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Connections

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Association of Mathematics Teacher Educators
http://www.amte.net

President's Column

Equity in Mathematics Teacher Education

Jennifer M. Bay-Williams, University of Louisville

In our field we often describe each other's professional contributions by our areas of research, creative endeavors, professional development, or service. For example, one might hear, "Reese Ening has done so much in the area of critical reasoning, problem solving, and geometry" or "Pat Turn's research interests are young children's algebraic thinking and linking number and algebra concepts." It makes sense to become relative experts in a particular focus area and continue to chip away at research questions or needs in that area as a way to move the field of mathematics education forward.

We will also hear equity related statements like the ones above: "Jen Der is a good person to involve in projects/research related to gender and/or sexuality," "Ethel Nicity has made major contributions in promoting equity in race and ethnicity," and, conversely, "Equity is not my research area."

At the same time, it seems that equity is not like problem solving and algebraic thinking…it is something bigger and something that should be infused in all other areas of mathematics education. Shouldn't every mathematics teacher educator be about equity? Imagine that when a doctoral candidate was searching the web for research interests of potential advisors, that he/she found equity or diversity on everyone's list. If one's research area was curriculum, then part of that focus would be on equity, for instance providing adaptations for the range of learners in the classroom or considering cultural relevancy in textbook problems, etc.

Having taught elementary, middle, and high school mathematics methods at three different institutions in three states, I have found it almost generalizable, at least notable, that there are two challenges:

(1) Candidates in their field experiences are often not seeing teachers that provide a range of accommodations or strategies to support students with special needs, gifted students, and English language learners.

(2) Candidates have naïve (at best) and biased (at worst) ideas about who can learn how much. The adaptations they consider for a lesson they might be teaching often times lowers the level of challenge, rather than bringing in the support structures to provide access.

Certainly these challenges must be every mathematics teacher educator's concern. As equity should permeate the range of research interests, equity needs to be infused in discussions throughout a methods course. Lesson planning and teaching is one opportunity. Asking questions to make explicit the importance of supporting all learners

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AMTE's Twelfth Annual Conference

Susan Gay, University of Kansas

On January 24-26, 2008, AMTE hosted our Twelfth Annual AMTE Conference in Tulsa, Oklahoma. A total of 444 people registered for the conference.

New at this year's conference, the preconference sessions were held Thursday morning, and the regular conference sessions began at 1:00 PM on Thursday. Over the three days, 147 sessions were held that ranged in length from 30 minutes to 90 minutes. We were delighted to have NCTM's current president, Francis (Skip) Fennell and NCSM's current president, Tim Kanold, attending and presenting at this conference.

The Opening General Session held Thursday evening addressed doctoral programs in mathematics education and was led by Robert Reys, University of Missouri, Glenda Lappan, Michigan State University, and Diana Lambdin, Indiana University. This session was followed by a welcome reception.

We were honored to have the Judith E. Jacobs Lecture given by Edward Silver, Professor of Education and Mathematics at the University of Michigan, in recognition of his contributions to our profession. His presentation was titled, "Mathematics Teacher Education in Dodge City: Desperately Seeking Wyatt Earp and Henri Poincaré."

Frank Lester of Indiana University received the first AMTE Award for Excellence in Research in Mathematics Teacher Education. His conference presentation was titled "Reflecting on 40 Years as a Mathematics Educator: Teaching, Teacher Education, and Research."

The Closing Session was given by Paola Sztajn of the National Science Foundation and Denise Mewborn of the University of Georgia. Their talk was titled "Reflections on Our Field: A Dialogue about Research in Mathematics Teacher Education."

There were many exceptional sessions led by great speakers during the conference. Those attending had lots of time to share ideas and questions during those sessions as well as during breaks and meals.

At the Business Meeting, next year's conference site and dates were named. We will meet at the Orlando Airport Marriott Hotel in Orlando, Florida on February 5-7, 2009.

The Call for Proposals to speak is available at http://www.amte.net. The deadline for submissions is May 2, 2008.

