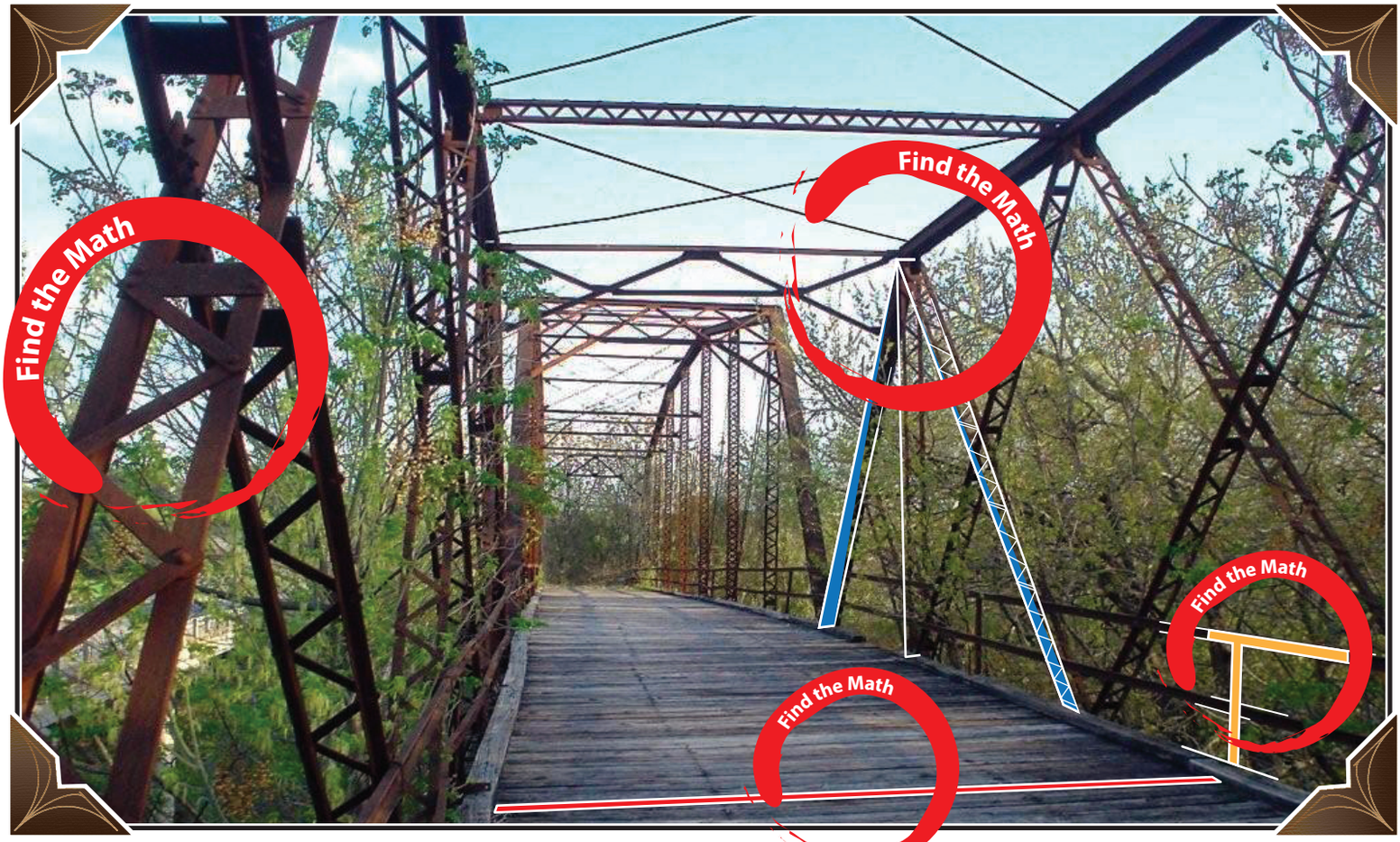
Texas Mathematics Teacher

Volume LVII Issue 2 Fall 2010

Find the Mathematics...



in a bridge!

see page 29

2010 Awards
See page 18 for the award winners.

Apply for 2011
Find scholarship and award forms online.

TCTM on Facebook and Twitter!
See page 29.

Texas Council of Teachers of Mathematics
Executive Board 2010 - 2011

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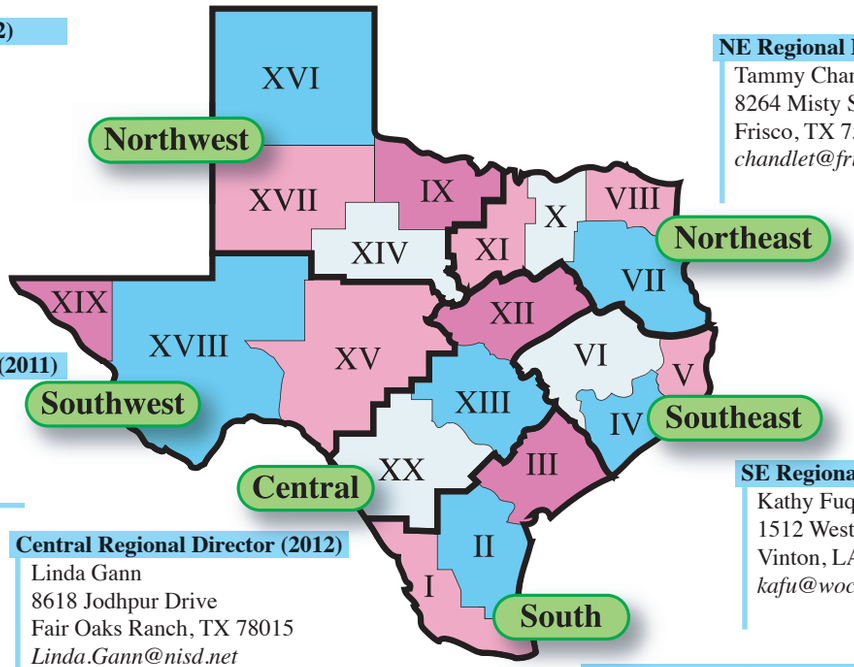

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Texas Mathematics Teacher

A PUBLICATION OF THE TEXAS COUNCIL OF TEACHERS OF MATHEMATICS

Volume LVII Issue 2 **Fall 2010**

Cover Photo by Mary Alice Hatchett, Mathematics Consultant, Georgetown, TX

Articles

Features

Departments

TCTM Applications

All applications (including membership) are now available online at the TCTM website <*www.tctmonline.net*>.

Texas Mathematics Teacher (ISSN# 0277-030X), the official journal of the Texas Council of Teachers of Mathematics (TCTM), is published in the fall and spring. Editorial correspondence should be mailed or e-mailed to the editor.

This journal is funded by the Texas Council of Teachers of Mathematics and printed at The University of Texas at Austin, which does not imply endorsement by the University or by the Charles A. Dana Center.

Call For Articles

Texas Mathematics Teacher seeks articles on issues of interest to mathematics educators, especially K-12 classroom teachers in Texas. All readers are encouraged to contribute articles and opinions for any section of the journal.

Manuscripts, including tables and figures, should be typed in Microsoft Word and submitted electronically as an e-mail attachment to the editor with a copy to the director. No author identification should appear on or in the manuscript. A cover letter containing author's name, address, affiliations, phone, e-mail address, and the article's intended audience should be included. After refereeing, authors will be notified of a publication decision.

Teachers are encouraged to submit articles for ***Voices From the Classroom,*** including inspirational stories, exemplary lessons, or management tools. If submitting a lesson, it should include identification of the appropriate grade level and any prerequisites. Items for ***Lone Star News*** include, but are not limited to, NCTM affiliated group announcements, advertisements of upcoming professional meetings, and member updates.

Businesses interested in placing an **advertisement** for mathematics materials should contact Mary Alice Hatchett. Advertisements do not imply endorsement by TCTM's board, editorial staff or members.

Deadline for submissions: Fall, July 1 Spring, January 1

Letter from the President

Dear TCTM Members,

I really appreciate the opportunity that you have given me to serve the Texas Council of Teachers of Mathematics as President.

The first thing I would like to do is to welcome all new TCTM members. TCTM is a partner affiliate of the National Council of Teachers of Mathematics (NCTM). In Texas there are also many local associate NCTM affiliates. To find out if there is one in your area of Texas you can visit the NCTM website <*www.nctm.org*> or read the Lone Star News section of this journal.

TCTM along with the Texas Association of Mathematics Supervisors (TASM) and the Texas Section of the Mathematics Association of America (MAA) are the sponsoring organization for Conference for the Advancement of Mathematics Teaching (CAMT). TCTM membership is included in the registration for CAMT.

I am sure that many of our new members joined at CAMT in San Antonio in July 2010. That was a great conference! I am sure you learned a lot, saw many new products and networked with colleagues.

The Start of Something Big is the theme of CAMT 2011. CAMT 2011 will be held at the Gaylord Texan <*www.gaylordhotels.com/gaylord-texan*> in Grapevine, Texas on July 18-20, 2011. The location is a beautiful resort. The program will offer many wonderful sessions; and the Exhibit Hall will feature vendors with useful products for your classroom. I look forward to seeing you there. If you would like to volunteer at CAMT 2011, please contact the Volunteer Chair, Martha Godwin at <*mgodwin@qcisd.net*>.

I am sure your school year is well under way, and I know you have begun a great year of mathematics. Did you begin with the end in mind? What will you and your students have accomplished by June? Are we preparing students for the role they will play in the world as adults? Students will need to be able to:

- organize and summarize their work
- see the big ideas
- make connections among ideas
- use precise mathematics language and appropriate representations to communicate ideas
- learn from and contribute to, the learning of others
- be a life-long learner, and
- self assess/reflect.

I hope that your students are engaging in mathematics that will help them acquire the skills they will need. You may find some articles in this journal to spark some new ideas for you to use.

As the TCTM Board tries to fulfill the TCTM mission – to promote mathematics education in Texas - I ask you to join us on this journey. Feel free to offer comments, concerns, suggestions to me at <*ntrapp@vtxb.com*>.

Sincerely,

Nancy Trapp
TCTM President 2010-2012 ■

Lone Star News

Affiliate Groups

These are local affiliated groups in Texas. If you are actively involved with them, please send future meeting and conference information to Cynthia Schneider at <*cschneider@austin.utexas.edu*> so we may publicize your events. Contact information for each group is available on the NCTM website, <*www.nctm.org*>. Contact information for regional directors is located on the inside front cover.

