STEM attainment among its partner schools and districts through its Progressive Math and Science Initiatives. These programs are designed to support science and math instruction to improve student achievement and promote teacher effectiveness. Further, the PSI and PMI curricula are aligned to the Common Core State Standards (CCSS) at the state and national level.

This document describes the analytic methodology that can be used to support CTL's efforts in evaluating the effectiveness of its PSI and PMI programs. In addition, the document outlines the data collection protocols necessary to conduct evaluations of current PSI and PMI implementation and expand to accommodate future, or yearly, evaluations.

## PMI-PSI PROGRAM EVALUATION METHODOLOGY OUTLINE

The purpose of evaluating the PSI and PMI programs is to quantify the extent to which these programs are supporting students in improving their academic achievement in science and math, respectively. The following methodology follows a quasi-experimental research design that attempts to identify the impact of PSI and PMI by creating a treatment-control group type analysis. To identify the true impact of a program on the outcomes of its participants the analysis involves comparing participant outcomes to non-participant outcomes. Students who received PSI and PMI instruction are assigned to the treatment group and students who did not participate are assigned to the control group. To accurately determine the effects of PSI and PMI, students in the treatment and control groups will share similar characteristics, and differ only in their assignment of the treatment.

Student outcomes of interest to the PSI and PMI evaluations are defined using student performance measures pertaining to science, math, and general academic behavior. Student outcomes are measured in terms of math and science test score performance following PSI/PMI instruction (posttest). Baseline ability will be measured as the same subject test score from the period preceding PSI/PMI instruction (pretest). Finally, to isolate the impacts of PSI and PMI, the final analysis will implement student-level control variables to ensure comparison only between similar students who differ only in their PSI/PMI instruction status. This eliminates ambiguity as to the cause of the estimated student gains in achievement.

The program evaluation methodology outlined in this document is applicable to different course subjects and grade levels. In changing the setting of the evaluation, the outcomes and program participation data must be updated accordingly; however, the evaluation

methodology remains unchanged. In order to update the evaluation on annual basis, the outlined evaluation methodology would typically require two years of data, one to provide posttest outcomes, and the other to provide pretest/baseline data for students included in the analytic sample. To update the analysis each year, the new school year would provide the posttest assessments and the preceding year's data becomes the pretest for the new cohort of students.

## DATA COLLECTION PROTOCOLS

This section details the data required to complete program evaluations of PSI and PMI across different grade levels and student outcomes of interest. The data requirements are divided into four main types of student and program variables. Note that the data collection protocols in this document are contained to the middle and high school grade levels.

This section concludes with a discussion of data collection regarding student and teacher pre and posttest surveys.

The data required to conduct the PSI and PMI program evaluations for 2014-15 are listed as follows:[1]

### *PROGRESSIVE SCIENCE INITIATIVE EVALUATION DATA*

**2014-15 Middle School Student Posttests (Grades 6-8)**

- ☐ Grade 8 New Jersey Assessment of Skills and Knowledge (NJASK) Science scores.
- ☐ End-of-year assessment grades for Grades 6-8. Note that these assessments must be standard throughout the district of interest to ensure comparability between students.
- ☐ PSI based posttest scores for PSI and non-PSI students in Grades 6-8. The scores would be collected from the final administration of the PSI assessments at the conclusion of the 2014-15 school year.

**2013-14 Middle School Student Pretests (Grades 6-8). Note that these are only required if a district has been operating PMI and/or PSI for more than one year.**

- ☐ Science course assessments from Grades 5-7. Again, the pretests have to be standardized across the district of interest.[2]
- ☐ PSI based pretest scores for PSI and non-PSI students in Grades 5-7. The scores would be collected from the end of the 2013-14 school year.

**2014-15 High School Student Outcomes (Grades 9-12)**

- ☐ End-of-Course (EOC) assessment scores for Biology, Chemistry, and Physics, as available, and if these assessments are standardized across the district.

[1] The listed data requirements and timing of certain elements can be extrapolated to time periods post 2014-15.
[2] Vertical scaling refers to centering test scores at the district average and dividing by the standard deviation. Each student's vertically scaled test score corresponds to their performance relative to the average student.

