



**Government
Performance and
Results Act (GPRA)
Indicators for the
MSP Program,
Performance Period
2012**

**Analytic and
Technical Support
for Mathematics
and Science
Partnerships**

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Government Performance and Results Act (GPRA) Indicators for the MSP Program, Performance Period 2012

The U.S. Department of Education's Mathematics and Science Partnerships (MSP) Program creates partnerships between high-need school districts and mathematics, science, and/or engineering departments at institutions of higher education for the purpose of providing intensive content-rich professional development to teachers and thus improving student achievement in mathematics and/or science. The program requires projects to evaluate the impact of participation in MSP professional development on gains in teacher content knowledge and on student achievement.

Under the Government Performance and Results Act (GPRA), all federal agencies are required to develop indicators in order to report to the U.S. Congress on federal program impacts and outcomes. For the MSP Program, the following indicators have been developed:

- ***Teacher Knowledge***
 1. The percentage of MSP teachers who significantly increase their content knowledge as reflected in project-level pre- and post-assessments.
- ***Student Achievement***
 2. The percentage of students in classrooms of MSP teachers who score at the basic level or below in state assessments of mathematics or science.
 3. The percentage of students in classrooms of MSP teachers who score at the proficient level or above in state assessments of mathematics or science.
- ***Evaluation Design***
 4. The percentage of MSP projects that report using an experimental or quasi-experimental design for their evaluations.
 5. The percentage of MSP projects using an experimental or quasi-experimental design for their evaluations whose evaluations are conducted successfully and yield scientifically valid results.
- ***Timeliness***
 6. The percentage of state education agencies (SEAs) that submit complete and accurate data on MSP performance measures in a timely manner.

Data on each of these GPRA indicators for the MSP Program for Performance Period 2012 (PP12) are presented in the sections below. Report data were analyzed from 488 MSP projects, serving a total of 40,052 participants, including elementary, middle, and high school teachers, coaches, paraprofessionals, and administrators.

Teacher Knowledge

1) The percentage of MSP teachers who significantly increase their content knowledge, as reflected in project-level pre- and post-assessments.

As part of their evaluations, MSP projects are required to assess teachers' content knowledge in mathematics and/or science via pre- and post-tests during the years in which they receive intensive professional development. Projects reported the number of MSP teachers who significantly increased their content knowledge in mathematics and/or science topics on project pre- and post-assessments. Exhibit 1 presents data for those teachers for whom gains in content knowledge were assessed. Among the teachers assessed, 63 percent of teachers showed significant gains in mathematics content knowledge and 67 percent of teachers showed significant gains in science content knowledge.¹

Exhibit 1: Percent of Teachers with Significant Gains In Content Knowledge, Among Teachers with Pre-Post Content Assessments, Performance Period 2012

| Content Area | Total number of teachers served | Percent of teachers with content assessments | Percent of assessed teachers with significant gains |
|--------------|---------------------------------|--|---|
| Mathematics | 23, 546 | 56% | 63% |
| Science | 16, 167 | 62 | 67 |

Note: Individual teachers who received multiple professional development courses may be counted multiple times

Student Achievement

2) The percentage of students in classrooms of MSP teachers who score at the basic level or below in state assessments of mathematics or science.

3) The percentage of students in classrooms of MSP teachers who score at the proficient level or above in state assessments of mathematics or science.

Projects also reported the number of students served, the number of students assessed, and the number of students scoring at the basic level or below and at the proficient level or above in state assessments in both mathematics and science. In Exhibit 2, it can be seen that about one million students were taught by teachers who received MSP professional development in mathematics, and approximately 787,000 students were taught by teachers who received MSP professional development in science. State assessment data were reported for half of students (50 percent) in mathematics and for 29 percent of students in science. In both mathematics and science, over half of students scored at proficient or above (55 percent in mathematics and 69 percent in science). The remaining students scored at basic or below. These numbers were aggregated across all grade levels and all schools with teachers in the MSP project.