SOUTHWEST REGION: *Service Centers 15, 18, 19*

Rita Tellez and Veronica Hernandez, Co-Regional Directors

Greater El Paso CTM

Annual fall conference CONNECTIONS: LINKING CONCEPTS AND CONTEXT was held on October 23, 2010. For future event information and registration please contact: GEPCTM President, Glen Torguson at <*gtorgu@sisd.net*> or Membership VP, Craig Rhoads at <*crhoad@sisd.net*>

SOUTHEAST REGION: *Service Centers 4, 5, 6*

Kathy Fuqua, Regional Director

Fort Bend CTM

Holds a short meeting in August, a fall mini-conference, a spring mini-conference and an end-of-year banquet to serve the districts of Alief, Fort Bend, Katy, and Stafford. Contact: Alena McClanahan, <*alena.mcclanahan@fortbend.k12.tx.us*>.

NORTHWEST REGION: *Service Centers 9, 14, 16, 17*

Angie Watson, Regional Director

Big Country CTM & Science

Will hold their 2011 Big Country Mathematics, Science, and Technology Symposium February 5th, at the Region 14 ESC. Contact: Kathy Hale, <*khale@esc14.net*>.

Texas South Plains CTM

Seventeenth Annual Panhandle Area Mathematics and Science Conference was held in September 2010, in Canyon, TX. Contact: Gilberto Antunez, <*gantunez@mail.wtamu.edu*>, or see <*www.wtamu.edu/academic/ess/edu/*> for information on 2011.

NORTHEAST REGION: *Service Centers 7, 8, 10, 11*

Tammy Chandler, Regional Director

East Texas CTM

For current information contact the president, Robin McClaran, at <*robinmc@etbu.edu*>.

Red River CTM

The STEAM (Successfully Training Educators As Mathematicians) Conference is held every four years at the campuses of Texas A&M University-Texarkana and Texarkana College, Contact: Debra Walsh, <*dwalsh@redwater.esc8.net*> or Susie Howdeshell, <*showdeshell@pgisd.net*> or see <*www.tamut.edu/~rrcmath/*>.

Greater Dallas CTM

Holds two mathematics contests (W. K. McNabb Mathematics Contests) for students in grades 7 - 12 - one in the fall (early Nov.) and one in the spring (early April). A banquet in May is held for the winners. Contact: Tom Butts, <*tbutts@utdallas.edu*> .

SOUTH TEXAS REGION: *Service Centers 1, 2, 3*

Barba Patton, Regional Director

Coastal CTM

Held their annual conference on June 18, 2010, in Corpus Christi. Contact: Faye Bruun, <*faye.bruun@tamucc.edu*>, or see <*cctm.tamucc.edu*>.

CTM @ Texas A&M University at Corpus Christi (Student Affiliate)

Contact faculty advisor Faye Bruun, <*faye.bruun@tamucc.edu*>

CTM @ Texas A&M University at Kingsville (Student Affiliate)

Contact NCTM Representative: Donna Perez

Rio Grande Valley CTM

The 43rd annual conference was held on November 20, 2010, at the University of Texas - Pan American, Edinburg, Texas, from 8:00 to 4:00 p.m. For future event information, contact Nancy Trapp <*ntrapp@vtxb.com*> or see <*www.rgvctm.org*> .

CENTRAL TEXAS REGION: *Service Centers 12, 13, 20*

Linda Gann, Regional Director

Austin Area CTM

The fall conference 'Making Every Moment Count' was held on November 6, 2010. Contact AACTM President Pam Johnson, <*pjohnso2@austinisd.org*>, or see <*www.aactm.org*> for future events.

Alamo District CTM

South San Antonio ISD is hosting a 'Academic Arama' on November 6, 2011 for ADCTM. Contact : Evelyn Trinidad (210) 977-7365.

Central Texas CTM

CTCTM will hold a spring mini-conference on February 19, 2011, in Waco at the Region 12 Service Center. Contact: Rachelle Meyer <*Rachelle_Meyer@baylor.edu*> or see <*www.baylor.edu/soe/ctctm*>.

STATEWIDE

Texas Association of Supervisors of Mathematics (TASM) meets in the fall and spring in Austin and at CAMT. Membership is required to register for this meeting. For membership and registration information, please see <*www.tasmonline.net*>.

The Association of Mathematics Teacher Educators of Texas (AMTE-TX) will hold their annual meeting at CAMT 2011. For more information contact the current president Colleen Eddy at <*leadership@amte-tx.org*>.

NATIONAL

National Council of Teachers of Mathematics (NCTM) Annual Meeting and Exposition will be held in Indianapolis, IN on April 13-16, 2011.

TEA Talks

Hot News

For additional information, refer to the websites listed

Mathematics Graduation Requirements

A 2010-2011 side-by-side chart outlining the graduation requirements is posted at http://ritter.tea.state.tx.us/curriculum/SBSGradReqs2010_2011.pdf. For more information on the graduation requirements, please see the Frequently Asked Questions (FAQ) documents posted at http://www.tea.state.tx.us/graduation.aspx.

Texas Math and Science Diagnostic System (TMSDS)

The Texas Mathematics and Science Diagnostic System (TMSDS) is managed by CORE K12, a division of CORE ECS. TMSDS is provided at no cost to Texas school districts and charter schools. TMSDS is a web-based TEKS-aligned diagnostic assessment system that covers grades 3 – 8 in mathematics and science as well as Algebra I, Geometry, Algebra II, Integrated Physics and Chemistry, Biology, Chemistry, and Physics. Instructions for enrolling in TMSDS can be found at www.tmsds.org. Please contact your regional education service center for training opportunities and technical assistance.

Texas Algebra Readiness Initiative Key Components

1. **Focused Curriculum**

   Texas Response to Curriculum Focal Points (TxRCFP) (K-8)

   The TxRCFP organizes the Texas Essential Knowledge and Skills (TEKS) around key conceptual ideas that emphasize integration of concepts across the strands/skills and lead naturally to mathematical connections and higher-level thinking. The pdf of the TxRCFP is available on the TEA Mathematics Curriculum website and at *<http://www.txar.org>*.

2. **Algebra Readiness Professional Development Academies**

   MSTAR: An Introduction (5-8)

   The MSTAR Introduction informs and familiarizes participants with the TxRCFP as a framework for improving overall mathematics instruction and achievement with the goal of decreasing the percentage of students who need math intervention. MSTAR Intro is currently available through ESCs. An online version of this training will be available on Project Share this fall.

   Elementary Students in Texas Algebra Ready (ESTAR): An Introduction (K-5)

   The ESTAR Introduction informs and familiarizes participants with the TxRCFP as a framework for improving overall mathematics instruction and achievement with the goal of decreasing the percentage of students who need math intervention. ESTAR is available through the Texas Regional Collaboratives.

   MSTAR: Geometric Approach to Algebra Readiness (6-8)

   The MSTAR: Geometric Approach to Algebra Readiness Academy provides content-based professional development focusing on geometric approaches to algebra. The Geometric Approach to Algebra Readiness Academy also focuses on addressing the needs of all learners through response-to-intervention (RtI) strategies that focus on integrating the TEKS and creating quality Tier 1 lessons. The MSTAR: Geometric Approach to Algebra Readiness Academy is available through the Texas Regional Collaboratives.

   MSTAR Academies: Foundations for Grades 5-8

   The MSTAR Academies provide intensive content-based professional development focusing on the how and what to teach to engage students in concepts and content. The MSTAR Academies also focus on addressing the needs of all learners through response-to-intervention (RtI) strategies that focus on integrating the TEKS and creating quality Tier 1 lessons. MSTAR Academies are currently available through ESCs. Phase II, a 3 day follow-up training, will be available in the summer of 2011.

   Math End-of-Course Professional Development (9-12)

   The High School End of Course Success Academies for Algebra I, Geometry and Algebra II provide intensive content-based professional development to high school teachers. The High School End of Course Success Academies for Algebra I, Geometry and Algebra II also focus on addressing the needs of all learners through response-to-intervention (RtI) strategies that focus on integrating the TEKS and creating quality Tier 1 lessons. The Algebra I EOC Success Academy is currently available through ESCs. The Geometry EOC Success Academy and the Algebra II EOC Success Academy will be available through ESCs in the summer of 2011.

3. **Grants to districts**

   Algebra Readiness Grants focus on improving student achievement in the area of algebra readiness. Grantees will design, develop and implement a comprehensive school improvement model for mathematics. A list of the Cycle One Grantees may be found at *<ritter.tea.state.tx.us/opge/disc/algebra/overview0912.html>*.

4. **Technology Based Supplemental Math Instruction Pilot (5-8)**

   The Technology Based Supplemental Math Instruction Pilot focuses on students who are not on track to meet the end-of course standards by providing technology-based supplementary instruction in mathematics.

5. **MSTAR Universal Screener (5-8)**
The MSTAR Universal Screener is a formative assessment system administered to students in grades 5-8 to support instructional decisions. The content of the MSTAR Universal Screener is based on algebra-readiness skills as identified in the Texas Response to the Curriculum Focal Points. Results can help teachers identify students who might not be ready for algebra and are in need of additional instructional support. Teachers will be able to monitor students' risk status by administering comparable forms of the MSTAR Universal Screener in fall, winter, and early spring. Administrations dates will be sent out on the mathematics listserv and will be posted on TMSDS.

The MSTAR Universal Screener can be accessed through the Texas Math and Science Diagnostic System (TMSDS). Teachers, students, and administrators can use their 2010-2011 TMSDS usernames and passwords to access the MSTAR Universal Screener. To find out how to upload students into TMSDS, visit www.tmsds.org or contact the TMSDS representative at your educational service center (ESC).

Important documents, including the administration manual, interpretive guide, frequently asked questions, and necessary student test codes, are available under the "Program Materials" tab in the MSTAR Universal Screener portal.

Online training focusing on interpreting the MSTAR Universal Screener reports and making instructional decisions based on the data is available on Project Share. The online course is entitled "MSTAR Universal Screener Overview."

Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST)

The 2010 PAEMST awards recognized outstanding grade K – 6 mathematics and science teachers whose innovative methods bring teaching to life in the classroom. In 2011, the PAEMST program will recognize outstanding mathematics teachers in grades 7 – 12.

