



PENNSYLVANIA ASSOCIATION OF MATHEMATICS TEACHER EDUCATORS

Newsletter

Fall 2012

PRESIDENT'S MESSAGE

If you are anything like me, every year you ponder the “number of years you have been teaching” and sit in disbelief that it has been so long. In the end, I think most of us marvel at how fast time flies (just like our parents said it would). However I also like to think that this relative speed is partly because we love what we do. We are passionate about teaching and about mathematics and about helping our students to achieve at the highest levels in their future classrooms. Indeed the years blur, and I often can't remember when a student graduated, but I can tell you where he student-taught, and where he sat in my methods class. And I surmise that, like me, one of the joys in your life is hearing from your former students – I do not think that will ever change. I still like to think that even in these economically distraught times, we have some of the best jobs in the world. Just like our students, it is not the money that keeps us in our positions, but the joy of helping future teachers hone their craft.

Another one of the joys of my profession is belonging to a relatively new organization known as PAMTE. Sure, this sounds corny, but I firmly believe that our organization serves a unique role for all of us in the Commonwealth. I believe that it is truly a fantastic group of mathematics educators with whom we can share ideas, collaborate and lean on for support. But I think we can do more, support each other in many meaningful ways, and reach out to mathematics education faculty who may be all alone at their college/university. This is also an organization in which you can take on immediate service opportunities and quickly realize leadership potential as well. This is why I would love to see our membership continue to increase – the more members we have, the more we can learn! So help us grow our membership and our knowledge-base. Check with your colleagues; are they members? Check with neighboring institutions and try to connect with the mathematics education faculty there. Reach out and invite them to join us. Jane Wilburne is the chair of our membership committee (as well as the committee on Governmental Relations), but she would love another 1-

2 people to join her on each committee. Please let me or Jane know if you are willing/able to help.

A committee in need of leadership is the Writer's Cooperative. This committee originated several years ago; it has a structure but is waiting for a few good people to get it off the ground. A lot of the initial leg-work has been done and the framework sets up a collaborative effort for a database of volunteers from across the state to serve as reviewers for manuscripts. Wouldn't this be a great way to help each other? If you are interested in learning more, let me know and I can send you details about the intention of the writer's cooperative. It is a great way for us to help each other in service and scholarship.

This past May, about 40 of us gathered for the 6th annual PAMTE symposium. It was a fantastic time; in two short days I took away a lot of practical ideas and made some new connections from across the state (I also caught a shrimp in my mouth at dinner!). If you were not able to make it, take time RIGHT NOW to put May 22-23, 2013, on your calendar. It will be held at Shippensburg University, giving us a relatively central location at which to meet. NOTE that we are having this on a Wednesday-Thursday instead of our usual schedule. The board decided to do this because of late commencement ceremonies, and to avoid the Memorial Day weekend. So perhaps you can make Shippensburg your stop in route to the beach or the mountains for you 3-day weekend!!

In the meantime, we are about to embark on the 2012-2013 academic year. I hope to see you at one of the following events. PCTM Annual Conference will be in Harrisburg (Camp Hill) on October 18-19; including the very popular Pre-service Teachers Day on Thursday. My students have always found this to be a great day. Preceding the PCTM Annual Conference, PCLM (PA Council of Leaders of Mathematics) welcomes PAMTE members to join them on Wednesday, October 17, for their afternoon session and social. This session will be 3:40 - 5:00 p.m. and the speaker, Eric Milou from

Rowan University, will present the many resources available from NCSM on the Core Curriculum State standards and other issues important to leaders in mathematics education. If any PAMTE member is interested in joining PCLM for the entire conference please contact Janie Zimmer, zimmer@rbed.us.

The AMTE Annual Conference will be in Orlando, FL on January 24-26, 2013. Registration is open for both conferences, and I hope to see you there.

A big thank you to Mary Lou Metz for all of her work in creating this edition of the PAMTE newsletter!

Best wishes for the start of the academic year! May it be a productive and effective one.

