Rice University School Mathematics Project: An Opportunity for Research

Sarah Singletary
February 14, 2006
Overview

- History and goals of RUSMP
- Professional Development at RUSMP
- Summer Campus Program
  - Recent research on teacher efficacy
- Mathematics Leadership Institute
  - Current research projects
- Job and research opportunities
History and Goals of RUSMP

The Rice University School Mathematics Project (RUSMP) was established in 1987, with a grant from the National Science Foundation, in order to provide a bridge between the Rice University mathematics research community and Houston area mathematics teachers.

Our major goal is to enhance the mathematical and pedagogical knowledge of Houston PreK-12 math teachers and support them in implementing more effective mathematics programs.
Summer Campus Program

- Four-week professional development program in mathematics content and pedagogy for Houston-area PreK-12 teachers
- Taught by master teachers
- Active learning approach with an emphasis on motivation, application, and problem solving
RUSMP master teachers

Mathematics content and pedagogy

Curriculum development
Research Question

- What is a master teacher?
- What does a master teacher do?
- What is required of the job?
Job Analysis

- Procedure
- Interviews with SMEs

SMEs:
- Original and current director of RUSMP
- Previous and current Master Teachers

Asked SMEs about the specific tasks Master Teachers perform

Determined personal characteristics needed to complete the tasks
Job Analysis: Master Teacher

Three broad task categories:

- Preparing lessons and materials for the course
- Determining individual characteristics and abilities of participating teachers
- Presenting lessons incorporating both mathematical content and recommended pedagogical practices
Master Teachers...

- Demonstrate effective classroom performance.
- Illustrates novel teaching techniques.
- Collaborate in planning and implementation of lessons.
- Model instruction in both group and individual sessions.
Role Modeling

Positive effects of role modeling

- Increases self-efficacy
- Increases understanding of individual tasks
- Improves performance
- Some research has found that increased self-efficacy is positively correlated with student performance (Ross, 1994, 1998)
Research Questions

- Does the Summer Campus Program increase the self-efficacy of program participants?
- Does the Summer Campus Program lead to increased content knowledge?
Method

- Participants:
  - 104 PreK-12 teachers enrolled in the Summer Campus Program
- Experience:
  - Average 8.9 years
- Procedure:
  - Participants were enrolled in one of five courses for a total of four weeks and received instruction from two Master Teachers
  - Participants completed the measures on two occasions: at the programs inception and conclusion
- Measures:
  - Self-efficacy (Quinones, 1995);
  - Preparedness Scale
  - Mathematics Content and Pedagogy Pre/Post-Test
Results

- Participants felt more confident in their ability to teach at the completion of the program
  - $t(100) = 2.85, p < .01$
    - Time 1: 2.69
    - Time 2: 3.61

- The majority of participants (89%) felt fairly or very well prepared to:
  - Take into account students prior conceptions about math
  - Use Cooperative learning groups
  - Use hands-on activities
  - Manage a class using manipulatives
  - Use technology

- Participants’ knowledge of content and pedagogy increased from the beginning to the end of the program
  - $t(104) = 18.99, p < .001$
    - Time 1: 47.4
    - Time 2: 83.9
RUSMP Summer Campus Program benefits teachers
- Builds self-efficacy
- Increases mathematical content and pedagogical knowledge

Job analysis of the master teachers has implications for professional development
- Teaching adults is not the same as teaching children
Mathematics Leadership Institute (MLI)

- $3.8 million NSF-grant
- Intensive year-round program
  - Four-week summer institute
  - Monthly meetings and workshops
  - On-site critiques of pedagogy and classroom
  - Goal is to develop “lead” teachers
    - Individuals that can promote higher student achievement by serving as role-models for other teachers
Current Research Projects

- Goal Orientation/Goal Setting
  - Determining the extent to which one’s goal orientation has upon learning outcomes

- Measure of Teacher Leadership
  - No established measure of teacher leadership

- Developing and Validating a Selection Tool
  - There are many problems pertaining to how individuals are selected to participate in MLI, there is a currently a project underway to determine better methods for doing so
Job Opportunities

- Current Work
- Conducting Observations
  - In order to fulfill grant requirements, participating teachers must be observed in the classroom
- Assisting with the implementation of the Summer Campus and Mathematics Leadership Program
  - Potential research
  - Writing technical reports
  - Clerical work