The Texas finalists in elementary mathematics are Elizabeth Hudgins of Eanes ISD, Lorene Wallace of Austin ISD, and Stephanie Weaver of Pearland ISD. Hudgins is a 5th grade teacher at Eanes Elementary School in Eanes ISD and has 8 years of teaching experience. Wallace is a 1st grade teacher at Bryker Woods Elementary School in Austin ISD and has 6 years of teaching experience. Weaver is a 3rd grade teacher at Shadycrest Elementary School in Pearland ISD and has 14 years of teaching experience.

A state panel of master teachers, specialists, and administrators reviewed the applications and chose the outstanding mathematics teachers for the National Science Foundation to consider for state finalist status. After an initial selection process at the state level, a national panel of distinguished scientists, mathematicians, and educators may recommend a finalist to receive the national award. If chosen as a national winner, the state finalist will receive $10,000 and an all expense paid trip for two to Washington D.C. for ceremonies that include recognition from the president of the United States at the Capitol.

Currently, outstanding certified mathematics and science teachers in grades 7 – 12, with five years or more of K – 12 teaching experience, are eligible to apply. If you would like to nominate an outstanding mathematics or science teacher, nomination forms and applications are available at *<www.paemst.org>*. Nominations are due by April 1, 2011, and applications are due by May 2, 2011.

Texas Education on iTunes U

Governor Rick Perry and the Texas Education Agency have joined together to launch Texas Education on iTunes U, which provides free multimedia content to educators, students and parents in Texas and around the world.

If you are a student, teacher, school district, higher education institution, professional organization, or a non-profit organization, TEA invites you to consider becoming a content provider for Texas Education on iTunes U. If selected as a content provider, your organization's current audio, video and PDF resources will be hosted on the Texas Education on iTunes U site in addition to any current website locations that can be linked in iTunes U.

For more information, please visit
<http://www.tea.state.tx.us/itunesu/>.

Assessment

For more information relevant to the mathematics education community from TEA's Assessment Division, please see the powerpoint available at

<http://www.tasmonline.net/Meetings.html>

entitled "TEA Student Assessment Update on Mathematics, 9/28/2010."

Additional presentations from the TASA Assessment Conference may be available on the TEA website *<www.tea.state.tx.us>*, search for Assessment Conference Presentations 2010.

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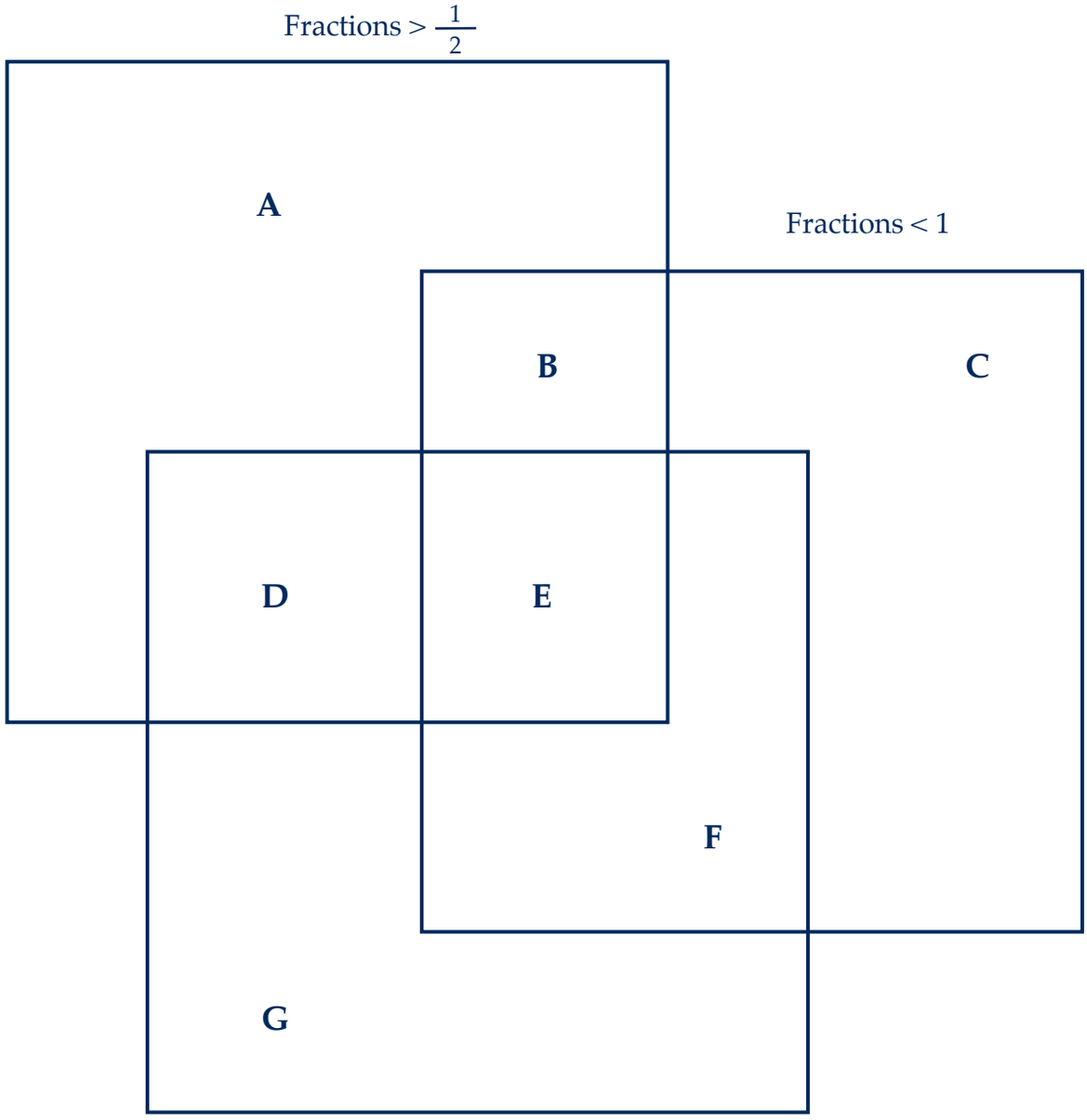
FEATURE

Student Activity

Number Sense Now! Grades K-6

Name at least one number for each letter:



Possible Answers

A : $\frac{5}{9}$ B : $\frac{3}{4}$

C : $\frac{4}{9}$ D : $\frac{8}{10}$

E : $\frac{6}{10}$ F : $\frac{9}{10}$

G : $\frac{1}{10}$

CAMT 2011

CAMT 2011: The Start of Something Big **July 18 – 20, 2011**
Gaylord Texan **Grapevine, TX**

CAMT 2011: The Start of Something Big

The Conference for the Advancement of Mathematics Teaching (CAMT) 2011 will be held July 18-20, 2011, at Gaylord Texan in Grapevine, Texas. For more details visit the CAMT website at *<www.camtonline.org>*

CAMT 2011 Volunteers

Dear Members of TCTM,

Volunteer to be a VOLUNTEER!

We believe that there is an opportunity for everyone to find their niche in helping CAMT to be a success for everyone involved – here's how you can join in on the efforts (we would love to have over 250 volunteers ready to go!). We are looking for fellow mathematics educators to assist us with supporting participants in areas such as the following: Registration, Exhibits, Speaker Check-In, or Transportation. Come work "behind the scenes." We need you! Please e-mail, telephone or fax your name and contact information (be sure to include contact information for the summer) to Martha Godwin, along with which of the following dates you are available to volunteer. Martha will respond via e-mail or home phone with a specific scheduled time and location.

Thank you for making every CAMT a wonderful experience!

Volunteer Information

I am willing to volunteer on	17th PM	18th AM	18th PM	19th AM	19th PM	20th AM	20th PM

Name: Last | First | Middle

Address: Number and street | Apt. number

City | State | Zip Code

Contact: ( ) Home Phone | ( ) Cell Phone | Email Address

Affiliation: District or Professional Affiliation | ESC

Please submit your form to Martha Godwin,

by mail: **Martha Godwin**
P.O. Box 82
Queen City, TX 75572

by email:
< mgodwin@qcisd.net >

Understanding and Improving Students' Perceptions of Algebraic Inequalities

Algebraic inequalities, as a component of mathematics education, have been the subject of recent studies. The National Council of Teachers of Mathematics (NCTM, 2000) called for the continued emphasis on students' ability to master the topic. Students in grades nine through twelve (more specifically, students in eighth grade pre-AP Algebra classes) must be able to explain inequalities using mathematical relational symbols and be able to understand the meaning of inequalities and their solutions (NCTM). To aid in the instruction that students receive concerning algebraic inequalities, it was necessary to recognize students' perceptions of relational symbols, understandings, and misconceptions regarding inequalities (Tsamir & Almog, 2001; Tsamir & Bazzini, 2004). Previous research has shown that common student errors with inequalities fall into four categories: a) regarding inequalities as equations, b) understanding of the terms *more* and *less* and of the corresponding relational symbols, c) relating and using different solving techniques, and d) struggling with interpreting solutions.

Students Regard Inequalities as Equations

According to Vaiyavutjamai and Clements (2006), students often confused the meanings of the greater than and less than symbols with the equal sign, and therefore, treated inequalities as equations. On a test covering inequalities, the researchers provided space for students to work the problems but asked that they place their final solution in an answer box provided. Students often wrote the correct answer in the workspace but then wrote a single number in the answer box. When asked to explain their answers, all students who had made the mistake indicated that they believed that the inequality problem had only one solution. The students solved for the unknown in the context of an equality, not an inequality. They failed to recognize that, while solutions to inequalities could be single numbers, they also could be a range of numbers.

Blanco and Garrote (2007) supported Vaiyavutjamai and Clements' (2006) claim, asserting,

> Many students understood the greater than and less than signs to be a nexus between two algebraic expressions. They then carried this nexus through the various steps in solving an inequality without attaching any meaning to it, even to the point of simply substituting an equals sign (p. 224).

Their research demonstrated that many students view the equal sign as being synonymous with the greater than and less than symbols. Without full understanding of the meanings of the relational symbols, students then failed to grasp the complete concept of the meaning of the symbol manipulations (Blanco & Garrote; Vaiyavutjamai & Clements).

