

Maxima Project summary:

Even though women's enrollment in post-secondary institutions and graduation levels continue to increase, their participation in science, mathematics, engineering, and technology (SMET) remains alarmingly low. Many educators and researchers argue that this issue can be addressed by making science and mathematics more socially relevant and inclusive to girls at all school levels, but particularly at the elementary school level. However, elementary teachers often feel unprepared to meet this challenge due to a lack of preparation and opportunities to participate in effective and responsive professional development programs.

By building upon current research on gender inclusive teaching, inquiry-based learning, multicultural education, and sociocultural constructivism, our project provides teachers and student teachers with an alternate framework for teaching science and mathematics for understanding in diverse classrooms. We call this alternate framework sociotransformative constructivism. Sociotransformative constructivism (STC) is an orientation to teaching and learning that connects multicultural education principles with social constructivism (a theory of learning). Utilizing this framework, one of the main goals of this project is to enhance the professional preparation of teachers in a way that will ultimately have a positive impact on the academic performance and participation of girls in SMET.

To this end, we have received funding from the National Science Foundation and the New Mexico Commission on Higher Education to conduct a three-year, professional development research project. Three two-week professional development summer institutes for 25 elementary and middle school teachers will be offered. The first institute was offered this summer, and started with an emphasis on science education. The next institute will have an emphasis on mathematics and science, and the last one will focus on the integration of science, mathematics, engineering, and technology.

During the institutes, gender inclusive, minds-on activities are modeled by the principal investigators in collaboration with other experienced teachers. Participating teachers are also responsible for preparing a curriculum unit in teams according to the grade level in which they teach. The purpose of these units is to enable teachers to start implementing in their own classrooms some of the STC and gender inclusive pedagogical strategies we discussed during the institute. In this way, the research team can provide more focused and responsive feedback during our visits to the schools. The teacher-developed units also facilitate data gathering on pupil attitudes toward and performance in science and mathematics. In addition, more information about the students' performance can be gathered via questionnaires, unit pre- and post- content knowledge tests, and ethnographic interviews with a focus group from each school.

So far, five schools are involved in the project: University Hills, Valley View, and Mesilla elementary schools, along with their corresponding middle schools, Zia and Lynn. Every term, we are placing a selected group of preservice teachers in the classrooms of teachers who participated in the summer workshop. In this way, we are

hoping to increase the opportunities for professional development for both teachers and student teachers.

Two unique aspects of this project are its longitudinal design and the in-school continuing support the research team is offering. Since we will follow the progress of a group of girls at each of these schools from grade 4 through 6, we will be better able to assess whether STC has an impact on the girls' academic performance and attitude toward science and math. Similarly, we will be able to assess whether teachers find STC to be a useful orientation to teaching science and math for understanding in diverse classrooms. We believe that by providing on-going and on-site support to teachers, not only will better bridges be built between the university and local schools, but we will all benefit from this opportunity for professional development and collaboration.

We invite interested preservice teachers to contact Dr. Alberto J. Rodriguez and/or Dr. Cathy Zozakiewicz (Co-Principals Investigators) at albertor@nmsu.edu or czozakie@nmsu.edu.

We are placing selected individuals each term at the participating schools for the next three years.

(Note: Even if you are selected to participate in this project, you must also follow all the other application procedures for student teaching through the Student Teaching Office).