~ *Janet White*, PAMTE President

SAVE THE DATE

Oct. 18-19, 2012	PCTM Annual Conference <i>Camp Hill, PA</i>
Oct. 18, 2012	Pre-Service Teacher Day <i>Camp Hill, PA</i>
Jan. 24-26, 2013	AMTE Annual Conference <i>Orlando, FL</i>
Apr. 15-17, 2013	NCTM Research Pre-session <i>Denver, CO</i>
Apr. 17-20, 2013	NCTM Annual Conference <i>Denver, CO</i>



New Apps I'm using this Fall

Steve Williams, Lock Haven University

In our Spring Newsletter, Jim Preston got us excited about his journey into the world of Apple computers. Around the same time as Jim, I also purchased an iPad and began playing around with some educational apps. My only mistake here was in purchasing the iPad over the Christmas holiday when I could not immediately take it to my office to use it.

Subsequently, we downloaded some fun apps for my five year old son and within a matter of days the device was no longer mine. However, that five year old is now six and heading to kindergarten in a few weeks. Therefore, the iPad is once again mine, if I can pry it out of my wife's hands!

A few months later, due to no longer being happy with my blackberry's operating system, I went ahead and bought an iPhone (my wife already had one). Don't get me wrong, I still terribly miss my blackberry for certain things, but I am seeing the FUNctionality of this iPhone and can mostly tolerate the things I don't like.

Piggybacking off of Jim's article, thanking him for introducing me to some new apps, and possibly needing to create a support group, I wanted to share a couple of my own apps that I am incorporating into my fall courses. First, I am excited about the socrative student response system apps I found. Since I worry about requiring students to use apps in the classroom, because I never know who has what kind of a device, this one is nice because the app really just directs you to a website that the students can go to on any device that can access the web.

There are two parts to this system. In fact there are two separate apps, one for the teacher and one for the student, but I downloaded both so I could get the feel for how it works from both ends. The teacher part creates a "room" where the students go to answer questions that you ask. The student part allows the students to enter the room and answer the questions asked. The teacher poses a question (multiple formats are allowed, such as T/F, MC, short answer, etc) and then releases it to be answered. The questions aren't actually entered into the app, rather they are simply posed in class verbally, written on the board, or displayed in some other way. The students then respond to the questions and the teacher sees the responses. I think this will be a good formative assessment tool for me to use when I want to determine overall class understanding and don't mind the responses being anonymous (which is also very good for some students). Just type in "socrative" into the App Store and the apps will appear. Or you can just go to www.socrative.com to use it on your laptop.

The second app I want to mention is a tool that I plan to use for student-teacher observations. Jim mentioned one in his article and I am finding this one useful as well.

The app is called LessonNote. When I observe student-teachers, I have my observation form template up on my laptop and begin completing it during the observation. In addition to this formal form I am required to complete, I also keep a notepad beside me that I separate into two columns. In the left column, I keep track of the time and what the teacher is doing and saying. In the right column, I keep track of what the students are doing and saying. However, this app seems to allow me to keep all of this in a more organized manner (and electronically as well). With this app, I can “create” the classroom exactly as it is set up. I can rearrange desks, tables, or whatever is in the classroom. I can indicate group work, individual work, class lecture, and other transitions. I can take a picture of the teacher or classroom. Once I “start taking notes,” the app will keep track of the time for me and I just have to take notes. When there is student-to-student interaction, I can connect two chairs with a line segment that indicates the interaction. I don’t have to try to remember, or write down, where the student was sitting that said what.

When I am done with the observation, I can “review lesson notes” and the entire lesson, with times, transitions, and interactions, is all right in front of me. While the only downside that I can find right now is that I cannot export the notes into a file that can be emailed to be saved on my computer (I imagine because it is its own system and not conducive to any type of Word or .pdf format), I don’t usually do anything with the hardcopy of my notes anyway, after my post-observation conference with the student-teacher. So I think I will be able to live with that inconvenience. Besides, when do I not have my iPad with me anyway? Oh yeah, when my son and wife have it!