Regarding inequalities as equations is one of the most common student mistakes when solving inequalities, according to researchers. To help students understand the differences between inequalities and equations. Blanco and Garrote (2007) maintained that teachers should "establish with clarity the differences between the concepts of equation and inequality, with the clear implications what this entails especially when it comes to interpreting their solutions" (p. 227). According to Tsamir and Almog (2001), students should be aware of their intuitive beliefs about the similarities and differences between inequalities and equations and so should engage in open discussions about them. Tsamir and Bazzini (2004) suggested using the "What if Not" technique to open the discussions allowing students to look at an original inequality like $3x^2 \geq 0$ and then ask themselves "What if it is not a '≥' relation. Students then solved and graphed the related inequalities $3x^2 \leq 0$, $3x^2 > 0$, $3x^2 < 0$, $3x^2 = 0$, and $3x^2 \neq 0$. Understanding their own intuitions as well as differences between the various forms of inequalities and equations will aid students in attempting to determine the reasonableness of their answers.

Students Have Limited Understandings of the Terms More and Less and of Relational Symbols

Warren (2006) credited students' treatment of

inequalities like equations to a poor foundational understanding of the terms more and less. She considered the terms to be "'essential' attributes of equivalence and non-equivalence" (p. 173). Without a firm grasp of the vocabulary and symbolic meanings, students cannot fully understand the meaning of inequalities. "If a student does not know how to read mathematics out loud, it is difficult [for him or her] to register the mathematics" (Usiskin, 1996, p. 236). Teachers often hurriedly brush over the terms more and less as used in a mathematical context. Warren conducted a three-year longitudinal study analyzing textbooks used in the first five primary grades and discovered that only five percent of the content was aimed at developing understanding with the concepts of the terms more and less.

Warren (2006) went on to classify students' perceptions of the terms more and less using a theoretical framework that demonstrated a hierarchical pattern in students' thinking processes beginning with the lowest level where the terms *big* and *small* were related to more and less respectively. The second level showed an awareness of a single argument (e.g. "There are more/less people") in a non-comparative sense by the students (p. 185). The third level suggested that students were able to use the terms in a comparative sense (e.g. to mean *bigger* or *smaller*), while the fourth level indicated understanding of more and less as a way to compare two arguments. At the fifth and highest level, students were able to associate more and less with two quantitative amounts (e.g. "11 is more than 9") (p. 185). Warren claimed that students failed to operate at the fifth level because most classroom instruction focused on arithmetic procedures involving solving number or word problems with addition and subtraction. These arithmetic lessons with more and less were not necessarily transferable to working with the same terms and concepts in algebra.

In addition to the concepts of more and less, pronunciation of the relational symbols can cause problems for students' understandings of inequalities. Rubenstein and Thompson (2001) stated that mathematical symbols that required more than one word to pronounce, such as *greater than* or *less than or equal to*" were often problematic for students. Furthermore, the researchers claimed that symbols that resembled each other as > (the greater than symbol) and ≥ (the greater than or equal to symbol), often confused students.

Tent (2000) declared that "If children are going to become proficient in the language of mathematics, they must see how that language fits into their lives and recognize inequalities as an important part of their mathematical world" (p. 295). Tent suggested introducing inequalities by relating them to events in students' lives with which they were familiar (e.g. "You must be in bed before 9:30") (p.295). This type of introduction allowed students to connect the spoken language of inequalities to their daily lives. They avoided viewing inequalities as foreign mathematical expressions that were known by an equally foreign name. Blanco and Garrote (2007) agreed that speaking about inequalities in both daily language and algebraic language helped students understand and translate between the two with greater ease. Tent also advocated the use of word expression charts to help students consider the many different ways of "pronouncing" an inequality like $x \leq 4$. As a class, students were led to brainstorm alternative mathematical sentences to represent the given expression such as, "4 is the biggest x can be," "x is at most 4," "x is no more than 4" (p. 295). Students were able to familiarize themselves with the various mathematical ways to describe an expression. Students also worked backwards from the verbal expression to find the written, an example of a representational algebraic activity that helped in mathematical proficiency (Kilpatrick, Swafford, & Findell, 2001). To encourage proper use of mathematical language, Rubenstein and Thompson (2001) further recommended having students verbalize an inequality as they wrote it. This method helped students connect the verbal and written forms and learn how to read the relational symbols used.

Students Have Difficulties Using and Relating Different Solving Techniques

To solve inequalities, Tsamir and Almog (2001) found that students used three main strategies: algebraic manipulations, graphical representations, and number lines. They found that students relied on algebraic manipulations most frequently. However algebraic manipulations alone led to the highest rate of incorrect solutions among students. Incorrect solutions were often the result of students failing to recognize excluded values, mistakes when dividing

or multiplying by a negative number, and solving equations instead of inequalities. Students used graphical representations less often than algebraic manipulations, but tended to find the correct answers using graphs. Interestingly, students did not use graphs to solve linear inequalities although they were more familiar with linear graphs due to the amount of time spent working with them in class. Students used number lines least often, and when they did, found incorrect solutions at the highest rate. The authors believed that graphical approaches to solving inequalities should be encouraged by teachers since graphs "provide students with visual images of solutions and thus facilitate interpretation of the results" (p. 522). Furthermore, Blanco and Garrote (2007) agreed that students' learning was enhanced when they were introduced to various methods to solve inequalities. The different strategies also helped a greater number of students, who may be different types of learners, understand the concept of inequalities. Students may have avoided many of the mistakes made if they were able to see a visual representation of the solution and evaluate its reasonableness.

Despite Tsamir and Almog's (2001) recommendation to include visual representations of inequalities, Becerra, Sirisaengtaksin, and Waller (1999) cautioned against using graphical techniques to solve and represent inequalities without first ensuring that students understood what solutions to inequalities meant. Otherwise, they warned, students will passively engage in graphing without recognizing the significance of the graph in relation to the inequality in the problem. It is possible that students will view the two solving processes (graphical and algebraic) and resulting answers of identical inequalities as unrelated.

Students Struggle with Interpreting Solutions

Beccerra, Sisrisaengtaksin, and Waller (1999) supported their suggestion that students do not always understand the meaning of the solutions they arrive at when solving inequalities. On an inequality test, students were able to arrive at $x > 3$ for the problem $3x - 7 > 2x - 4$. However, when interviewed about their answers, many students were unable to determine if $x = 0$ was a valid solution within the solution set. The students' difficulties indicated that they lacked a full understanding of what the solution "x is greater than three" meant and that certain numbers would not result in a true problem statement.

Tsamir and Bazzini (2004) built on the former research regarding students' interpretations and understandings of solutions to inequalities. They found that students have intuitive beliefs that only inequalities can be solutions to inequalities; a single integer could not be the only solution. When asked if $\{x \mid x = 3\}$ could be the solution to a given inequality, many students claimed it could not on the basis that "'the solution to an inequality has to be a range,' or that 'solutions to inequalities must be inequalities" (p. 807). While interviewing students about the answers on the inequality test, the researchers discovered that many of the students who did correctly identify $\{x \mid x = 3\}$ as a possible solution on the test misunderstood the solution and shared the same incorrect intuitive belief as the students who answered the question incorrectly. Upon clarification, Tsamir and Bazzini found that the students misunderstood $x = 3$ to be one of the true values in a range. The students perceived $x = 3$ as a part of a solution set rather than the entire solution set.

Tsamir and Bazzini (2004) suggested that to help students understand their own intuitive beliefs about inequalities and their solutions and avoid making mistakes when solving inequalities, teachers must become familiar with students' intuitions. Furthermore, to help solidify students' understandings that solutions to inequalities do not necessarily have to be inequalities, teachers should include a plethora of examples to demonstrate inequalities with single-value solutions. Tsamir and Bazzini also advocated the use of what they referred to as "reverse order tasks" in which students' were provided with a solution and asked to find an inequality statement for which the solution would be true. This type of reverse task was also supported by Driscoll (1999) who believed that algebraic thinking

caused by doing and undoing mathematical tasks led to an enhanced understanding of mathematical, and specifically algebraic, concepts like inequalities.

In this study, it is hypothesized that middle school algebra students will demonstrate through their performance on a given inequality test the same misconceptions about inequalities that prior research has revealed: treating inequalities as equations, confusing the meanings of the mathematical terms more and less, struggling with using different solving techniques, and displaying difficulties interpreting the meanings of solutions. While previous studies have looked at these same student issues on separate occasions and as separate studies, this study aims to identify student misconceptions about all of these four known issues through the use of a single study and instrument. From this it can be determined whether students' incorrect answers are the result of a specific misconception or whether their incorrect answers are often due to general misconceptions in all four areas with which the research suggested students struggle.

Method

Participants

The participants included 30 eighth-grade, pre-AP algebra students (N=30), including 16 males and 14 females, attending a public school in a metropolitan area of Central Texas. Twenty-three of the students were White, three students were Asian, two were African American, and two marked "other" under ethnicity. The age distribution ranged from 13 to 14 years old. All students had previously received instruction on the concept of algebraic inequalities.

Instrument

The *Understanding Inequalities* instrument used was an inequalities test designed by the authors with several questions adapted from Goodson-Epsy (1998), Tsamir and Bazzini (2004), and Vaiyavutjamai and Clements (2006). The first two questions required students to define the terms more and less as used in mathematics. The second section included three inequalities, each including one unknown. The students were provided with a blank number line where they were asked to represent their solutions. The third section was made up of five inequalities of varying difficulty each with one unknown and space provided for student work. Instructions for the section ask that final answers be placed in boxes to the right of each question's work space. Items 11 and 12 required students to represent solutions to two given inequalities of greater difficulty level on number lines, while Items 13 and 14 asked students to solve two different inequalities and represent the solutions on the provided Cartesian graph. The last two word problems dealt with solving of algebraic inequalities. The complete instrument can be found in Appendix A.

Procedure

The purpose of the study was explained to the students and their voluntary participation was stressed. Willing participants were administered the *Understanding Inequalities* untimed instrument that took no longer than 15 minutes to complete. Students' responses were anonymous.

Answers to Items 1 and 2 were scored based on Warren's (2006) identification of levels of students' understandings of the terms more and less. Students whose definitions fell into Warren's *quantified* category received a score of 5. Definitions in the *general* category received a 4, while those in the *positional language/bigger/smaller/not as much* category received a 3, *non-comparative sentence* definitions received a 2, and finally, *big/small* definitions were given a 1.

Test Items 3 through 5 were scored correct or incorrect based on students' use of an open, as opposed to a closed, circle on the appropriate number, and shading of the line in the correct direction. Items 6 through 10 were scored correct or incorrect based on the final answers students placed in the answer boxes provided. Student written work displayed in the workspace was used to identify student errors and to determine common student misconceptions. Correct shading of the number line and the use of the correct open or closed circle helped determine correct answers on Items 11 and 12. Also, students were required to identify that the solution to Item 12 was the set of numbers between two distinct integers.