Connections *is published three times a year: fall, spring, and summer. The Editorial Board will consider a wide variety of types of submissions. Each submission is reviewed by the editorial board for relevance to the AMTE membership and for quality of work. For more information on the types of submissions sought, see http://www.amte.net. Please direct all comments, questions, or submissions to the editor at lstalling@kennesaw.edu or 770-420-4477.*

Frank Lester Named First Recipient of AMTE's Excellence in Scholarship in Mathematics Teacher Education Award

Tracie McLemore Salinas, Appalachian State University

At the Annual Conference in January 2008, Frank Lester, Jr. of Indiana University was awarded AMTE's first Excellence in Scholarship in Mathematics Teacher Education Award. The call for nominations for this award explains that the winner will "have made a significant and lasting contribution to the field of mathematics teacher education" and "demonstrated commitment to mathematics teacher education through one or more of the following areas:

- The dissemination of research findings offering unique perspectives on the professional development of mathematics teachers.
- The publication of materials useful in the preparation or continuing professional development of mathematics teachers.
- Design of innovative preservice or inservice programs.
- The contribution of theoretical perspectives that have moved the field forward.

Dr. Lester began his career in mathematics education forty years ago as a mathematics teacher in Florida. After earning his doctorate in 1972 at The Ohio State University, Lester began teaching at Indiana University. Although he has held several international visiting positions, Lester has remained at Indiana University throughout his career. Lester's national and international reputation earned him the honor of being named Indiana University's Martha Lea and Bill Armstrong Professor of Teacher Education in 2000. In 2006 he was awarded the Chancellor's Professorship in Teaching and Research, a distinction that also recognized his work in scholarship and practice.

Letters from supporters of Lester's nomination point out his influence as a researcher and his dedication as a teacher educator. One supporter wrote, "His coauthored chapter in the 1989 NCTM Yearbook was titled 'Developing Understanding in Mathematics via Problem Solving' and described the philosophy that was the foundation of that project. This chapter was, to the best of my knowledge, the first time the notion of teaching mathematics *via* problem solving appeared in print." Another points to his work on student assessment as what teachers "should read as part of their professional development."

With more than 100 publications and at least as many presentations to his credit, Lester has certainly helped to extend the bounds of mathematics education research. He continues to stretch those bounds by exploring the theoretical and philosophical foundations of research in mathematics education. A recent four-year project that involved a comprehensive survey of international research in mathematics education resulted in the March 2007 publication of the *Second Handbook of Research on Mathematics Teaching and Learning*. Lester's work as editor pulled together fifty-eight prominent researchers to provide an overview of the field of mathematics education research since the original handbook was published in 1992.

Lester's scholarship also includes service on a number of editorial boards, including *Journal for Research in Mathematics Education, Journal of Educational Psychology,* and *Mathematics Thinking and Learning.* He has been awarded funding for a number of research projects for a total of over ten million dollars. Two recent NSF-funded projects provided him opportunities to investigate student achievement data gathered by the National Assessment of Educational Progress (NAEP) and to study teacher enhancement in ten urban Indiana school districts.

Lester's influence on scholarship in mathematics education research extends beyond his own accomplishments to his mentoring of other mathematics educators. Lester has supervised the doctoral dissertations of forty-five students and served on committees of dozens more. He actively seeks to collaborate with graduate students on research projects and writings. In so doing, he not only continues to be a productive writer and researcher but also mentors scholars into the field.

His reputation and body of work as a researcher and teacher are evidence of Lester's place in mathematics education. With the AMTE Excellence in Scholarship in Mathematics Teacher Education Award, Lester's peers in mathematics education have the opportunity to express their recognition and appreciation for his work.

Congratulations to Dr. Frank Lester, the winner of the first AMTE Excellence in Scholarship in Mathematics Teacher Education Award!

Lester's influence on scholarship in mathematics education research extends beyond his own accomplishments to his mentoring of other mathematics educators.

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President's Column

is one strategy. For example, one might ask: "How might this activity be adapted for English language learners?" Once the suggestions are made, a follow up question, such as, "Which of these adaptations maintain the learning objectives?" or "What is the cognitive demand or depth of knowledge for the learner?"

Beyond lessons, there are many opportunities to ask questions (or assign reflection prompts) that focus teachers' attention on issues of equity and diversity. For example, when solving a task grounded in an interesting context, ask, "Is the context of interest to all learners, and if not, how might it be altered to better fit a particular group of students?"

The purpose of this brief column is not to share the best ideas for infusing equity and diversity into teacher education and professional development since there are a number of resources that do this well, but to suggest that infusing equity is every mathematics teacher educator's responsibility. Without an emphasis on equity across all mathematics teacher preparation programs, the country will continue to have classrooms where there are not high expectations for all children.