¹ Teacher gains were deemed as “significant” if their overall group showed a statistically significant gain in scores, and their individual scores were at least a third of a standard deviation greater than the pre-test scores among teachers within their group.

Exhibit 2: Percent of Students Scoring at Proficient Level or Above, Among Students Taught by MSP Teachers And Assessed In Each Content Area, Performance Period 2012

| Content Area | Total number of students taught by MSP teachers | Percent of students with assessment data | Percent of assessed students at <i>basic</i> or below | Percent of assessed students at <i>proficient</i> or above |
|--------------|---|--|---|--|
| Mathematics | 1,038,381 | 50% | 45% | 55% |
| Science | 787,007 | 29 | 31 | 69 |

Evaluation Design

4) The percentage of MSP projects that report using an experimental or quasi-experimental design for their evaluations.

Exhibit 3 presents the percentages of MSP projects that reported using various types of evaluation designs in PP12. Less than one percent of projects reported that they implemented an experimental design, which is the most rigorous research design for testing the impact of an intervention, wherein schools, teachers, or students are randomly assigned to treatment or control groups.

Nearly half of projects (48 percent) reported using a quasi-experimental design to compare the effects of the MSP Program on participating teachers and/or their students to non-participating teachers and/or their students. Evaluations using a quasi-experimental design can show causality by demonstrating equivalence between groups at baseline or adjusting for any initial differences between groups in the analysis of outcome data. Thirty percent of projects used a matched comparison quasi-experimental design, which further attempts to equate the two groups by matching participants in the two groups on baseline characteristics. Nearly one-fifth of projects (19 percent) reported using a non-matched comparison group.

The remaining projects reported using a one-group design with no comparison group, a qualitative design, or a mixed methods design. Approximately one-third of projects (36 percent) reported using pre-tests and post-tests to assess the gains of the teachers served by MSP (a “one-group” design). Twelve percent of projects reported using primarily qualitative methods, and three percent of projects reported using “other” methods, which included a mix of quantitative and qualitative methods.

Exhibit 3: Types of Evaluation Designs Used by Projects, Performance Period 2012

| Evaluation Design | Percent of Projects |
|---|---------------------|
| Random assignment design (experimental) | <1% |
| Quasi-experimental design | 48 |
| <i>Matched comparison groups</i> | 30 |
| <i>Non-matched comparison groups</i> | 19 |
| One-group design | 36 |
| Qualitative / descriptive design | 12 |
| Other | 3 |

5) The percentage of MSP projects using an experimental or quasi-experimental design for their evaluations whose evaluations are conducted successfully and yield scientifically valid results.

Every MSP project is required to design and implement an evaluation and accountability plan that allows for an assessment of its effectiveness. The requirement for evaluation of MSP projects is specified in the program’s enabling legislation in the *No Child Left Behind Act*. In order to ensure that projects are providing high-quality information on program outcomes, a set of criteria was developed as part of the Data Quality Initiative (DQI) through the Institute for Education Sciences (IES) at the U.S. Department of Education. These criteria are slightly revised each year in order to bring them into closer alignment with the What Works Clearinghouse Standards. The four criteria, as shown below, specify the conditions for projects using experimental and quasi-experimental designs to be deemed successful evaluations that yield scientifically valid results.

1. **Data reduction rates (i.e., attrition rates, response rates).** This criterion was not relevant to quasi-experimental designs that present evidence of baseline equivalence of the analysis sample. Experimental designs were required to meet two criteria:
 - Overall attrition is less than 30 percent; AND
 - The difference in attrition rates between the groups being compared is 15 percent or less.

2. **Baseline equivalence of groups.** Experimental designs that met the attrition criteria above were not required to establish baseline equivalence. Experimental designs that had high attrition (i.e., did not meet the attrition criteria above) were required to meet the same criteria as quasi-experimental designs, as specified below.
 - Baseline equivalence is established when:
 - The mean difference in baseline measures in the groups being compared is less than or equal to 5 percent of the pooled sample standard deviation; OR
 - The mean difference in baseline measures in the groups being compared is more than 5 percent but less than or equal to 25 percent of the pooled sample

standard deviation and the differences between the groups are adjusted for in the analysis.