Items 13 and 14 were marked correct if students met all three requirements: 1) correct identification of the solution, 2) correct drawing of the graph using an appropriate dashed or solid line, and 3) correct shading above or below the line. The final two questions, both word problems, were marked correct if students identified either the correct answer or a setup that would lead to the correct answer. Items were scored incorrect if students set the problem up as an equation rather than an inequality or used the comparison symbol incorrectly (it faced the wrong direction). On Item 15, if students set up the problem correctly but forgot to multiply by 24, the number of months for the rental, the problem was still counted correct. On both Items 15 and 16, if students failed to place a decimal point in the correct place when writing cents but otherwise set up the problems correctly, their answers were marked correct. Less emphasis was placed on the actual solution than on students' demonstrations that they understood the concept of inequalities and how to set them up.

Results

The participants' level of understanding of the terms more and less ranged from a score of 1 (big/small) to 5 (quantified). Only four students (students A, G, J, and K) demonstrated the highest level of understanding of both terms. The mean score for Item 1 was 2.63 (SD = 1.40). The mean score for Item 2 was 2.6 (SD = 1.43).

Seven students missed Item 3. Four students (C, P, Y and CC) drew a solid rather than an open circle on the line graph, while three students (J, L, and BB) shaded the wrong direction. Seven students also missed Item 4. Three students (C, Y, CC) used closed, rather than open circles, two students (L and W) shaded the wrong direction, one student (P) made both errors, and student K made a computational error that led to a wrong answer. On Item 5, students C and P failed to draw open circles on the number line to represent excluded values. Student E shaded the wrong direction, while student F made a computational error and students Y and CC made computational errors in addition to using closed rather than open circles.

Item 6 was answered incorrectly by four of the 30 students. Student Q solved the inequality problem as an equation and wrote "$x = 1¼$" in the answer box. Students T and DD understood the concept as demonstrated by their work, but missed the question when they attempted to convert the fraction to a decimal. Student T wrote "$x > .8$" and student DD wrote "$< x$". Student U also missed the question due to conversion errors and the sign direction ("$x < 1.22$"). Item 7 was answered correctly by all students. Item 8 was missed by three students (D, Q, BB) whose signs were all facing the wrong direction. Item 9 was missed by all students. Answers ranged from no response, restating the problem, to various incorrect attempts. Some students did write "$x \leq 0$." All students answered Item 10 correctly.

Five of the 30 students answered Item 11 incorrectly. Student A found a positive answer rather than a negative when dividing each side of the inequality by -5. This led to incorrect shading on the number line. Student C drew an open rather than a closed circle over the -2 on the number line. Student E failed to switch the sign when dividing by a negative which resulted in shading incorrect values. While student L remembered to switch the direction of the sign when dividing by a negative, he or she still shaded the wrong direction and divided 10 by -5 incorrectly arriving at the answer of positive, rather than negative, 2. Student O found the correct answer in the workspace, but went on to shade the wrong direction on the number line.

Nineteen out of 30 students incorrectly graphed Item 13. Students A and G failed to shade on the graph to represent a complete solution set. Four students (B, D, P, and Z) drew a solid rather than a dashed line on the graph to represent excluded values. Four students, I, T, W, and X, combined the two mistakes and neither shaded nor drew a dashed line. Four students (L, N, R, and CC) simply drew the wrong graph, while students E, F, S, and AA each failed to switch the sign when dividing by a negative and, therefore, shaded on the wrong side of the line on their graphs. One student (BB) did not seem to understand how to graph the inequality at all. The student drew an open circle on the x-axis at the value 3 and then shaded all values on that line that were less than 3. The student drew a second open circle at the value of -2 on the y-axis and shaded all values on the line

greater than -2. The student's solution based on his or her written work in the workspace was "$y > -2$". On Item 14, six students (A, B, G, I, T, and W) failed to shade any included values on the Cartesian graph. Student W also drew a dashed rather than a solid line to represent included values. Students Z and CC incorrectly graphed the line, while students J and N incorrectly shaded their graphs despite finding the correct answers in the workspace. Student BB also found the right answer in the workspace, but drew an incorrect graph. The student placed an open circle over the value of 1 on the x-axis and drew a ray upwards with a slope of -1. An open circle was also drawn on -1 of the y-axis and served as the endpoint of a ray drawn upwards with a slope of 2. No shading was used.

Thirteen students answered Item 15 correctly. Those who missed the problem wrote their solution as an equation rather than an inequality (students G, K, N, X, Z, and CC) or wrote the comparison symbol facing the wrong direction (students J and L). Some students (P, Q, S, T) who missed Item 15 partially set up the problem by writing the equations to determine the costs of each of the rental cars, but failed to connect the two arguments using any type of relational symbol. Students A, F, and O wrote and circled seemingly random numbers as their answers showed little or no work indicating how they arrived at their answers. No final answer was provided either. Student Y added a variable as a third argument to the inequality set-up, while student BB provided no answer at all. Similar answers were given for Item 16. Fourteen students answered Item 16 correctly. Three students (G, N, and Z) set up their solution as an equation rather than as an inequality while 3 students' (I, L, and AA) comparison symbol faced the wrong direction. Students A and F wrote and circled seemingly random answers unsupported by written work. As in Item 15, students P, Q, S, and T, as well as student Z, partially set up the problem without the use of any relational symbols to connect the two parts of the problem, and student Y added a variable as a third argument in the inequality. Student BB provided no answer and student CC's answer was unclear due to handwriting.

Discussion

The 30 students in this study tended to struggle most with representing inequalities as graphical representations. While they might have been able to find the correct solution set in the workspace provided through algebraic manipulations, translating their solution to a Cartesian or line graph proved to be more difficult for them. Common mistakes on the line graphs revolved around students' tendencies to draw a closed circle over a number that was not included in the solution set as indicated by a greater than or less than symbol as opposed to a greater than or equal to or less than or equal to symbol. Similarly, students' most common mistakes when using Cartesian graphs were drawing a solid line rather than a dashed line to represent excluded values. In this instance, students appeared to be treating the graphing of inequalities much like they would the graphing of equations. Students also struggled with knowing which side or direction to shade on both Cartesian and line graphs. This suggests an uncertainty about the meaning of the relational symbols used in inequalities.

The students also demonstrated struggles in interpreting inequality solutions correctly. On Item 9, most students wrote that x was represented by a set of numbers using an inequality sign rather than as the correct, single value. This suggests that students have misconceptions about what the solution to an inequality represents and possess an intuitive belief that solutions to inequalities must also be inequalities.

Students' treatment of inequalities as equations was generally restricted to many students' failure to recognize the rules for solving inequalities that differ from those for solving equations. Several did not recognize how to deal with negative numbers when solving inequalities. These rules and the necessity of them should be emphasized to students to help develop their understandings of the process and the concept.

The students' scores on the first two test Items, defining the terms more and less were expected. However, the poor correlation between students' level of understanding of the terms and students' abilities to work with inequalities was not expected

(the correlation between student scores on Item 1 and number of questions answered correctly was 0.01, while the correlation between student scores on Item 2 and number of questions answered correctly was -0.01). Although, the relationship between level of understanding of the terminology and correct responses was not high, it was interesting to read students' interpretations of the terms. Teachers should encourage students to have a wide understanding of the terms rather than allowing them to be limited to understandings like "to add" or "to subtract."

Teachers should focus on emphasizing the difference between inequalities and equations and what inequalities mean. Demonstrating the reasoning behind reversing the relational signs when dividing by negative numbers might help students understand why it is critical to finding a correct solution. Furthermore, providing students with many opportunities to work with various representations of inequalities may help students see the connection between them as well as be able to use them correctly. Many of the mistakes the students made, especially on the graphical representations, could have been avoided by checking answers and substituting in values. However, none of the students indicated on the test any attempt to check their solutions. Reflection on their answers may have helped students recognize their common misconceptions and correct them.

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Appendix

Understanding Inequalities

Grade:_____ Age:_____ [Male] [Female] *(circle)*

Ethnicity: [White] [Black] [Asian] [Hispanic] [Other] *(circle)*

(1) Define the word "more" as it is used in mathematics. You can include examples.

(2) Define the word "less" as it is used in mathematics. You can include examples.

Solve the following problems. Use the number lines to show your solutions:

(3) $5 > x$

(4) $x + 3 < 10$

(5) $2 - 3 < x + 5$

Solve for x. Show your work! Write your final answers in the boxes.

(6) $8 < 4x + 3$

(7) $2x \geq 5x - 3$

(8) $3 - 4x \leq 6x - 7$

(9) $5x^4 \leq 0$

(10) $5x - 10 \geq 0$

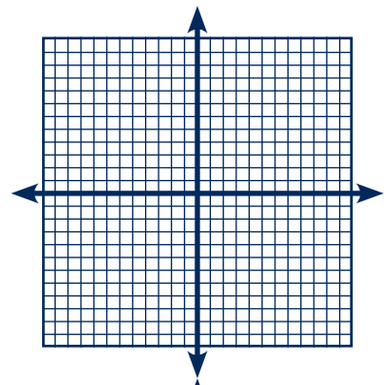
Find and represent the solutions for x on the number lines:

(11) $-5x - 7 \leq 3$

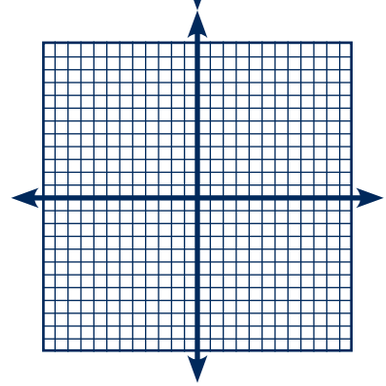
(12) $(x+3)^2 < 16$

Graph the solution for the inequalities below:

(13) $2x - 3y < 6$



(14) $y - 2x \leq 1$.



Write an equation to solve the following word problems:

(15) Horatio has decided that instead of purchasing a car, he wants to lease one. He is considering two cars. Horatio can lease a Mazda for two years for $300 per month with no additional charge for mileage. He can lease a Toyota for the same period of time for $200 per month, but there is a mileage charge of 20 cents per mile. What is the minimum number of miles that Horatio would have to drive during the two years in order for the Mazda to be the best choice?