At any rate, here are a couple of new apps for you to try out as the semester is about to begin.

PAMTE Membership Update

Jane Wilburne, Penn State Harrisburg

We have 63 members and 13 graduate student members as of June, 2012. Reminders for renewing membership were sent in July to those whose membership was not renewed at the symposium. Please see the PAMTE website (www.pamte.org) for the current membership application.

Here is a list of new PAMTE members. We welcome them into the organization.

Lorraine Howard	Wilkes University
Sararose Lynch	Westminster College
Linda Iseri	Mansfield University
Tetyana Berezovski	St. Joseph’s University
Kelly Brent	Carlisle High School

Also, below is a list of graduate students who have joined PAMTE. We hope their involvement in PAMTE will be rewarding.

Justin Boyle	University of Pittsburgh
Susan Jane Feeley	Penn State University
David Fischer	Drexel University
Maureen Grady	Penn State University
Karin Lange	Temple University
Kelly McGinn	Temple University
Cynthia Paul	Drexel University
Jeanne Shimizu	Penn State University

Please reach out to mathematics educators across the state and encourage them to join PAMTE!

The 2013 NCTM Louisville Regional Program Committee is seeking speaker proposals for consideration for the 2013 NCTM Regional Conference and Exposition. The conference will be held in Louisville, KY, Wednesday evening, Thursday, and Friday, November 6-8. The theme of the conference is “Number and Operations: Be Radical and Get Real! Please submit your proposal online by September 30, 2012 at: <http://www.nctm.org/conferences/content.aspx?id=28020> (This date is earlier than in previous years, so please note this change.) For accepted proposals, the lead speaker will receive a complimentary registration. (All co-speakers for a session must register and pay the appropriate registration fee.)

Louisville offers many visitor activities within walking distance from the convention center including the Louisville Slugger Museum and Bat Factory, Muhammad Ali Center, Frazier History Museum, GlassWorks, and much more! Our conference expects to draw from Indianapolis, Cincinnati, St. Louis, Nashville, Knoxville, Charlestown, Columbus, Chicago, Birmingham, etc.

Your contribution to the program will help NCTM provide a rewarding experience for all participants at the Louisville Regional Conference and Exposition. We look forward to your presentation at this exciting conference. Thank you for your support of NCTM.

If you have any questions, please contact Amy Hillen, Program Committee Member, at ahillen@kennesaw.edu.

Note: Please be reminded that no product should be discussed during your presentation that will benefit you financially.

Geometry for Inservice Teachers - Course Focusing on Specialized Content Knowledge

Tetyana Berezovski, St. Joseph's University

Mathematics teaching at any level requires that teachers have an extensive knowledge of mathematics, including the mathematics pedagogical and content knowledge specific to the work of teaching (NCTM, 2006). Deborah Ball and Hyman Bass argue that *Mathematical Knowledge for Teaching* (MKT) is critical for teacher development and mathematical practice. At the heart of MKT is *Specialized Content Knowledge* (SCK) – mathematical knowledge and skills unique to teaching, and is very different from knowledge needed by other professions, such as research mathematicians, engineers, and others (Ball & Bass, 2003).

Current research also suggests that awareness of *mathematical structure* (Mason et al., 2009) and *mathematical flexibility* (see Yakes & Star, 2011) is critical for developing teachers' ability to understand geometric ideas and concepts, and move beyond specialized techniques of problem solving to formal mathematical reasoning and proof. Mathematical structure is defined as the knowledge of general properties, which are instantiated in particular situations as relationships between elements. Such elements can be mathematical objects (like numbers and triangles) or relations, or relations between relations as part of an ongoing hierarchy (Mason, Stephens, & Watson, 2009; Mulligan, Vale, & Stephens, 2009; Vohns, 2006). Flexibility is knowledge of multiple approaches for solving mathematics problems, and the ability to select the most appropriate and most efficient strategy for a given problem (Yakes & Star, 2011; Star & Rittle-Johnson, 2008; Star & Seifert, 2006). These theoretical constructs: *Specialized Content Knowledge* (SCK), *Mathematical Structure* and *Flexibility* served as a foundation for the development and implementation of a non-traditional Geometry course for inservice secondary mathematics teachers that I created and piloted in the summer of 2011.