- ☐ AP course assessment scores in Biology, Chemistry, and Physics I/II.[3]
- ☐ PSI based assessment scores for PSI and non-PSI students in high school.

**2013-14 High School Student Pretests (Grades 9-12)**

- ☐ Grade 8 NJASK Science assessment scores from 2013-14. These scores will be used as proxies for students' baseline science ability for EOC course performance.
- ☐ PSI based pretest scores for PSI and non-PSI students from Grades 8-11. The pretests can be collected from the end of the 2013-14 school year, where available.

### *Progressive Math Initiative Evaluation Data*

**2014-15 Middle School Student Posttests (Grades 6-8)**

- ☐ Grades 6-8 Partnership for Assessment of Readiness for College and Careers (PARCC) Math scores. Note that with the change in state assessments in New Jersey, we would vertically scale the assessments for comparability across assessments and years.[4]
- ☐ PMI based posttest scores for PMI and non-PMI students in Grades 6-8.

**2013-14 Middle School Student Pretests (Grades 6-8)**

- ☐ Grades 5-7 NJASK Math scores from the previous year. These scores would be vertically scaled to be comparable to 2014-15 PARCC scores.
- ☐ PMI-based pretest scores for PMI and non-PMI students in Grades 5-7 and/or the results of any mathematics pretests that are required by the district.

**2014-15 High School Student Outcomes (Grades 9-12)**

- ☐ High school math PARCC assessment scores.
- ☐ AP course assessment scores in Calculus AB and/or BC.
- ☐ PMI based assessment scores for PMI and non-PMI students in high school.

**2013-14 High School Student Pretests (Grades 9-12)**

- ☐ Grade 8 NJASK math assessment scores from 2013-14. This will serve as the pretest for EOC Algebra I and II test scores.
- ☐ PMI based pretest scores for PMI and non-PMI students from Grades 8-11 and/or the results of any mathematics pretests that are required by the district. The pretests can be collected from the end of the 2013-14 school year.

[3] AP Physics B will be replaced with AP Physics I and II starting in 2014-15.

[4] Vertical scaling refers to centering test scores at the district average and dividing by the standard deviation. Each student's vertically scaled test score corresponds to their performance relative to the average student.

### *Overall PMI-PSI Evaluation Data*

**Overall Student Outcomes**

- ☐ Grade promotion/retention. This will be measured by observing the grade of enrollment for each student in each year including students in Grades 6-12.
- ☐ Enrollment in advanced or college-level courses in high school.
- ☐ Graduation rate for all students

**PSI and PMI Program Variables (Grades 6-12)**

- ☐ Unique student identifiers. This allows us to link current test scores with past test scores and link student data from multiple sources. The identifiers must be consistent across all data sources.
- ☐ Student indicator of PSI and PMI participation status for each year in the data. This variable identifies students who received PSI-PMI instruction and their tenure in the program.

**Student Characteristics (Grades 6-12)**

- ☐ Date of birth (only month and year of birth are required).
- ☐ Gender
- ☐ Race/ethnicity
- ☐ English Language Learner status
- ☐ Free or reduced price lunch status
- ☐ Disability status
- ☐ Grade level
- ☐ School of attendance

## Teacher and Student Pre- and Posttest Surveys

CTL administers teacher and student surveys to collect participants' perceptions of PSI-PMI. The purpose of the student surveys is to gauge perceptions of the program as well as to assess how well students are adapting to the new program and use of technology in the classroom. Similarly, teachers are surveyed regarding their perception of how well students are responding to PSI-PMI instruction and how they believe the use of technology in the classroom affects their instructional methods. In terms of data collection protocols, the surveys are administered once at the beginning of each school year, to indicate the pre-program period, and once at the conclusion of the year, indicating the post-program period. These surveys will allow CTL to measure student and teacher growth over time in terms of their perceptions regarding the efficacy of PSI and PMI.

Finally, note that it will be important to create teacher and student links to the quantitative variables listed above by maintaining unique identifiers from the student test score and demographic datasets.


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