(16)You can rent a 15-foot moving truck from I-Haul rental for $100 per day plus 10 cents per mile or you can rent a comparable truck from Spyder rental for $75 per day plus 20 cents per mile. What is the minimum number of miles would you have to drive the truck during one moving day for it to be cheaper to rent from the I-Haul?

AWARDS

2010 President's Grant Award

Sixteen $600.00 President's Grants were awarded this past summer by TCTM. We would like to extend our congratulations to each of the following recipients. All recipients volunteered two hours of their time at CAMT and attended the annual TCTM reception as guests of TCTM. If you have been teaching for five or more years, look for the President's Grant application online. The President's Grant is intended to encourage experienced teachers to attend CAMT by helping cover part of the expenses associated with attending the annual conference.

Alicia Tibbs
Hempstead ISD,
Grade K-2 ESC 4

Catherine Smith
Plano ISD,
Grade K-2 ESC 10

Karol Stutes
Hempstead ISD,
Grade K-2 ESC 4

Barbie Avila
Ysleta ISD,
Grade K-2 ESC 19

Maria Mathilde Guerrero
Galena Park ISD,
Grade 3-5 ESC 4

Joelle Garcia
Plano ISD,
Grade 3-5 ESC 10

Rhonda Davis
Pearland ISD,
Grade 3-5 ESC 4

Cherry Morris
Anahuac ISD,
Grade 3-5 ESC 4

Evelyn Martinez
El Paso ISD,
Grade 6-8 ESC 19

Francisca Enih
Houston ISD,
Grade 6-8 ESC 4

Sarah Landry
Allen ISD,
Grade 6-8 ECC 10

Christy Reves
West Orange Cove CISD,
Grade 6-8 ESC 5

Zuleika Piratello
El Paso ISD,
Grade 9-12 ESC 19

Tannisha Gentry
Houston ISD,
Grade 9-12 ESC 4

David Gonzalez
El Paso ISD,
Grade 9-12 ESC 19

Sukhbir Singh
Corpus Christi ISD,
Grade 9-12 ESC 2

AWARDS

2010 Mathematics Specialist Scholarship Award

Seven Texas students were awarded the $2000 TCTM Mathematics Specialist Scholarship for 2010-11. We would like to extend our congratulations to each of the following recipients. Each scholarship awardee attend a Texas college or university - public or private - and works as a student teacher in order to pursue teacher certification at the elementary, middle or secondary level with a specilization or teaching field in mathematics.

Meghana Aleti
University of Texas at El Paso
ESC 19

Kathryn Ewing
Baylor University
ESC 11

Kim Anh Hoang
University of Houston
ESC 4

Anna Williams
Texas A&M University
ESC 5

Danielle Brager
University of Houston
ESC 4

Vienna May Galgana
University of Houston-Clear Lake
ESC 4

Maria Martinez
University of Houston
ESC 4

AWARDS

2010 TCTM CAMTership Awards

Sixteen $600.00 CAMTerships were awarded this past summer by TCTM. We would like to extend our congratulations to each of the following recipients. All recipients volunteered two hours of their time at CAMT and attended the annual TCTM reception as guests of TCTM. If you have been teaching for five or fewer years, look for the CAMTership application online. The CAMTership is intended to encourage beginning teachers to attend CAMT by helping cover part of the expenses associated with attending the annual conference.

Elizabeth Reece
Edgewood ISD,
Grade 9-11 ESC 20

Ela'n Wilson
Alvin ISD,
Grade 8-10 ESC 4

Christine Castellano
El Paso ISD,
Grade 9-12 ESC 19

Sheri Montgomery
Round Rock ISD,
Grade 9-12 ESC 13

Donna Haley
Newton ISD,
Grade K-2 ESC 5

Krystle Musick
Pearland ISD ,
Grade K-2 ESC 5

Adriann Vasquez
Socorro ISD,
Grade K-2 ESC 19

Paige Reeves
Little Cypress Mauriceville CISD,
Grade K-2 ESC 5

Lana Longworth
East Central ISD,
Grade 3-5 ESC 20

Sandra Aparicio-Salehi
Pearland ISD,
Grade 3-5 ESC 4

Laurinda White
Hardin-Jefferson ISD,
Grade 3-5 ESC 5

Rubianna Garza
Pearland ISD,
Grade 3-5 ESC 4

Claudia Alfred-Long
Crosby ISD,
Grade 6-8 ESC 4

Breena Jackson
Pearland ISD,
Grade 6-8 ESC 4

Naroda Knox
El Paso ISD,
Grade 6-8 ESC 19

Dorothy Bailey
Port Neches-Groves ISD,
Grade 6-8 ESC 5

2010 TCTM Award Recipients

Leadership and Achievement Awards

Each year since 1995, TCTM has accepted nominations for two awards for leaders in our professional community. The TCTM Leadership Award is presented to a TCTM member who is nominated by a TCTM affiliate. The second award, the E. Glenadine Gibb Achievement Award, is presented to someone nominated by a TCTM member. The following individuals have been honored and we wish to acknowledge their former and ongoing contributions this year in the leader spotlight. **If you wish to nominate someone for 2010, please see the forms on our website**.

Our prior awardees are:

Year	Leadership(local/state)	Gibb (state/national)
1995	Mary Alice Hatchett	Iris Carl
1996	Betty Forte	Cathy Seeley
1997	Diane McGowan	Pam Chandler
1998	----	----
1999	Linda Shaub	Eva Gates
2000	Lloy Lizcano	Bill Hopkins
2001	Susan Hull	Pam Alexander
2002	Janie Schielack	Judy Kelley
2003	Bonnie McNemar	Dinah Chancellor
2004	Dixie Ross	Jacqueline Weilmuenster
2005	Barbara "Basia" Hall	Barrie Madison
2006	Nancy Trapp	Lois Gordon Moseley
2007	Kathy Hale	Cynthia L. Schneider
2008	Jim Wohlgeheagen	Juanita Copley
2009	Jane Silvey	Jo Ann Wheeler

AWARDS

2010 TCTM Leadership Award

Elaine Young, Ph.D.

The Texas Council of Teachers of Mathematics (TCTM) is proud to announce that it has chosen to honor **Elaine Young, Ph.D.**, of Texas A&M University, with its annual TCTM Leadership Award. The TCTM Leadership Award recognizes outstanding service at the local and/or state level in the field of mathematics education.

Dr. Elaine Young is an Associate Professor of Mathematics at Texas A&M University-Corpus Christi. She has served as an advisor to the NCTM student affiliate as well as president of the Coastal Council of Teachers of Mathematics regional group. She has served as co-chair of the annual ME by the Sea mathematics education conference. She teaches mathematics content courses for future teachers. Her research interests include the role of emotion in problem solving and the learning and teaching of mathematics of preservice teachers.

AWARDS

2010 E. Glenadine Gibb Achievement Award

Paula Steffen Moeller, Ed.D.

The Texas Council of Teachers of Mathematics (TCTM) is proud to announce that it has chosen to honor **Paula Steffen Moeller, Ed.D.**, of the University Texas System, with its annual E. Glenadine Gibb Award. The E. Glenadine Gibb Award recognizes outstanding service at the state and/or national level in the field of mathematics education.

Paula Steffen Moeller, Ed.D., is the director of College Readiness Initiatives at the University of Texas System. Previously she managed the professional development and systemic intervention team for Texas Instruments for the United States and Canada. While there, she designed a systemic change model to eliminate the achievement gap in middle school mathematics.

She served as the director of mathematics for the Texas Education Agency where she was involved in TEKS refinement/alignment, development of TAKS, and was a member of the design team that developed projects for the Governor's Math Initiative. Paula has served as the secretary for the Texas Council of Teachers of Mathematics, 1st and 2nd Vice President for the Association of State Supervisors of Mathematics, and chaired several conference committees with the National Council of Teachers of Mathematics. She is the Conference Chair for the Conference for the Advancement of Mathematics Teaching, a conference that serves 7,000 teachers annually. During her career, she has worked in both rural and urban school settings and has provided staff development and leadership in mathematics to teachers serving approximately 4 million students in Texas. She has been an invited panelist and has served as a principal and co-principal investigator for several National Science Foundation teacher enhancement programs.

FEATURE

PAEMST

Presidential Awards for Excellence in Mathematics and Science Teaching

The 2010 PAEMST awards recognized outstanding grade K – 6 science and mathematics teachers whose innovative methods bring teaching to life in the classroom. In 2011, the PAEMST program will recognize outstanding mathematics teachers in grades 7 – 12.

The Texas finalists in elementary mathematics are Elizabeth Hudgins of Eanes ISD, Lorene Wallace of Austin ISD, and Stephanie Weaver of Pearland ISD. Elizabeth is a 5th grade teacher at Eanes Elementary School in Eanes ISD and has 8 years of teaching experience. Lorene is a 1st grade teacher at Bryker Woods Elementary School in Austin ISD and has 6 years of teaching experience. Stephanie Weaver is a 3rd grade teacher at Shadycrest Elementary School in Pearland ISD and has 14 years of teaching experience.

A state panel of master teachers, specialists, and administrators reviewed the applications and chose the outstanding mathematics teachers for the National Science Foundation to consider for state finalist status. After an initial selection process at the state level, a national panel of distinguished scientists, mathematicians, and educators recommends a finalist to receive the national award. If chosen as a national winner, the state finalist will receive $10,000 and an all expense paid trip for two to Washington D.C. for ceremonies that include recognition from the president of the United States at the Capitol.

Currently, outstanding certified mathematics and science teachers in grades 7 – 12, with five years or more of teaching experience, are eligible to apply. If you would like to nominate an outstanding mathematics or science teacher, nomination forms and applications are available at *<http://www.paemst.org>*. Nominations are due by April 1, 2011, and applications are due by May 2, 2011.

Lindsey Perry • Curriculum Division
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APPLICATIONS

2011-12 TCTM Mathematics Scholarships

There are ten $2000 scholarships available for 2011-12. Any student attending a Texas college or university - public or private - and who plans on student teaching during the 2010-11 school year in order to pursue teacher certification at the elementary, middle or secondary level with a specialization or teaching field in mathematics is eligible to apply. A GPA of 3.0 overall and 3.25 in all courses that apply to the degree (or certification) is required. Look for the scholarship application online at *<www.tctmonline.net>*. The application must be postmarked by May 1, 2011.