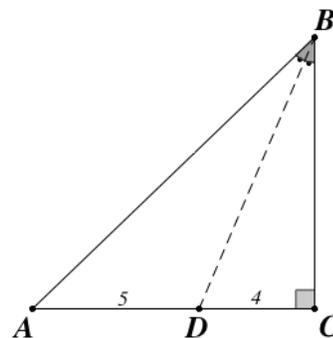
Fundamental high school Geometry concepts, such as congruence, similarity, area, and coordinate geometry were at the core of this course. Teachers used paper folding, constructions (both by hand and using GSP), and problem solving and reasoning to develop knowledge and skills for writing formal mathematical

proofs. Starting with very simple problems and progressing to rudimentary and later to more challenging tasks, the teachers were able to solve and prove complex mathematical structures and conjectures. Teachers were able to compare the efficiency of different methods and recognize problems that could be solved by more than one method. These learning environments created a medium to explore the nature of mathematical structure where *within-conceptual* and *between-conceptual* relationships became vivid and accessible to teachers. To evaluate the change of teachers' knowledge I utilized a variety of assessment tools, including quantitative (pre and post assessment data) and qualitative data (teachers' written work, artifacts and reflections), which showed the significant increase in teachers' knowledge of geometry.

The significance of teaching this research-based Geometry course provided teachers with opportunities to be able to extend their mathematical knowledge beyond traditional undergraduate mathematics geometry courses, bridge this knowledge to their practice, and prepare them for successful implementation of the Common Core State Standards (CCSSI, 2010).

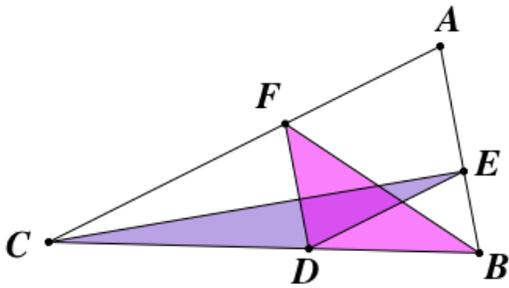
In the following I introduce three 'area' problems that highlight three cognitive shifts in teachers' learning this concept: 1. Finding/defining area; 2. Area as a mathematical object (looking at the shapes of equal area); 3. Area as a method of problem solving/proving.

1. In the right triangle ABC , the bisector of $\angle ABC$ divides the opposite leg into two segments of length 4 and 5. Find the area of triangle ABC .

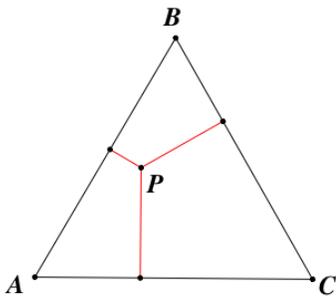


2. In triangle ABC , point D is on the side BC . Through point D construct two lines parallel to the sides AB and CA respectively. Points E and F are the intersections of these lines with sides AB and CA respectively. Prove

that triangles CED and DFB have equal area.



3. Use area to prove that a sum of distances from an interior point P to the sides of an equilateral triangle ABC is constant (that is the same for all interior points P).



Besides solving these problems, teachers also were expected to design their own problem (or in some cases use a published problem) to create a teaching scenario utilizing this problem.

At this stage of learning, teachers were able to apply their pedagogical expertise in correlation with newly developed mathematical knowledge, contextualizing their specialized content knowledge.

References:

Bair, S. L., & Rich, B. S. (2011). Characterizing the Development of Specialized Mathematical Content Knowledge for Teaching in Algebraic Reasoning and Number Theory. *Mathematical Thinking and Learning: An International Journal*, 13(4), 292-321.