Without an emphasis on equity across all mathematics teacher preparation programs, the country will continue to have classrooms where there are not high expectations for all children.

Recently, the Association of Mathematics Teacher Educators (AMTE) established an Equity Task Force (co-chaired by Rochelle Gutierrez and Edd Taylor). The Task Force includes members that focus their research on issues of equity, as well as those that have other research interests, but are knowledgeable and committed to improving equitable practices in mathematics teacher preparation.

Recently, Rochelle Gutierrez and I attended the NCTM Equity Summit in Washington, D.C. Two representatives from each national NCTM affiliate attended. A representative from each organization shared initiatives that they are doing or planning and lively discussions focused on how we can work collectively to better address equity and diversity issues in teaching and learning. Interestingly, even with this group of people primarily selected because of their commitment to equity, there were times when it became clear that while someone might deeply understand the issues within one context (e.g., culture), they may not be aware of considerations related to other contexts (e.g., gender).

This meeting was inspiring, though the task is enormous. Our AMTE Equity Task Force is making great progress in thinking about how AMTE can provide leadership in preparing and supporting teachers and teacher educators in the quest for a challenging mathematics curriculum for all students. The least we can do as leaders in mathematics education is to realize that every one of us has equity as a focus.

AMTE's response to the National Mathematics Advisory Panel's Report is available at http://www.amte.net.

Thanks to Texas Instruments for supporting this issue of AMTE Connections.

"Why do I have to take Abstract Algebra? I'm never going to teach group theory."

Douglas A. Lapp, Ph.D.
Central Michigan University

If your experience is like mine, this question is not all that uncommon when advising undergraduates in a secondary mathematics education program. In fact, it is not all that unreasonable considering the way we prepare secondary mathematics teachers. The typical mathematics education major consists of mathematics content courses practically equivalent to an undergraduate major in mathematics followed by a methods course in mathematics teaching and learning. In addition, some programs even contain a technology course. However, do students really make the connections we would like to see between their upper-level undergraduate mathematics courses and what goes on in the secondary school classroom?

It doesn't take too many student teacher observations before the answer to this question becomes obvious—no. To combat this problem, at Central Michigan we have redesigned our teacher preparation program to help students make explicit connections between the undergraduate and secondary mathematics curricula. Although this is not the only goal of our redesign, it will be the focus of this particular discussion. Our old program consisted of the typical mathematics courses, a technology course, and a methods course, along with field experiences. In the new program, we have created four courses that integrate mathematical and pedagogical content knowledge while weaving technology throughout. In the first three courses, although we use secondary curricula and vignettes as springboards for discussion, the main focus is the understanding of undergraduate mathematics and making connections to concepts taught in high school. In these courses we model the kind of teaching we want students to use in their own classrooms. The fourth course spends more time on pedagogy and field experiences utilizing both written cases and video cases to ground the discussion. These courses are taken over a four-semester sequence giving both early induction and long-term exposure to issues surrounding the teaching and learning of mathematics.

In the first course, the focus is on algebraic concepts. One of the goals is to help students see connections between high school algebra and an undergraduate course in abstract algebra. For this reason, we try to highlight algebraic structure and its relationship to the high school curriculum. For our courses we have chosen to link the experience to reform secondary curricula, namely Core-Plus (CPMP) and the Interactive Mathematics Program (IMP). The other two content-specific courses examine geometry and then probability and statistics. For the sake of this discussion, I will focus on the first course in the sequence, which is related to algebra.

The usual progression of a unit in our new course on algebra is to begin with a written vignette, case, or video to situate the discussion in classroom practice. For example, in the series of experiences surrounding algebraic structure and the concept of inverse we examine a classroom vignette where the teacher begins a lesson on the concept of inverse function following a previous lesson on function composition. In this vignette, the teacher takes a purely procedural approach to inverse function (i.e., solve for the other variable and switch letters). When asked insightful questions by several students, the teacher fails to see how their questions are relevant and in one instance discourages a student who is conceptually on target. One reason for the teacher's shortcoming stems from her lack of mathematical understanding. This scenario sets the stage for the discussion and exploration that will follow.

The preservice teachers now respond to questions about the vignette. The typical responses usually focus on affective issues about how the teacher interacted with the students, but rarely hit on issues surrounding the mathematics involved in the classroom episode.

