

## An Initiative for Improving Pre-Service Teachers' Pedagogical Content Knowledge in Mathematics

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**Abstract :** Mathematics anxiety has an important consequence for teacher practices that influence students' attitudes and achievement. Elementary prospective teachers have the highest levels of mathematics anxiety in comparison with other college majors. In his teaching practice, the researcher developed a highly successful teaching model to reduce pre-service teachers' higher math anxiety and simultaneously to improve their pedagogical math content knowledge. There were eighty one participants from 2015 to 2018 who took the Mathematics for Elementary Teachers I and II. As the analysis data indicated, elementary prospective teachers' math anxiety was greatly reduced with improving their math pedagogical knowledge. U.S encounters a critical shortage of well qualified educators. To solve the issue, it is essential to engage students in a long-term commitment to shape better teachers, who will, in turn, produce k-12 school students that are better-prepared for college students. It is imperative that new instructional strategies are implemented to improve student learning and address declining interest, poor preparedness, a lack of diverse representation, and low persistence of students in mathematics. Many four year college students take math courses from the math department in the College of Arts & Science and then take methodology courses from the College of Education. Before taking pedagogy, many students struggle in learning mathematics and lose their confidence. Since the content course focus on college level math, instead of pre service teachers' teaching area, per se elementary math, they do not have a chance to improve their teaching skills on topics which eventually they teach. The research, a joint appointment of math and math education, has been involved in teaching content and pedagogy. As the result indicated, participants were able to math content at the same time how to teach. In conclusion, the new initiative to use several teaching strategies was able not only to increase elementary prospective teachers' mathematical skills and knowledge but also to improve their attitude toward mathematics. We need an innovative teaching strategy which implements evidence-based tactics in redesigning a education and math to improve pre service teachers' math skills and which can improve students' attitude toward math and students' logical and reasoning skills. Implementation of these best practices in the local school district is particularly important because K-8 teachers are not generally familiar with lab-based instruction. At the same time, local school teachers will learn a new way how to teach math. This study can be a vital teacher education model expanding throughout the State and nationwide. In summary, this study yields invaluable information how to improve teacher education in the elementary level and, eventually, how to enhance K-8 students' math achievement.

**Keywords :** quality of education and improvement method, teacher education, innovative teaching and learning methodologies, math education

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