2011 President's Grant to CAMT

There are sixteen $600 President's Grants available for 2011. The President's Grant is intended to support mathematics educators with a district or campus affiliation with more than five years of teaching experience in Texas to attend CAMT. The $600 grant is intended to defray part of the costs to attend the state conference. If you plan to attend CAMT, have more than five years teaching experience in Texas and are currently affiliated with a campus or district, look for the application online at *<www.tctmonline.net>*. The application must have been postmarked by March 15, 2011. Those selected will be required to volunteer two hours at CAMT and attend the TCTM reception to receive their check. Look online after April 1, to see who was selected.

2011 CAMTerships

There are sixteen $600 CAMTerships available for 2011. The CAMTership is intended to encourage beginning teachers to attend CAMT by helping cover part of the expenses associated with attending the annual state conference. If you have been teaching five or fewer years in Texas and are attending CAMT, look for the CAMTership application online at *<www.tctmonline.net>*. The application must have been postmarked by March 15, 2011. Those selected will be required to volunteer two hours at CAMT and attend the TCTM reception to receive their check. Look online after April 1, to see who was selected.

NCTM Membership

What's an easy way to support TCTM?

Join NCTM or renew your NCTM membership!

Sign up for your NCTM membership and use the link on the web form to indicate TCTM as the affiliate you wish to receive a rebate! Go to *<www.nctm.org>*.

TCTM will receive $5.00 if you are joining NCTM as a new member, and $3.00 if you are renewing. In the past, the state affiliate only received the rebate if the NCTM membership flowed through the state treasurer. Now you can sign up directly with NCTM and give back to your state affiliate. However, you may only choose one state affiliate for the rebate (it will not be split).

Please remember, you cannot join your local affiliates from the NCTM website. You must join the local affiliates directly by the process they have established. You may join TCTM by either attending the CAMT conference as a paid participant, or by using our membership form found online at *<www.tctmonline.net>*.

Voices from the Classroom

Teaching Secrets: Don't Cripple With Compassion

Late last month, my teaching colleagues and I got to participate in the National Council of Teachers of Mathematics' national conference here in San Diego. We moved one of our teacher workdays so teachers could attend because our principal did the math (so to speak) and found that it was cheaper to send the entire staff on a professional development day than it was to send the six teachers who asked to go and hire subs for the two days they'd be gone. Pretty smart.

We are working on creating a constructivist math program at our school, and our philosophy is that everyone, not just the math teachers, has a perspective that will help us revamp our program. So, even though I am an English teacher, I went along and looked forward to learning.

I attended many great sessions and came away with ideas for my own content area as well as math. I was most excited by NCTM's process standards that outline the critical thinking required to make meaning of math instead of mimicry as is too often the case.

In a session on the process standards, though, the presenter made a statement that rocked me to my core and absolutely resonated with me: One of the major issues with American teachers especially is our predilection to rescue kids instead of letting them struggle with the content a bit. In essence, we're too compassionate.

Think about it. How often do we see a kid with a cramped look on his face and rush in to show him how to do something? What about when they whine and say it's too haaaaaard?

I get how difficult it is to step back and let them struggle, but I also know that it's in the disequilibrium that kids have to make sense of things and that's when the learning happens. If we do it for them, why would they be persistent with a problem or give it more than 30 seconds? And how can they become confident, self-directed learners if we don't ever let them have that experience? Finally, why would they ever believe that they are able to figure it out if we show them by our actions that we don't believe they can, either?

I'm not talking about failing to scaffold instruction or give kids input. Of course we want to do that. What I'm talking about is resisting the urge to fix things for them instead of asking more questions to get them thinking. I'm talking about sometimes just telling them, "I know you can do this," and walking away.

For example, I recently passed out four interrelated epitaphs from Spoon River Anthology by Edgar Lee Masters and told the groups to try to piece together the story and figure out the big scandal, using evidence to support their thinking. The scandal is never explicitly stated, but there's enough evidence in the text to figure it out. Beyond that, there are a number of conclusions that students could make a case for, so there was more than one right answer.

Groups read each epitaph and discussed it for maybe a minute before they started whining. "I don't get it!" "What's the answer? We can't figure it out." I just shrugged my shoulders and said, "I don't have any clue," then told them I knew they could solve the mystery. After realizing I really was going to make them suck it up and keep working at it, they returned to the text and started trying to puzzle through it.
I circulated among the groups and listened. When I did speak, it was usually to ask a question to help kids dig deeper into their own thinking. It took some time, but in each group the light bulb would click on, and the kids would get excited because they were coming up with something plausible.

Groups shared their conclusions with each other at the end of it and debated the merits of each group's result. And my whiny kids? To a person, they all said, "Hey, can we do more stuff like this? This was cool!" They did something hard and prevailed; I think that's pretty cool myself.

One of my early mentors gave me great advice that speaks to the issue of crippling kids with compassion. She told me, "Don't do anything for the kids that they can do themselves, and if they can't do it themselves, teach them the tools they need so they can." Wise words.

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This article originally appeared on *TeacherMagazine.org* as part of a publishing partnership with the Teacher Leaders Network. Reprinted with permission of the author.

Improving Elementary School Students' Multiplication Skills through Small Group Intervention and Recursive Review

Many students struggle with foundational mathematics concepts, especially multiplication and basic facts. As such, teaching strategies are constantly being developed, tested, and modified to help struggling mathematics students. Many teachers grapple with these methods in an effort to find teaching strategies that will help students to better understand multiplication, as this skill is foundational to many others. As educators and inquirers in our classrooms, we are constantly investigating such ideas, seeking to implement effective methods that help students develop proficient mathematical skills such as single digit multiplication. Further, as elementary school teachers, we seek new ideas that will help us to ensure that our students not only learn their multiplication facts, but also are able to apply them in classroom work as well as in their everyday lives.

The purpose of this informal inquiry project was to research and determine the effectiveness of two popular teaching methods, small group instruction and recursive review. Specifically, we sought to determine if these methods were effective for students learning multiplication, if using these teaching methods would increase student achievement in this area, and in what ways such improvement might culminate.

Our Process of Inquiry

Initially, we gave a ten minute pre-test in each of our two classrooms to gain a baseline measure for student understanding in multiplication. The pre-test consisted of a multiplication chart with mixed up, one digit factors (see appendix A). Thereafter, small group instruction was used in one classroom while small group recursive review was systematically used in the other in an effort to increase students' multiplication skills. The initial test was used again to measure student understanding after the interventions, and results from each setting were compared. Below, we report on each teaching method and discuss our overall findings from the inquiry project.

Small Group Instruction

The small group sessions included six randomly chosen, nine-year old, fourth-grade students in a small rural town outside of San Antonio, Texas. Based on class grades, these students were low to average performers in mathematics. Thus, the students had some prior knowledge about multiplication; however, the pre-test showed that the students were not fully proficient in this area. Further, the teacher observed in classroom instruction that each of these students consistently had difficulties with multiplication. Three of the participants (Group A), two White females and one African-American male, received the small group interventions and the other three participants (Group B), one Hispanic female and two White females, did not.

The students in Group A received four weeks (two days per week) of small group intervention. During the first week of small group instruction, students were given a multiplication songs book. The songs are intended to help students memorize the multiples of each factor through connecting multiples to familiar songs. Multiples of 2, for example, are sung to the tune of "Twinkle, Twinkle, Little Star," multiples of 6 correlate to the tune of "Jingle Bells," and multiples of 7 are sung to the tune of "Happy Birthday." The teacher and students sang the songs together until the students were able to sing independently. Next, students rolled two dice to make a multiplication fact, allowing them to think about these facts (up to 6 x 6) at random. When a student rolled the die, the resulting fact was solved by the other participants in the group. Counters and whiteboards were available to the students to help them solve such problems. Towards the end of the session, students were encouraged to verbalize their own, creative multiplication word problem to the

other members of the group, who would in turn solve the problem.

The second week of small group instruction involved a multiplication problem solving board game. The goal of the game is to reach the end of the trail by correctly solving multiplication problems. The game was played throughout 25 minute periods, with each correct solution earning the student a certain amount of spaces of advancement. The sessions ended with selected songs from the multiplication songs book.

During the third week of small group instruction, students were shown various multiplication flash cards to check for recall. Students were advised to write their answers on their white board and present to the group when they were finished, and students were given the opportunity to discuss the strategies they used. After the flash card activity, students were given problem solving wipe off sheets, each of which had various multiplication word problems. The teacher and students read the problem, identified the question for each problem, underlined key words, and circled important numbers. Students then worked independently to identify the solutions to each problem. The last few minutes of the second session of the week were concluded with songs from the multiplication songs book.

The final week of small group instruction involved the use of sets of 12 tiles with the numbers 1 through 12 on one side and an abstract image on the other. The numbered tiles are placed on a base labeled with the letters A through L, with each letter representing an answer choice. Students place the numbered tile on the correct answer choice then flip the tiles to reveal a picture. If the picture matches the picture in the book, then all choices are correct. During the last ten minutes of the final session, students completed the post-test.

Recursive Review

Participants in the recursive review intervention consisted of 6 ten- and eleven-year old, randomly-chosen fifth-grade students in a general education classroom. All participating students passed the Texas Assessment of Knowledge and Skills test (TAKS) in their fourth-grade year, but were identified as low performing in mathematics. Three of the participants (Group C), two Hispanic males and one African-American female, received recursive review interventions. The other three participants (Group D), one Hispanic female, one Hispanic male, and one White male, did not.

Students in Group C were taught multiplication fact strategies in a small group (8 sessions total) using a spiraling process called recursive review wherein the focus is to build skills that have been acquired previously. Specifically, recursive review for multiplication exposes students to a variety of ways to do and understand multiplication. Through these methods, the students are exposed to a number of ways to all reinforce the same concept. These methods include, but are not limited to, the use of problem solving techniques, arrays, graphics, and symbols to solve multiplication problems.

Additionally, each day students in Group C were given a different mathematics action wall skills sheet for 30 minutes (see appendix B). Thereafter, the teacher reviewed the worksheet with the students in a small group setting utilizing recursive review techniques. Each mathematics action wall reviewed the same concept, multiplication, but each day it had a different set of mathematics problems.

Results

In order to determine the effectiveness of these methods, we analyzed the results of the post-test (the post-test was identical to the pre-test) given on the last day of each intervention. Results from the post-test are summarized in Figures 1 and 2. These data indicate that both types of intervention were effective for students who received the small group time in comparison to their peers that did not. The results further indicated that the small group interventions that focused on recursive review appeared by inspection to increase overall academic performance in multiplication skills. Moreover, during detailed observations, we saw that students in the treatment group all

showed greater confidence when performing multiplication tasks. Based on these data, we concluded that the small group interventions appeared to be effective, and that mathematics scores and overall academic performance may be improved using a daily recursive review.