To address this lack of mathematical analysis, the students continue with an investigation titled, *Form & Function*. In this activity, students examine the algebraic structure of a set of six functions that under the operation of function composition form a group (isomorphic to D_3). The functions used are

$$e(x)=x,\ f(x)=\frac{1}{x},\ g(x)=\frac{x}{x-1},$$

$$h(x)=1-x,\ j(x)=\frac{1}{1-x},\text{ and}$$

$$k(x)=\frac{x-1}{x}.$$

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"Why do I have to take Abstract Algebra?

The students use a computer algebra system (CAS), such as TI-Nspire, to explore the effects of composing these functions (see Figure 1), building a table for the operation. They look for properties such as closure, associativity, an identity element, and inverses. Students attempt to match functions with inverses using both graphical and symbolic means.

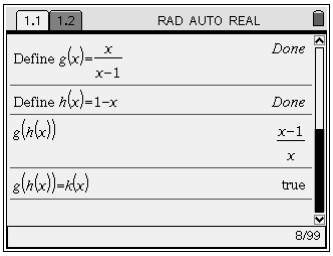

Figure 1

From a graphical perspective, they graph a function, place a point on the graph and show its coordinates. Since the inverse function can be thought of as a mapping that reverses the input and output, they simply take the numerical values of the coordinates and map them to the opposite axes constructing perpendicular lines to identify the location of the inverse point in the x-y plane. Then using a locus command they create the graph of the inverse function by first principles (see Figure 2).

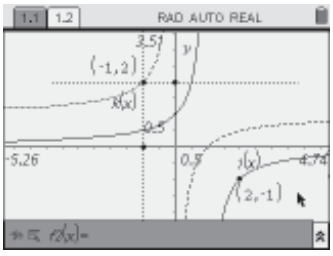

Figure 2

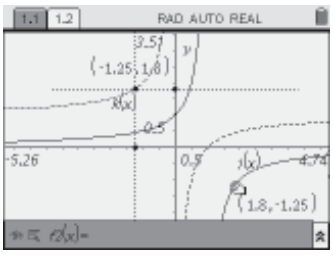

Figure 3

Here, the function *j(x)* is used to create its inverse, *k(x)*, by using the point (2,-1) and mapping the coordinates: -1 to the *x*-axis and 2 to the *y*-axis. When the locus is created using (2,-1) as the driving point, we get the dashed graph shown in Figure 2. Students then compare this graph to the six functions to determine a possible inverse function. If the point is grabbed and moved, the inverse image moves along with it (see Figure 3). In this case, we are using two different functions that are inverses of each other. The surprise for some students comes when they try a function like $f(x)=1/x$. In this instance, the locus falls on top of the original function's graph indicating that *f* is its own inverse (see Figure 4). In either case, the focus of this mapping approach is to generate a discussion of inverse as an "undoing" process. From our experience, this view is the most common held by our preservice teachers. However, the procedural or process approach can greatly limit a student's view of inverse. Unlike the situation with the real numbers or integers and the identity element, 0, under addition, with the function and inverse mapping example, the learner can avoid the concept of an identity element and simply view it as an algebraic expression being "undone." This view can unify the graphical and symbolic representations as just illustrated, but it still leaves other symbolic perspectives untouched. While experiencing an "undoing" view of inverse is not necessarily a concern since the concept of inverse has the characteristic of "undoing" as part of its concept definition (Tall & Vinner, 1981), students also need to see the more abstract structural aspect of the concept that is illustrated by the relationship between inverses and the identity element.

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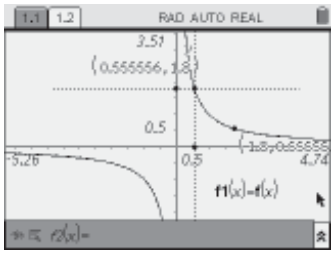

Figure 4

To address the more structural view of inverse from a group theoretic perspective, the CAS and manipulatives can be used to further explore the relationship between an identity element and inverses. In *Form & Function*, students also build operation tables for triangular attribute blocks that are manipulated by the basic moves $\{r_0, r_{120}, r_{240}, v, d_1, d_2\}$ where the *r's* represent rotations and the other elements of the set represent the three axes of flips (see Figure 5). Noting the effects of applying the

basic moves in succession, students answer questions related to the algebraic properties from group theory. Since the set of functions used earlier is isomorphic to the group of symmetries on an equilateral triangle, students now notice the same patterns emerging when performing rotations and flips on the triangle as they did when composing the functions using ith a CAS.

