

Request for Funding
College of Education and Human Development
Researched-based Inquiry in
Elementary Teacher Preparation
Quality enhancement Plan
Academic Year: 2007-2008

Part I: Cover Page

College of Education and Human Development
Proposal Title: Research-based Inquiry in Elementary Teacher Preparation

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Abstract

This proposal is to amend the undergraduate elementary interdisciplinary curriculum to incorporate a Research-based Inquiry strand throughout the elementary methods for teaching courses in order to provide greater coherence among related topics, and to provide students and faculty the opportunity for increased intellectual interaction and shared inquiry. This will be achieved through reorganization of the courses and the development of a bifurcated two-tiered mathematics methods course. We believe learning should be relevant to practice and real experience; therefore, this project will provide a more integrative approach for the teaching and learning of practical pedagogical components while centralizing and reconstituting content knowledge into pedagogical content knowledge. The undergraduate students benefit from the faculty research process through a teaching and learning as scholarly activity, by building a community of scientifically based practitioners. Learning outcomes include inquiry, improved critical thinking and problem solving, enhanced collaboration, and improved technical competence to design and deliver instruction in increasingly diverse K-12 classrooms. Expected outcomes from this project include increased mathematical conceptualization, improved teaching skills, improved communication of research based strategies for teaching and learning of mathematical concepts.

Part II: Learning Outcomes

By actively participating with faculty, students will...

- Demonstrate critical thinking
- Apply their problem-solving abilities
- Demonstrate/model pedagogical skills related to teaching and learning of mathematics
- Demonstrate improved understanding of mathematical content.

Part III: Process

Background

The College of Education and Human Development is committed to improving teaching effectiveness and learning excellence. Our college created a document that promotes our vision to improve students' problem-solving, critical-thinking, and leadership skills by providing opportunities for exponential learning through internships, teamwork research projects and participation in student organizations. Inquiry-rich courses are the way that academic programs can become more relevant and effective in developing students' lifelong learning skills. In a college such as ours, the scientific application of research-based practices should be the predominant "way of knowing." Involvement of undergraduate students in such courses will increase their awareness, understanding, and confidence in their ability to not only interpret research, but also a pathway to advanced degree programs. "All teachers, whether preservice or inservice, should engage in inquiry as part of their teaching practice (e.g., by interacting with students and analyzing their work)" (National Research Council, 2001, p. 429).

To integrate higher order thinking skills into the undergraduate learning experience, we have to create an atmosphere for scholarship and a community that promotes open exchange of ideas. For example, problems addressed in our disciplines are complex, interdisciplinary, and global. Our students often perceive their courses as isolated from one another, and may never make the complex connections across disciplines. An interdisciplinary inquiry-based learning community can provide a forum for dialog, debate, discussion, and discourse to diversity and expand students' perspectives and competencies. "Effective teaching requires knowing and understanding mathematics, students as learners, and pedagogical strategies" (NCTM, 2000, p. 17.) This knowledge and understanding can develop as students explore in a more intense fashion the content they are expected to teach.

The Process and Timeline

Overview:

Learning occurs within social settings (Boaler, 2000) therefore, interacting across carefully integrated content areas within small task groups enhance student's confidence, problem-solving and critical-thinking skills by developing a setting conducive for maximal learning (Piaget, 1969). These close collaborations among undergraduate students and faculty maximizes students interaction with the content creating a "zone of proximal development" where they have the potential to develop deeper and more meaningful understandings within an active and inviting community of experts. As the inquiry process unfolds, students begin to question more, make more observations, giving the opportunity for deeper interaction and involvement with the phenomena. To make meaning of what they are exploring, students are required to reflect, engage in discourse, compare results and observations, and apply these newly developed conceptions to other contexts (Institute for Inquiry, 2007). This gives students the opportunity for learning with understanding, an essential skill for students to solve the new kinds of problems they will face in the future (NCTM, 2000).

Specifics:

The project will realign the elementary interdisciplinary curriculum to develop a two-part mathematics methods sequence where students take Part 1 as second semester juniors and Part 2 as first semester seniors. The content of mathematics methods will be redefined to reduce the number of topics and carry the five process strands (Problem Solving, Reasoning and Proof, Communication, Connections, and Representation) across both parts. Both parts will emphasize smaller learning communities where undergraduate students work as a focused team of collaborators who explore mathematics concepts, present their ideas, and pose teaching and learning strategies appropriate to the content solving problems use inquiry methods. The first part of the sequence will be developed in the Fall of 2007 and implemented in the Spring of 2008. The reconfigured second part (the current methods course) will be implemented in the Fall of 2008.

These will be assessed through the use of an observational checklist at the beginning and end of the semesters. The checklist will be developed as part of the grant. A pre and post testing of mathematics content of a sample certification examination will possibly be implemented. In addition, a project such as a media presentation on an inquiry-based learning lesson with a rubric for student assessment for use in the field will be developed. The assessments used will be refined as needed.

While this project will deal directly with mathematics education the process will be used in all the discipline areas within the interdisciplinary degree programs. This will serve as a model for implementing the inquiry rich courses in all the discipline areas.

Part IV: Budget

\$4,000- support for 1 part-time doctoral student

\$ 3,000- Research and curriculum redesign (Dianne Goldsby)

\$ 3,000- Research and curriculum redesign (Robert Capraro)

10,000 - TOTAL

Part V: Future Needs

After implementation of the first part of the two-course sequence, the learning outcomes would be evaluated and adjustments made to the course content and instructional strategies. This will necessitate the time and effort commitments of the designers to the project and the provisions for continued implementation.

Boaler, J. (2000). Exploring situated insights into research and learning. *Journal for Research in Mathematics Education*, 31, 112-119.

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