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Editorial: Continuing the Dialogue on Technology and Mathematics Teacher Education

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As the newly appointed coeditors of the mathematics section of this journal, we begin our tenure with an editorial highlighting some of the needs related to technology and mathematics teacher education and reminding readers of the mission of the journal.

We are keenly aware of the need for educators at all levels to use technology to design and structure learning environments for students. Teacher educators are poised to assist pre and inservice teachers to take advantage of emergent technology for learning and teaching by modeling the infusion of technology into the curriculum and by helping teachers consider issues related to such infusion. According to the *National Educational Technology Standards for Teachers* (International Society for Technology in Education, 2000), “School and college of education coursework must consistently model exemplary pedagogy that integrates the use of technology for learning content with methods for working with PK-12 students” (p. 6-7).

Regarding mathematics, the mathematics education community has encouraged the use of technology as an appropriate means for learning and teaching mathematics in many of its reform documents (Conference Board of the Mathematical Sciences, 2001; Mathematics Association of America 1991; Mathematical Sciences Education Board, 1991; National Council of Teachers of Mathematics (NCTM), 1989, 2000). In fact, NCTM (2000) stated that “technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances learning” (p. 24). Technology is encouraged for all grade levels beginning in kindergarten

and is often identified as an “equalizer” when dealing with equity issues in mathematics (pp. 13-14).

Although there is always need for more research regarding learning and teaching mathematics with technology, research conducted to date has presented positive results in favor of using technology. Research reveals, for example, that the use of technology is an effective means to produce growth in students’ understanding of mathematics content (Hembree & Dessart, 1992; Hoyles, 1991; Kaput, 1992, Kennedy, 1994; Kulik & Kulik, 1987). However, research also shows that technology is not being used widely by classroom teachers (Huang & Waxman, 1996; Milou, 1999; Owens, 1993).

To achieve the technological goals outlined by the reform movement, teachers must be prepared for their new roles in a technology-rich environment. In mathematics, the situation is unique because of the vast and growing diversity of technology that can be used specifically to teach mathematics (e.g., spreadsheet, dynamic geometry software, computer microworlds, and graphing calculators). Because this technology is evolving, it is not sufficient simply to instruct teachers on how to use a particular technology. Instead, teachers must be prepared to make decisions about various technologies, must be taught new skills for working with them in classrooms, and must be able to address many of the pedagogical issues that arise when using technology. In assisting teachers to incorporate technology, mathematics teacher educators must address inherent beliefs about the use of technology for teaching mathematics, work with teachers with varied technology experiences, and help teachers make informed decisions about the appropriate use of technology.

A FORUM FOR DIALOGUE

CITE journal in general, provides a forum for teacher educators to discuss issues that are important to consider when preparing to integrate technology in their practices (See Bull, Willis, & Bell, 2000) for a discussion about the development of this journal). The mathematics portion of this journal provides a forum for mathematics teacher educators in particular, to discuss issues inherent in preparing teachers of mathematics to integrate technology effectively for learning and teaching mathematics. To encourage continued

dialogue about technology and mathematics teacher preparation, we use the remainder of this article to share our vision of the journal as a vehicle for sharing practice, research, and issues involved in helping mathematics educators at all levels infuse technology into their curriculum.

This blind, peer-reviewed academic journal provides mathematics teacher educators an outlet for discussing issues about technology and mathematics teacher preparation that is critical to both practice and research. For example, mathematics teacher educators may identify and discuss opportunities and challenges that occur in the process of helping teachers incorporate technology, share programmatic concerns and insights, or report on research that examines particular methods used for working with teachers. Additionally, the electronic format takes advantage of the power of the Internet by allowing the inclusion of color graphics, photographs, java applets for illustration, video clips, and other media that cannot be incorporated in a print journal (see Garofalo, Drier, Harper, Timmerman, & Shockey, 2000, as an illustration).

As the mathematics education community works to move the technology agenda forward, many questions need to be addressed, including “How do we prepare teachers for their role in this information age?” Below we provide a list of further questions to begin the dialogue. This list is neither comprehensive nor all-inclusive. It merely serves as a springboard for further discussion. We encourage readers to share their insights on these and any other important issues regarding technology and mathematics teacher education.