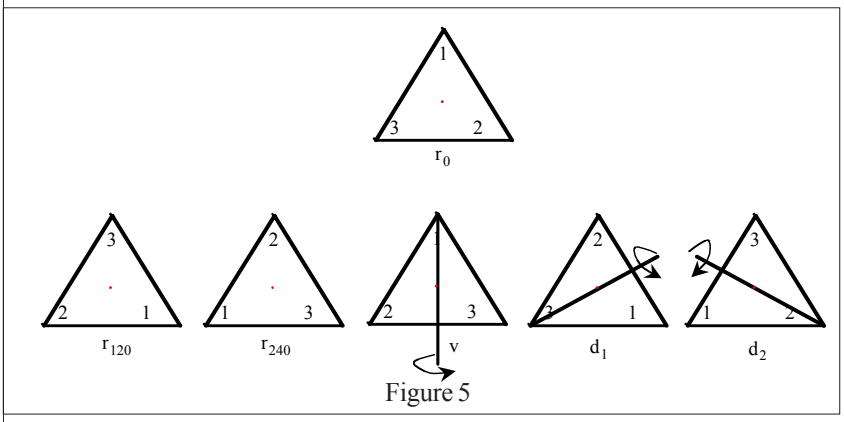

Figure 5

Once the algebraic properties are introduced from a structural perspective, students then work with the CAS to explore other types of binary operations by using functions of two variables to create binary operations. For example, consider the binary operation defined by $a*b=a+b-5$. Students can explore properties by defining this operation on the CAS as $op(a,b)= a+b-5$.

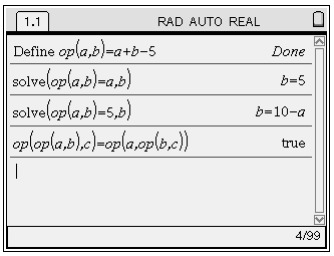

Figure 6

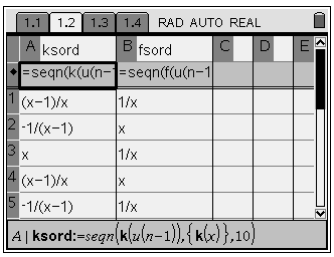

Figure 7

To explore the identity element, students use the CAS to solve solve $a*b=a$ for b (see Figure 6). Now the definitions of various properties and their relationships become important. For example, to find the inverse of an element, say a, students invoke the relationship between inverses and the identity element (see Figure 6). Or to check associativity, students explore whether or not the statement, $(a*b)*c=a*(b*c)$, is true (see Figure 6).

The final portion of the exploration serves as a precursor to LaGrange's Theorem, by investigating the effects of generating cyclic subgroups and noting the order of the elements. This exploration is easily done with an algebraic spreadsheet as shown in Figure 7. Here a function is composed with itself by defining the next cell in the spreadsheet to be the function composed with the previous cell.

Once the mathematical exploration is completed, the students now revisit the questions that they responded to earlier, but the difference is that now instead of primarily focusing on the affective issues from the vignette, they also consider the mathematical implications connected to the undergraduate curriculum. To cap this experience off, the students then take time to examine in greater detail the secondary curriculum materials (in this case, IMP) and discuss the trajectory of a series of secondary student explorations from the text and its connection to the vignette and recently completed undergraduate activity.

Although it is difficult to summarize in the space allowed here, I hope I have given the reader a taste of our new preservice secondary mathematics preparation program. This paper describes a part of the first course in a four-course sequence. We have been collecting data on students going through the new program including observational data from the student teaching experience. Our hope is that the new program will instill the desired connections among mathematical, pedagogical, and curricular content knowledge so that the new teachers will critically examine classroom situations from multiple perspectives. Future articles in *Connections* will discuss other aspects of our approach in these courses in our new sequence.

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AMTE Affiliate News

New Affiliates:

At the January 2008 Annual Conference, AMTE recognized three new affiliates: the New Jersey Association of Mathematics Teacher Educators (featured in the fall issue of *Connections),* the Rocky Mountain Association of Mathematics Teacher Educators, and the South Carolina Association of Mathematics Teacher Educators.

At the January 2008 Annual Conference, AMTE recognized three new affiliates.