Ball, D. L., & Bass, H. (2003). Toward a practice-based theory of mathematical knowledge for teaching. In B. Davis & E. Simmt (Eds.), *Proceedings of the 2002 annual meeting of the Canadian Mathematics Education Study Group* (pp. 3-14). Edmonton, Alberta, Canada: Canadian Mathematics Education Study Group.

Ball, D. L., Hill, H. C., & Bass, H. (2005). Knowing mathematics for teaching: Who knows mathematics well enough to teach third grade, and how do we decide? *American Educator*, 29, 14-22.

Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education*, 59(5), 389-407.

Brakoniecki, Aaron. (2009). Mathematical Knowledge for Teaching Exhibited by Preservice Teachers Responding to Mathematical and Pedagogical Contexts. In Swars, S. L., Stinson, D. W., & Lemons-Smith, S. (Eds.). *Proceedings of the 31st annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Atlanta, GA: Georgia State University. vol. 5, 1360 - 1368.

Common Core State Standards Initiative (CCSSI). (2010). *Common Core State Standards*. Washington, DC: National Governors Association Center for Best Practices and the Council of Chief State School Officers.
<http://www.corestandards.org/the-standards/mathematics>.

Mason, J., Stephens, M., & Watson, A. (2009). Appreciating Mathematical Structure for All. *Mathematics Education Research Journal*, 21(2), 10-32.

Mulligan, J., Vale, C., & Stephens, M. (2009). Understanding and developing structure— Its importance for mathematics learning. *Mathematics Education Research Journal*, 21(2), 1-4.

National Council of Teachers of Mathematics. (2006). *Curriculum Focal Points for prekindergarten through grade 8 mathematics: A quest for coherence*. Reston, VA: Author.

National Council for Teachers of Mathematics (2000). *Principles and standards for school mathematics*. Reston, VA: Author.

Star, J. R., & Rittle-Johnson, B. (2008). Flexibility in problem solving: The case of equation solving. *Learning and Instruction*, 18, 565-579.

Star, J. R., & Seifert, C. (2006). The development of flexibility in equation solving. *Contemporary Educational Psychology*, 31, 280-300.

Vohns, A. (2006). Reconstructing basic ideas in geometry – an empirical approach. *Zentralblatt für Didaktik der Mathematik*, Vol. 38 (6), 498-504.

Yakes, C., & Star, J. R. (2011). Using comparison to develop teachers' flexibility in algebra. *Journal of Mathematics Teacher Education*, 14, 175-191.

My Thoughts on the Khan Academy *Steve Williams, Lock Haven University*

I developed and taught an online Calculus 1 course this summer. It was the third online course I have developed and offered during our summer and winter sessions at Lock Haven University. I promised myself when I started to develop these courses that I would not be one of those instructors who simply told his students to, “read and study these chapters on your own, do these homework problems, and then take this test.” Rather, I wanted to create videos of all of my lectures so my students could see and hear ME actually teaching them. It’s not that I think I am the best teacher in the world (maybe second or third, behind some other great PAMTE teachers), but I do think that I am fairly good at explaining mathematical concepts (at least the ones that I understand myself) to my students.

Creating all of the videos is not an easy task. It takes a lot of dedication, but I feel that the benefits to my students are critical. In fact, I conduct a survey of my online courses and my students always state how the videos were the most important part of the course. They overwhelmingly comment that my online course is just as good, if not better, than a face-to-face course. The abilities to stop, rewind, watch at their convenience, and watch again are their favorite features of the videos.

Over the past year, this has caused me to think quite a bit about the “flipped classroom” and how I could incorporate these types of videos into my face-to-face courses. While there seems to be quite a bit of controversy over certain aspects of the flipped classroom, my vision is to have my students watch these types of lectures at home rather than doing their homework. This would allow us to spend classtime working on homework in front of my so I could be there to help them. However, my vision is initially clouded by a few issues: 1) I just don’t think that students, who already have a difficult time spending time on homework outside of class, will sit down and watch my lectures before coming to class (I know they sit down and watch a lot of youtube videos, but mine aren’t nearly as entertaining as most of them); 2) I worry that, once I see any of the problems students are having on the homework in class, I will end up teaching the material in the lectures anyway; and 3) It really is a lot of work to create all of the videos and I will feel like I

am doing double-duty by basically preparing for an online course and a face-to-face course.

