Assessing the Effectiveness of the MAST Program for In-Service Teachers

Melissa S. Taylor, Loyola Marymount University

Faculty mentors: Katharine Clemmer, M. Catharine McElwain, Jeffrey A. Phillips

Introduction

The National Academies’ 2007 report, Rising Above the Gathering Storm, calls for improvements in K-12 Science, technology and mathematics (STEM) education as US students are not adequately prepared to enter the workplace, and even less prepared to compete with students from other countries. For example, US high school students scored lower than three-fourths of the countries in the world. The United States must prepare to enter the workplace, and even less prepared to compete in the global 21st century.

To meet the needs of teachers and students in the Los Angeles area, Loyola Marymount University’s Center for Math and Science Teaching (CMAST) created the Math and Science Teacher (MAST) program. The focus of this professional development system is to help current teachers improve both their pedagogical and content knowledge. Rather than focusing on recruiting or training new teachers, MAST seeks to maximize the results of the existing teachers. Early studies have shown that students in these teachers’ classes increase their scores on the California Standards Tests within the first year of implementation. This project seeks to document and understand the changes that occur in teachers’ attributes and teaching style while participating in MAST.

What is MAST?

The LMU Center for Math and Science Teaching (CMAST) has developed an intensive professional development program for secondary math and science teachers that focuses on both pedagogy and content mastery.

Goals:
- Develop teacher potential in a challenging and collaborative environment
- Integrates content and pedagogy
- Requires teachers to collaborate, analyze and reflect on classroom performance data
- Collaborates to personalize research supported practices in context
- Use recognized metrics of student engagement and performance to assess the effectiveness of MAST and therefore likely to show differences between those who have not started MAST and those who have successfully participated for several years.
- We administered the survey on the first day of the 2009 Summer MAST Institute to the 42 new participants before they had any instruction and to our “expert” group, which is comprised of eight successful MAST participants, who have been selected to be transformational leaders (TLs).

Participant Survey

We designed a survey to measure what teachers did in the classroom, their attitudes about teaching math & science as well as their views of mathematical and scientific processes. Each of these areas is a focus of MAST and therefore likely to show differences between those who have not started MAST and those who have successfully participated for several years.

Among the possible changes in MAST participants that we wanted to assess in this project, are their views of:
- 1. Student plasticity
- 2. Their own plasticity (with regard to teaching)
- 3. Their role in the student learning process
- 4. Assessment and feedback with regard to their teaching
- 5. The role of risk-taking in teaching
- 6. Their locus of control
- 7. Desirable teacher-student (and student-student) interactions

Values assessment and feedback

What do you think about my teaching from my colleagues, administrators, and experts?

Strongly disagree Strongly agree

- Lively & vibrant
- Cross-functional & interactive

Locus of control

If one of my students isn’t doing a class assignment, it’s because...

Strongly disagree Strongly agree

- the student wasn’t paying attention in class
- I gave an assignment that wasn’t at the students’ level

Capacity to improve teaching/learning

Making mistakes is part of the learning process.

Strongly disagree Strongly agree

- Highly
- Significantly

Student-student interactions

An observer in my class would describe my students as...

Strongly disagree Strongly agree

- Working independently and interdependently
- Not likely engaged and talking

Student Test Scores

California Standards Test (CST) are used to assess student proficiency in math and science and by extension, teacher proficiency, before and after entering MAST. CSTs are multiple-choice tests given each year to students in public schools in California. In middle school, the tests are by grade level; in high school, they are course specific: algebra, geometry, biology, etc.

Across all of the schools and teachers, the CST scores are higher during and after MAST. The number of students scoring above or far below basic dropped from 68% to 48% and the number scoring proficient or advanced proficient rose from 11% to 27%.

Conclusions

The MAST system can significantly raise the student standardized test scores in the classrooms of teachers who successfully complete the program. We have observed statistically significant differences between the new participants and experts/ TLs on several questions related to teachers’ views of how assessment fits into ones development, teaching as a learnable craft as well as their locus of control. These differences supported that the most successful MAST participants answered in concurrence to the MAST ideology.

We will continue to administer this survey yearly to all new and current MAST participants. We are interested in collecting these data to predict whether the MAST system is the cause for the differences in the new and expert participants, or if the expert participants had views that already corresponded to the MAST ideology and thus why they are more successful.

It is also not cost effective to train teachers who are not going to adopt the MAST system. We are hoping to gather enough data in the future to screen participants when they enter MAST. Based upon how their responses match up to successful participants and to unsuccessful participants we could predict how well they would adopt the MAST system. Therefore helping to make the program more cost effective by only training the teachers who are more likely to adopt the system.

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