Rocky Mountain Association of Mathematics Teacher Educators (RMAMTE)

RMAMTE began with a session at the fall Colorado Council of Teachers of Mathematics Conference in Denver. Currently the group has 40 members and a website at http://clem.mscd.edu/~bevans21/rmamte.htm. The first RMAMTE officers are President Pam Smith, Fort Lewis College; President Elect Rob Powers, University of Northern Colorado; and Secretary Michelle Chamberlin, University of Wyoming.

South Carolina Association of Mathematics Teacher Educators (SCAMTE)

SCAMTE began as a working session at the South Carolina Council of Teachers of Mathematics (SCCTM) in October of 2006. Electronically, a Constitution and Bylaws were ratified and officers were voted in. The current officers are President Chrystal Dean, Clemson University;President-elect Megan Burton, University of South Carolina; Treasurer Lou Ann Martin, Tricounty Technical College; Secretary Vicki Phillips, Oconee County School District; and Student Representative Sandra Linder, Clemson University. SCAMTE held its first official meeting at the 2007 SCCTM conference. SCAMTE's website is http://scamte.googlepages.com/home.

Other Affiliate News:

Pennsylvania Association of Mathematics Teacher Educators (PAMTE)

Currently, PAMTE has 61 members. Our membership committee, led by Lynn Breyfogle, has done an excellent job of recruiting new members and reaching out to universities with mathematics education faculty.

PAMTE has hosted several activities recently, including a session at the Pennsylvania Council of Teachers of Mathematics Annual Conference in November 2007 on the TI-NSpire. Doug Lapp, from Central Michigan University, led the session to familiarize PAMTE members with the latest technology and presented ideas for incorporating the calculator into secondary preservice methods courses. In addition, during the AMTE annual meeting, PAMTE members met for a Thursday dinner meeting. Twelve members shared a great meal and fellowship.

On May 15th and 16th, PAMTE will hold its second annual symposium at Shippensburg University. The two day event will have many roundtable discussions, updates from state representatives on certification and assessment issues, and many other interesting sessions. The annual PAMTE board meeting will also be held at this time and new board members will be elected.

Georgia Association of Mathematics Teacher Educators (GAMTE)

GAMTE held its first conference in October 2007 immediately preceding GCTM's annual conference. Sharon Taylor and Greg Chamblee (both of Georgia Southern) coordinated the conference, which was attended by twenty-two mathematics educators. Sessions featured research, teaching practice, and teacher preparation program features. Papers from the sessions were published in the conference proceedings edited by Lynn Hart (Georgia State University) and Clara Okoka Nosegbe (Atlanta Public Schools) and available at http://www.gamte.org. Check the website also for calls for proposals for the 2008 conference.

Three newly elected officers were announced at the Business Meeting: President-elect Cindy Henning (Columbus State), Blanche Pressle (Macon State), and Linda Crawford (Augusta State). GAMTE thanks outgoing officers Sharon Taylor (Georgia Southern) and Cindy Henning (Columbus State) for their service.

Upcoming AMTE Deadlines

May 2	Proposals to Speak Due for Annual Conference
June 1	Ballot due for vote on changes to AMTE's Constitution and Bylaws
June 1	Manuscripts due for AMTE Monograph

Knowledge Needed for Teaching With Technologies – Call it TPACK

Margaret L. Niess
Oregon State University

As the 21st century unfolds with new and more powerful technologies, educators will continue to face the important challenge of incorporating appropriate technologies in student learning. Should students be learning with tools that they are likely to use as adults? Or should they wait until they are adults to use these tools?

In mathematics, teachers have been challenged for over 20 years to figure out how to incorporate calculator technologies in classroom instruction. Should students have access to calculators before they have mastered the fundamental arithmetic facts of addition, subtraction, multiplication and division? What constitutes a fundamental mathematical understanding? Do students lose important computational skills needed for successful citizenship with the use of calculators? While answers to these questions are by no means settled even after a decade of research, more questions have arisen for mathematics teachers with easy access to more digital technologies such as spreadsheets, *Geometer's Sketchpad,* computer algebra systems (CAS), and a myriad of applets. All of these digital tools are purported to be tools for mathematical thinking, and are recommended for students' use when learning mathematics.