- What knowledge base is necessary for the effective infusion of technology (e.g., graphing calculators, dynamic geometry software, personal digital assistants, java applets, computer microworlds, and discussion boards) in the mathematics classroom? How do we help teachers obtain this knowledge base?
- What role do beliefs play in the integration of technology? What methods are effective for working with individuals whose technology views are counter to the ones espoused by the reform movement?
- How do teachers come to understand the use of technology as a means for solving problems, for reasoning, and for communicating about significant mathematics? What preparation will teachers need in order

to facilitate this process with their own students?

- How do we structure field experiences for preservice teachers to ensure that they have opportunities to use technology as they develop their teaching skills?
- How can we prepare teachers for the technology demands of standards-based curricula? How does technology interact with curricula? What decisions should teachers be prepared to make regarding technology and curricula?
- How do we start the process of restructuring both the K-12 and the higher education mathematics/mathematics education curricula to take advantage of the available technology?
- How can we help teachers use the electronic tools available on the Internet (e.g., Illuminations, Navigations, and other websites) for learning and teaching mathematics?
- How can we help teachers learn to use the Internet to integrate mathematics with other disciplines?
- How do we (or do we) help elementary teachers infuse technology in the learning and teaching of mathematics? What are the differences in the issues and challenges of calculator use versus other mathematics-specific technology use at the elementary level?
- What models exist for helping mathematicians and mathematics educators infuse technology into their mathematics and mathematics education courses for teachers, both to help teachers learn content with the use of technology and to help teachers consider issues related to technology in K-12 classrooms?
- What models exist for delivering professional development online, especially to individuals in rural or isolated environments? Have these approaches been successful? What challenges exist?

ACCEPTABLE MANUSCRIPT FORMATS

Numerous formats and approaches to scholarship are accepted. To assist the potential contributor to the mathematics portion of *CITE* journal, we delineate various types of manuscripts that are acceptable and clarify the intent of each. This list is not meant to be exclusive of other possible formats.

Professional Practice Based

Articles of this type provide an opportunity for individuals to share successful approaches used for preparing both pre and inservice teachers. These articles should provide specific instances of how teachers were assisted in their efforts to teach in technology rich environments. Enough details should be provided in the manuscript so that other mathematics teacher educators can implement the ideas in their own professional environments. Examples should be provided to capture the essence of the interventions. Whenever possible, articles should include resources that were used in the development of the intervention.

Program Description

There are programs in existence that have been found to be successful in preparing teachers to use technology. Individuals who are developing or are looking for ways to enhance their own programs are in need of ideas. This type of article provides a means for sharing information about unique programs by discussing the opportunities that they provide. Of special interest are manuscripts that describe programs that are unique or that are using methods not widely used or known. Specifically, these articles should provide the rationale for decisions that were made, challenges and insights that were garnered, and outcomes of the program.

Research Studies

Research conducted to examine issues pertaining to technology and teacher

education provides valuable information about opportunities, challenges, and issues that need to be addressed. Studies using any of a variety of designs (including quantitative, qualitative, or case studies) are encouraged.

Conceptual or Theoretical Pieces

Articles that move the technology agenda forward by addressing issues related to helping teachers integrate technology in mathematics education are important for facilitating dialogue. Such articles may include reviews of literature on technology and teacher education or papers that outline a research or practical agenda for technology and mathematics teacher education.

Commentaries

Commentaries provide readers opportunities to react to articles in the journal and encourage ongoing dialogue about identified issues.

CONCLUSION

As we assume the coeditorship, we acknowledge the efforts of the previous editors (Mark Klespis and Christine Browning) in guiding the journal from Volume 1 through the first issue in Volume 2. We encourage the mathematics education community to take advantage of the opportunity that this online journal provides. This journal is still in its infancy, and we have accepted editorship with great excitement. We encourage readers to become involved with the journal by submitting manuscripts and/or serving as a reviewer. To serve as a reviewer, complete the information found at <http://www.ace.org/pubs/reviewerinfo.cfm>.

We look forward to an ongoing dialogue about technology and mathematics teacher education.

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