- Baseline equivalence should be established in the analysis sample on pre-treatment measures of the outcome variable, or on other variables that are highly correlated with the outcome variable;² OR
 - If the data required for establishing baseline equivalence in the analysis sample are missing (and there was evidence that equivalence was tested), then baseline equivalence for quasi-experimental designs can be established in the baseline sample provided the data reduction standards in the first criterion are met as well.
3. ***Quality of the measurement instruments.*** Evaluations met this criteria if they met one of three criteria:
- Data collection instruments that had already been deemed valid and reliable to measure key outcomes; OR
 - Data collection instruments developed specifically for the study were sufficiently pre-tested with subjects who were comparable to the study sample or high reliability was established; OR
 - Data collection instruments contained selected items from validated and reliable instrument(s) and the resulting instrument included at least 10 items and at least 70 percent of the items were from validated and reliable instrument(s).
4. ***Relevant statistics reported.*** Evaluations met this criteria when the final report included treatment and comparison group post-test means and tests of statistical significance for key outcomes, sufficient information for calculation of statistical significance (e.g., mean, sample size, standard deviation/standard error), or results from statistical models that have been clearly specified.

The evaluations of all final-year MSP projects that reported using an experimental or quasi-experimental design with a comparison group were reviewed by a team of reviewers according to the criteria to determine the number of projects that conducted successful evaluations yielding scientifically valid results.³

Most evaluations of MSP projects included multiple evaluations of various outcomes. The review considered outcomes of teacher content knowledge, teacher practices, and student achievement. Projects had a passing evaluation if any of their evaluations of one of these three outcome domains passed the criteria listed above, as required for their design.

² WWC Quick Review Protocol, Version 2.0:

<http://ies.ed.gov/ncee/wwc/references/iddocviewer/Doc.aspx?docId=28&tocId=1>.

³ Projects that reported using unspecified “other” designs were screened in order to determine whether they used experimental or comparison group designs. Those that did were also included in the group of projects reviewed.

The review team focused primarily on the information contained in the final evaluation reports. Information was supplemented with the evaluation data in the annual performance reports (APRs), as well as information provided directly by projects, in an attempt to fill in missing information.

One hundred and one projects reported submitting a final-year report in PP12 and using an experimental or quasi-experimental design. Materials of these projects were screened to verify it was the project’s final year and that a qualifying design was used to evaluate an outcome in one of the three designated domains. Seventy-one projects were verified to be eligible. These projects received a full review and were evaluated on the criteria described above.

Twenty-one of these projects (30 percent) conducted an evaluation that met all of the design criteria. Twenty projects successfully employed quasi-experimental designs that included comparison groups, and one used an experimental design.

Exhibit 4: Final-Year Projects

| Final-Year Projects that Conducted Rigorous Evaluations and Met Criteria | Total |
|---|-------|
| Conducted an experimental or quasi-experimental evaluation with a comparison group in a designated outcome domain | 71 |
| Included at least one evaluation that passed all criteria | 21 |

Among the 21 projects that conducted successful evaluations, 14 projects successfully studied their program’s impacts on teacher content knowledge, four projects successfully studied impacts on classroom practices, and 14 projects successfully studied impacts on student achievement.⁴

Timelines

6) The percentage of SEAs that submit complete and accurate data on MSP performance measures in a timely manner.

Submission guidelines for APRs were developed as a basis for the timeliness calculation. MSP State Coordinators were responsible for ensuring that all projects within their state submitted complete and accurate data by this date. APRs for PP12 were accepted until February 28, 2014. Projects that informed the Department of Education that they would not receive teacher and/or student data in time were given an extension on the due date of their reports. All states submitted the required APR reports on time. Thus, 100 percent of states submitted complete and accurate data on MSP performance measures in a timely manner.

⁴ Five projects had evaluations that met the criteria in two domains and three projects had evaluations that met the criteria in all three domains.