Recent notions of integrating digital technologies into classroom learning have shifted to a focus on curriculum and instructional uses for digital tools and resources, rather than a focus on the educational possibilities that various digital tools' capabilities seem to suggest. Perhaps Earle (2002) framed this point the best:

> Integrating technology is not about technology – it is primarily about content and effective instructional practices. Technology involves the tools with which we deliver content and implement practices in better ways. Its focus must be on curriculum and learning. Integration is defined not by the amount or type of technology used, but by how and why it is used. (p. 8)

Numerous researchers have converged on a description of teachers' knowledge for teaching with newer technologies as the integration of technology, content, and pedagogy in much the same way that Shulman described pedagogical content knowledge (PCK) as the knowledge teachers need for teaching. Basically, they defined technological pedagogical content knowledge (TPCK) as that body of knowledge that teachers needed for teaching with and about technology in their assigned subject areas and grade levels. TPCK has been described as the interconnection and intersection of content, pedagogy (teaching and student learning), and technology (Margerum-Leys & Marx, 2002; Mishra, & Koehler, 2006; Niess, 2005; Pierson, 2001). The idea of TPCK has developed to the point that the American Association of Colleges of Teacher Education supported the collaboration of multiple TPCK authors in the development of *The Handbook of Technological Pedagogical Content Knowledge for Educators* (2008, Routledge).

In 2003, the National Council of Teachers of Mathematics (NCTM) released their *Technology Position* stating that, "Technology is an essential tool for teaching and learning mathematics effectively; it extends the mathematics that can be taught and enhances students' learning."

In 2006, the Association of Mathematics Teacher Educators (AMTE) confirmed this idea, recognizing the importance of TPCK in the preparation of mathematics teachers, indicating that, "Mathematics teacher preparation programs must ensure that all mathematics teachers and teacher candidates have opportunities to acquire the knowledge and experiences needed to incorporate technology in the context of teaching and learning mathematics" (AMTE, Technology Position Statement).

Important challenges have been raised in the discussion of TPCK. How are technologies integrated appropriately to achieve these realities? What does it mean for a teacher to rely on an integrated knowledge of technology, content, and pedagogy (TPCK) for actualizing these

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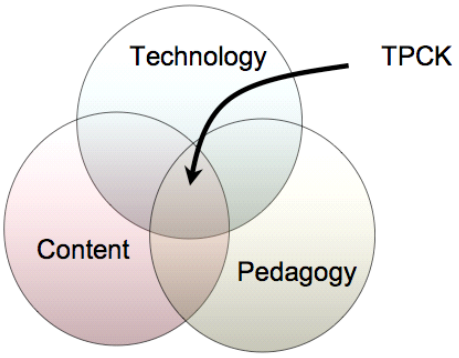

Figure 1. Venn diagram highlighting the intersection as the important knowledge teachers need –TPCK.

(Continued from page 9.)

Knowledge Needed for Teaching With Technologies

opportunities? What TPCK must teachers exhibit in planning, organizing, critiquing and abstracting for specific mathematical content, student needs, and classroom situations, while concurrently considering technologies to support mathematics learning?

However, another challenge from a more political scene has been with the acronym of TPCK itself. The acronym was widely described with the use of a Venn diagram with the intersection as the intentional focus (see Figure 1).

Despite the growing recognition of TPCK as the knowledge teachers needed for teaching with technology, the acronym itself seemed to be troublesome – not only were the letters confused, but saying the entire phrase was difficult for most. More importantly, the acronym was being linked too closely with the idea that the emphasis was focused on integrating technology – losing the sense of the complex nature of the intersection and interconnection of content, pedagogy and technology. This teacher knowledge, the interaction and integration of technological, pedagogical, and content knowledge, is proposed as highly complex and challenging to both establish and use effectively. TPCK guides the educational uses of technologies so that they are best appropriated in the service of students' learning and so that the educational use of technology never eclipses its pedagogical content imperative. Simply adding a calculator tool to show students how to rapidly roll two dice a thousand times so they can propose that the most common sum is 7, is not really the idea of teachers relying on TPCK.

Thus, at the fall meeting of the National Technology Leadership Initiative, educational leaders were challenged to reframe the acronym to better represent the ideas being proposed. What acronym will better direct that teachers must go beyond technological, pedagogical, and content knowledge taken in isolation? What acronym will suggest the notion of the totality of successfully integrating educational technologies into curriculum-based instruction? Through the discussions, this complex, synergistic interplay among the three kinds of knowledge was reframed as **TPACK** describing it as the **total package** required for truly integrating **t**echnology, **p**edagogy, **a**nd **c**ontent **k**nowledge in the design of curriculum and instruction preparing students for thinking and learning mathematics with digital technologies. For mathematics then, **TPACK** represents the knowledge and experiences mathematics teachers need for incorporating technology within the context of teaching and learning mathematics.