Having said all of this, you would think that the Khan Academy would come to the rescue. (If you have yet to hear of the Khan Academy, you must have been living in a remote area of the world for the past year and you really need to go to www.khanacademy.org to check it out.) Imagine my delight when I heard about this site that was producing free lectures on almost every topic you could consider. I thought this would be the perfect place to direct my students to watch videos explaining the concepts to my students, without me having to create them, leaving classtime for homework.

The videos at the Khan Academy really are pretty good. Sal really is a very good explainer of concepts. However, the videos are just that—videos. While Sal often claims that his videos are “interactive,” they are not. Yes, he asks questions, but he obviously answers them himself. He has not even created videos (or at least the ones that I have watched, and I watched all of the ones that relate to my Calculus 1 course so I could direct my students to them as a resource) that encourage the listener to press pause, consider a solution, and press play to check their solution. The videos on the site are nothing more than I could simply create myself for my students, if Bill Gates would like to fund me to do so. So don’t be misled, these videos will not replace you as a teacher any more than the late-1980s tutorial-based math software did. But the site is a good resource to direct your students to if they would like to watch someone else explain concepts, on their own time, that they didn’t quite get in class. But if they, or you, are looking for something truly amazing, then look elsewhere.

So, why didn’t I just use the Khan Academy for my online Calculus 1 course this summer? Oh, don’t get me wrong, I seriously considered it, as it would have saved me about 80 hours of work if I could have just told me students to “watch these videos.” But as with anything that you don’t create yourself for your class, there are aspects of each video that you wouldn’t use. Then, you would spend a lot of time telling students to “not worry about that kind of a problem” or something similar. We all know that we tend to be very specific in our own lectures, not giving students too much “extra” stuff without carefully telling them that it is “extra.”

Furthermore, the videos do not necessarily progress in the exact way I structure my course. I always like to look at any course I teach as a semester-long story. And I like to tell that story my own way. There are multiple ways to tell the story, but I have the course structured so it tells the story the way I want it. And I do not like it when someone else interrupts my storytelling and begins to tell it a different way (which, incidentally, is one reason why co-teaching is often difficult—the co-storytellers do not take the time to carefully coordinate their story, leaving one interrupting the other to say something that the first one was going to eventually say). Therefore, it was easier for me to simply create my own videos the way I wanted it and use the Khan Academy videos as a resource.

In addition to this, most of the videos from the Khan Academy really are just Sal doing a bunch of examples. Sure, he explains the concepts as well, but nothing more than any of us do in our own classes, I assume. He really just does go over example after example, in a very traditional manner. This isn't to say that this aspect makes the videos good or bad, but it is what it is.

Now, I did use the Khan Academy videos as a resource to direct my students to for further investigation or explanation of a concept or to watch more examples being done. However, my final survey showed that almost no one used the videos. I don't know if it was because my own videos were sufficient or not, but my students did not feel the need to use the Khan Academy to succeed in my course. I suppose if I had not created my own lectures that my students would have been forced to watch explanations from someplace and would have probably used them. But they did not even use them as an outside resource. I suspect that if I simply told my face-to-face classes to watch these videos before coming to class, that nearly no student would and they would expect me to teach the concepts in class. On the other hand, I also suppose that I could probably force my students into the habit of watching them before class by only working on homework in class.

My final analysis, I guess, is that the Khan Academy is a great place for anyone to go to learn something about a concept that they know little about or want to learn more. They have a lot more than just math on the site. The videos are also a great resource to direct students to so they can get outside help when you are not available. However, I am not quite sure at this point that I would

feel comfortable using the videos as a centerpiece around which to structure a course.

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