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# Rice University School Mathematics Project: An Opportunity for Research

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# Overview

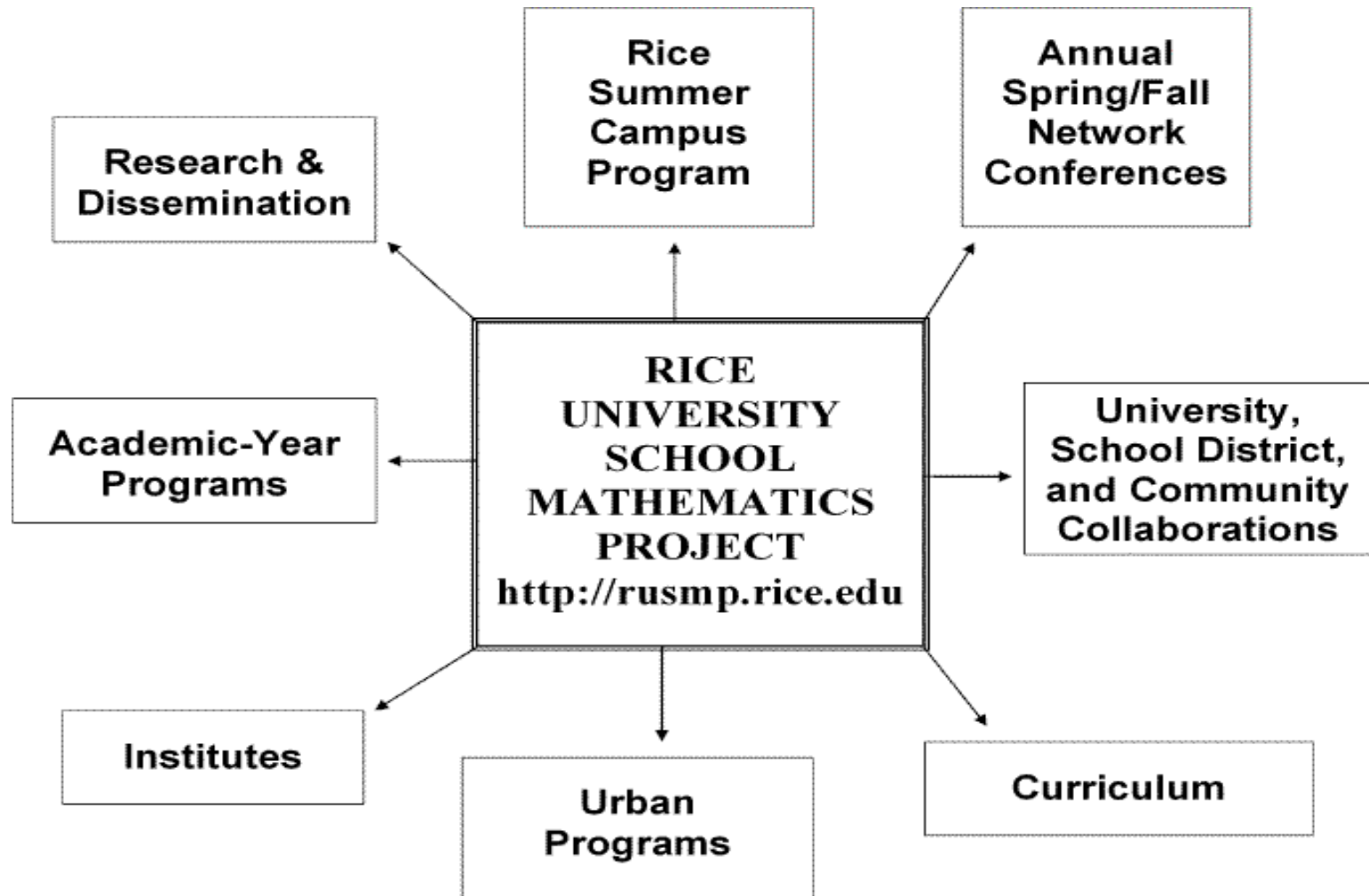
- History and goals of RUSMP
  - Professional Development at RUSMP
  - Summer Campus Program
    - Recent research on teacher efficacy
  - Mathematics Leadership Institute
    - Current research projects
  - Job and research opportunities
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# History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



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# 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
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RUSMP master teachers



Mathematics content  
and pedagogy



Curriculum development

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# Research Question

- What is a master teacher?
  - What does a master teacher do?
  - What is required of the job?
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# 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
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# 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
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# 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.
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# 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)
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# Research Questions

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

- 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
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# 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
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# 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
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# 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
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