

# The Mathematics Education Colloquium

*Dr. Sheryl Stump*

As described by Dr. Ralph Bremigan in a previous Mathematics Exchange article, MATHS 497: The Student-Faculty Colloquium is “one of the most unique and exciting courses offered in the Department of Mathematical Sciences at BSU” [1]. The Colloquium recently took an interesting new twist with the addition of a section devoted to issues in mathematics education. Like the mathematics Colloquium, the mathematics education Colloquium is a group of students and faculty who meet together one hour each week to explore a particular topic in depth. Each week, one or more of the participants leads the discussion.



The topics for the mathematics education Colloquium are issues related to the teaching and learning of mathematics. For example, the focus of the Colloquium during the fall semester of 2005 was the book, *The Mathematical Education of Teachers* [2]. The book describes recommendations for the mathematical preparation of elementary, middle grades, and high school teachers. Among the general recommendations are the following:

*Prospective teachers need mathematics courses that develop a deep understanding of the mathematics they will teach. (p. 7)*

*Although the quality of mathematical preparation is more important than the quantity, the following amount of mathematics coursework for prospective teachers is recommended.*

- (i) Prospective elementary grade teachers should be required to take at least 9 semester-hours on fundamental ideas of elementary school mathematics.*
- (ii) Prospective middle grades teachers of mathematics should be required to take at least 21 semester-hours of mathematics that includes at least 12 semester-hours on fundamental ideas of school mathematics appropriate for middle grades teachers.*
- (iii) Prospective high school teachers of mathematics should be required to complete the equivalent of an undergraduate major in mathematics that includes a 6-hour capstone course connecting their college mathematics courses with high school courses. (pp. 7-8)*

*Courses on fundamental ideas of school mathematics should focus on a thorough development of basic mathematical ideas. All courses designed for prospective teachers should develop careful reasoning and mathematical “common sense” in analyzing conceptual relationships and in solving problems. (p. 8)*

*Along with building mathematical knowledge, mathematics courses for prospective teachers should develop the habits of mind of a mathematical thinker and demonstrate flexible, interactive styles of teaching. (p. 9)*

*Teacher education must be recognized as an important part of mathematics departments’ mission at institutions that educate teachers. More mathematicians should consider becoming deeply involved in K-12 mathematics education. (pp. 9–10)*

Although the initial plan for the semester was to discuss the entire book, the members of the Colloquium soon decided that the specific recommendations for the preparation of elementary teachers deserved extended attention. Thus, the group spent the bulk of the semester discussing the recommendations for developing prospective elementary teachers’ knowledge in the following content areas: Number and Operations, Algebra and Functions, Geometry and Measurement, and Data Analysis, Statistics, and Probability. An outgrowth of the discussion was the formation of a working group to establish new goals and assessments for the mathematics content courses taken by Elementary Education majors at Ball State.

As a junior, Jessica Kerner was one of the undergraduate Mathematics Teaching majors who participated in the Colloquium during the fall semester of 2005. She said this about her experience:

*I learned a lot about the Elementary Education major requirements in order to be aware of math curriculum and how to teach it. I found this information important as a secondary math major due to needing to know what my future students will be learning and how they will be learning the material at younger ages. I realized through this colloquium that even professors felt that the Elementary Education math requirements needed to be altered to create better prepared teachers and hold them to expectations that mirror what students of specific grade levels and ages should be able to accomplish in mathematics. I wish I could have taken the extension of this specific colloquium the following semester to see if any discussion was made about changes to the secondary program, as it too deserves just as much if not more restructuring.*

*As a colloquium I loved the opportunity to get to know more faculty of the math department. I loved being a part of something that can create change and discuss problems and possible solutions to those problems. The colloquium better prepared me for the idea of sitting in on departmental in-services once I am in a school and teaching, and made me feel more involved in my education and those of my*

*peers. I appreciate that all the faculty were open-minded to the input I had to give while in the colloquium and were eager to hear my thoughts on discussions.*

In the fall semester of 2006, the focus of mathematics education Colloquium was the book, *How People Learn: Brain, Mind, Experience, and School* [3]. This book provides an overview of research on learning and highlights the following key findings:

- 1. Students come to the classroom with preconceptions about how the world works. If their initial understanding is not engaged, they may fail to grasp the new concepts and information that are taught, or they may learn them for purposes of a test but revert to their preconceptions outside the classroom. (pp. 15–16)*
- 2. To develop competence in an area of inquiry, students must: (a) have a deep foundation of factual knowledge, (b) understand facts and ideas in the context of a conceptual framework, and (c) organize knowledge in ways that facilitate retrieval and application. (p. 16)*
- 3. A “metacognitive” approach to instruction can help students learn to take control of their own learning by defining learning goals and monitoring their progress in achieving them. (p. 18)*

John Herr, a graduate student working on an MA in Mathematics, was one of the participants in this Colloquium. He offered the following comments:

*The discussions are usually quite lively as strong personalities clash and complement each other during discussion.*

*As students we play a special/important role in the Colloquium. We are in the unique situation of being both colleagues and students. So it is a great opportunity to outgrow the traditional adversarial relationship of students and teachers, and talk with and exchange ideas with professors as equals. On the other hand, we bring the experience of currently being mathematics students and so can bring a different (though equally important) perspective to the discussions.*

*The group brings a very practical approach to the material; we are not just talking about lofty ideas. The group is generally interested in making these ideas practically useful for us right now. The discussion is between individuals who are all math teachers, and this adds concreteness and depth to the discussions.*

*It’s a great experience to realize that as teachers we never stop growing and learning. There is not some magic formula that once figured out there is nothing more to know. Even very experienced professors encounter many of the same difficulties that we novice teachers experience. Teaching is such a dynamic craft that even the experienced teachers do not have it all figured out.*

All students and faculty are welcome to participate in the mathematics education Colloquium. Those who are interested should inquire in the office of the Department of Mathematical Sciences, RB 425.

## References

- [1] R. Bremigan, *MATHS 497: The student-faculty colloquium*, Mathematics Exchange, **3** (2003) 24–26.
- [2] The mathematical education of teachers, Conference Board of the Mathematical Sciences, Mathematical Association of America (2001).
- [3] How people learn: Brain, mind, experience, and school, National Research Council, National Academy Press (2000).