***TPACK** represents the knowledge and experiences mathematics teachers need for incorporating technology within the context of teaching and learning mathematics.*

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Proposed Changes to AMTE Constitution and By-Laws

Please use the postcard in this newsletter to vote on these changes. Mail your ballot by June 1, 2008.

AMTE's Constitution Committee, chaired by Janet Caldwell (Rowan University), was charged with reviewing the AMTE Constitution and Bylaws and recommending updates as needed. Other members of the committee were Virginia Keen (Wright State University– Lake Campus), Travis Olson (University of Missouri), Al Otto (Illinois State University, retired), Ingrid Peterson (University of Kansas), and Sid Rachlin (East Carolina University). They have completed their task. A complete copy of the current and proposed revisions, along with the rationale for the revisions, is available on the AMTE website at http://www.amte.net.

Proposed changes to the AMTE Constitution and By-Laws, along with a brief description of specific changes and rationale for the changes, are posted on the AMTE website. These changes will be voted on at AMTE's January business meeting and then ratified by e-mail ballot in February 2008. The Committee has met and conferred with the Board over the past two years to determine needed changes as described below.

The following items in the Constitution were revised for clarification and consistency with current practice:

- Goals of AMTE are clarified.
- Affiliates are now included.
- Mail ballots may be conducted electronically.
- Shorter grace period is allowed for paying dues since this is now done electronically.
- Membership list is no longer maintained by Treasurer.
- The status of non-voting, ex-officio Board members is clarified.
- Term of office for NCTM Representative is designated.
- The Annual Board meeting is now required.
- The definition of a quorum of the Board applies only to voting members.
- Voting for President takes place in odd-numbered years, but term begins in even-numbered years.

The changes described below are proposed to the By-Laws:

- The grace period for membership renewal is deleted.
- The Executive Director position is described.
- Conference Coordinator position is added and described.
- The Advisory Board is deleted, since it has never existed.
- A new section is added on ex-officio, non-voting members of the Board.
- The nominations committee no longer validates results of the election under electronic voting.
- Procedures for modifying Constitution and By-Laws were revised, making it easier to amend the By-Laws.

To vote on the proposed changes, complete and mail the postcard included in this newsletter by June 1.

Featured Mathematics Education Article:

Toward Technology Integration in Mathematics Education: A Technology-Integration Course Planning Assignment

Gladis Kersaint, University of South Florida

CITE CONTEMPORARY ISSUES IN TECHNOLOGY AND TEACHER EDUCATION

Abstract: This article describes a technology integration course planning assignment that was developed to enhance preservice teachers' technological pedagogical content knowledge (TPCK). This assignment required preservice teachers to work with peers to integrate various technological tools (e.g., graphing calculators, web-based mathematics applets, etc.) in a secondary level mathematics course (e.g., Algebra 2). A description of the context and the course in which this assignment is given is provided and lessons learned from several years of implementation are discussed.

Online at
http://www.amte.net

Membership/Renewal Forms

Position Papers

Position Listings

Resources

Forum for Members

Other Opportunities

Upcoming Conferences

2008		
July 6-13	ICME 11	Monterrey, Mexico
July 17-21	PME 32	Morelia, Mexico
July 31-August 2	MAA MathFest	Madison, Wisconsin
August 3-7	Joint Statistical Meeting	Denver, Colorado
October 2-3	NCTM Regional	Oklahoma City, Oklahoma
October 16-17	NCTM Regional	Cleveland, Ohio
November 6-7	NCTM Regional	Reno, Nevada
November 13-15	SSMA	Raleigh, North Carolina
2009		
January 5-8	MAA-AMS Joint Meeting	Washington, DC
February 5-7	AMTE	Orlando, Florida
April 22-25	NCTM	Washington, DC
July 19-24	PME 33	Thessaloniki, Greece
August 2-6	Joint Statistical Meeting	Washington, DC
September 24-27	PME-NA	Atlanta, Georgia

Kennesaw State University
Lynn Stallings, AMTE *Connections* Editor
1000 Chastain Road, MB #0122
Kennesaw, GA 30144-5588

The date on the label indicates the month that your membership is due to expire.