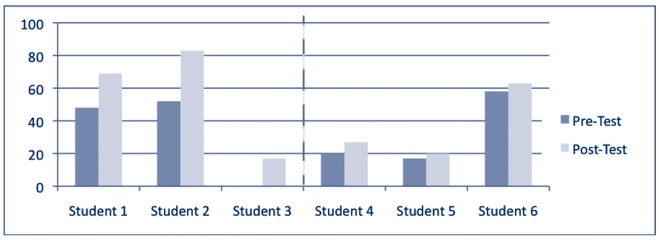

Figure 1

Pre/Post Test Results of Small Group Interventions: Treatment Group (Group A: Students 1-3) and Control Group (Group B: Students 4-6)

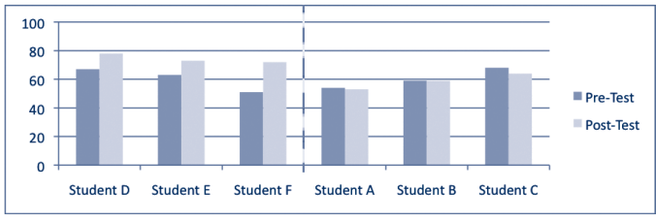

Figure 2

Pre/Post Test Results of Recursive Review Interventions: Treatment Group (Group C: Students D-F) and Control Group (Group D: Students A-C)

Discussion

The results from the study indicate that focused small group instruction appear to improve multiplication abilities of elementary school students. The differences in scores between the students who received each intervention (see Students 1-3 and D-F in Figures 1 and 2), however, are not significantly different, by inspection. Therefore, it is difficult to say which method is better.

Before the study was conducted, these students were struggling with the basic concept of multiplication. After being given the daily review and small group instruction, they were not only able to multiply but able to use multiplication skills in a variety of different scenarios. They could answer word problems that had been confusing to them before, and that they had been having extreme difficulty solving. They could glance at arrays and write out the problems based on the table.

We believe that the one-on-one attention received during each session greatly benefitted students in other significant ways. As a result of small group interventions, in fact, students were able to respond to multiplication facts with faster automaticity and recall. This was proven through several activities that were done during the small group sessions. Students became quicker in recalling basic multiplication facts, were able to easily create multiplication word problems, and were able to understand situations in which multiplication was the necessary operation. Overall, students appeared to have a clearer understanding of the concept of multiplying, and the students were able to apply multiples in real world situations, appearing to make much deeper connections.

Implications

Though we do acknowledge that our study has many scope and time limitations, we believe that the results are important. For example, we saw indications that the use of traditional multiplication charts may not reinforce multiplication, but rather pattern building. Students are conditioned to follow such charts in a numerical order, resulting in reliance on patterns rather than understanding and automaticity. The pre- and post-test demonstrate this, showing that students were inclined to follow the pattern typically seen on traditional multiplication charts, rather than finding multiples of factors that are mixed up on a chart. For example, Student 4 had a tendency to find the multiples according to the factor shown on each column, looking at a factor of 8, for example, and vertically writing the multiples of 8 without considering the corresponding row. In reality, the multiples should have been 24, 40, 16, 72, and 64 (rather than 8, 16, 24, etc.).

Our results also imply that small group instruction and small group recursive review are effective strategies for improving multiplication skills in elementary students. Post-test scores indicate positive growth among the experimental groups towards automatic recall of multiplication facts. We also acknowledge that knowledge assessment of multiplication facts needs to be considered in investigating these methods, as multiplication charts may not be an effective tool for assessing the students' knowledge of the concept of multiplication. We did find, however, that student performance on the multiplication chart activity correlated with demonstrated understanding of the concept of multiplication.

Conclusions

Recent national policy documents endorse automaticity in facts as important overall mathematical competence in the K-12 education. According to this inquiry project, it is apparent that small group sessions in general may be effective for developing these skills among a variety of students. Further, the results are indicative of the progress made by students from two different schools and in two different grade levels. We also believe that our data imply that small group sessions may be effective for other content areas and other skills, and hope to investigate this assertion. Overall, the success of our study has helped us to modify teaching strategies during small group sessions to help students to continually progress through mathematics in a meaningful and successful way.

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Appendix A

Mixed Up Multiplication Chart

Directions: Complete the multiplication chart in any order.

x	3	5	2	9	8	6	1	4	0
3									
5									
2									
9									
8									
6									
1									
4									
0									

Appendix B

MATHEMATICS ACTION WALL

Recursive Review SET 1

Multiplication: Solve 2 digit by 2 digit problems

32
x 16

Use the arrays above to write and solve the multiplication problem.

Multiplication: Solve 2 digit by 3 digit problems

254
x 12

Problem Solving

Ms. Carrier has 12 students. She wants to give each student 5 stickers. How many stickers does she need to pass out?

show all work

NCTM 61st Delegate Assembly

April 23, 2010 — San Diego, California

At the Winter 2010 meeting of the TCTM Board of Directors, the Board asked TCTM's representatives at the Delegate Assembly to propose something related to Common Core State Standards (CCSS) for Mathematics. Even though Texas is not participating in the CCSS movement, TCTM's Board of Directors realized that the national tide will not leave Texas without impact. The Common Core standards will not only influence textbook and other instructional resources that are available for Texas classrooms, but they may also influence the Mathematics TEKS revision process that begins in January 2011.

Candy George, NCTM Representative for 2009-10 and Paul Gray, President for 2008-10, attended the Southern Regional Caucus to propose a resolution supporting NCTM as it worked to support teachers around the country as they implemented the new national mathematics standards.

Working with members of the Southern Regional Caucus, TCTM proposed the following resolution. The following shaded text comes directly from the NCTM website *<www.nctm.org/about/affiliates/content.aspx?id=26482>*.

Resolution:

Be it resolved that the Delegate Assembly recommends to the NCTM Board of Directors that: NCTM as the leading voice for mathematics teachers continues to advocate in the ongoing development, implementation, and assessment of the Common Core State Standards (CCSS) for Mathematics, and that NCTM increase the level of communication of their involvement in the process.

Rationale:

The adoption of the Common Core State Standards (CCSS) will have a significant impact on mathematics teaching and learning. It is important that classroom mathematics teachers have a voice in the conversations about development, implementation, and assessment since they are the professionals who possess the knowledge, by virtue of their teaching experience, of how these changes will impact children. The NCTM Board of Directors needs to know that they have the support of local and state Affiliates of NCTM as they, and their spokespeople, continue the important role of advocacy in this process. Local and state Affiliates would like to serve as partners in this effort in order to communicate NCTM's role in the development of these Common Core processes to educators, policymakers, and other stakeholders.

The next morning, at the NCTM Delegate Assembly, Paul presented this motion on behalf of the Southern Regional Caucus and TCTM. The Georgia CTM representative seconded the motion, and the Delegate Assembly adopted it as presented. TCTM leadership made a difference for NCTM and the NCTM Board of Directors!

During summer 2010, the NCTM Board of Directors responded to the resolution initiated by TCTM through the Southern Regional Caucus:

BOARD ACTION:
The Council and its leadership have been engaged with the writers and developers of the Common Core State Standards (CCSS) since the development of the first draft of the standards early in 2009. NCTM has kept all of its members informed of the process through several articles in NCTM Summing Up and the September 1, 2009, President's Message from then NCTM President Hank Kepner. A mailing to all NCTM Affiliates on September 15 included talking points on the Common Core Standards and a set of frequently asked questions for Affiliates to share with their leadership and membership. The lead article in the October 1 NCTM Summing Up invited all members to submit comments on the current draft of the standards. In March, a message from Kepner to all NCTM members summarized the status of the initiative and again invited members to review the standards and submit comments. Future work will continue to be reported in NCTM Summing Up as well as to NCTM Affiliates in AffiliateNews.

On two occasions, President Hank Kepner and a group of NCTM members met with the leaders of the initiative and writers of the standards. After the final public draft was released and the comment review period ended, Kepner continued to have extensive discussions with the lead writer of the mathematics standards. In February, the Board of Directors formed a Common Core Standards Response Group to plan next steps and develop an action plan for NCTM to implement on the release of the Common Core Standards.

The final Common Core State Standards, released on June 2, 2010, reflect many of the recommendations and comments of individual NCTM members and leadership. Current NCTM President Mike Shaughnessy sent all NCTM Affiliates a message on the day of the release. The message included links to the NCTM news release on the standards and a joint statement of NCTM, the Association of State Supervisors of Mathematics, the Association of Mathematics Teacher Educators, and the National Council of Supervisors of Mathematics. Since the CCSS release, NCTM and those three Affiliates have begun work on developing materials to support mathematics teachers, leaders, and state supervisors in meeting the implementation challenges presented by the CCSS. A group of NCTM authors is currently developing a new resource or publication that will connect the Common Core State Standards to NCTM's Principles and Standards for School Mathematics, Curriculum Focal Points, Focus in High School Mathematics: Reasoning and Sense Making, and the new Essential Understanding Series. Another NCTM group is developing outreach materials to support teachers and others involved in implementing the CCSS.

As implementation of the CCSS begins and assessments related to the CCSS are developed, the engagement of NCTM leadership with the groups developing CCSS-related assessments will be a significant focus of NCTM's upcoming activities.

Paul Gray, Ed.D. • *<pgray@sbcglobal.net>*
TCTM Past-President • *Houston, TX*

FEATURE

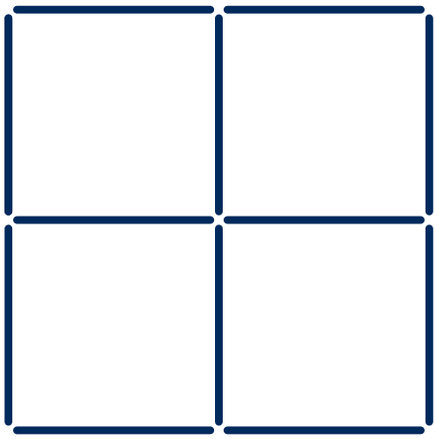
Puzzle Corner

Sticks #15 Puzzle

We are interested in how your students responded to this problem and how they explained or justified their reasoning. Please e-mail copies of your students' work, include your name, grade level, campus name and district name to Mary Alice Hatchett, Director of Publications, *Texas Mathematics Teacher*. Selected submissions will be acknowledged and published in subsequent issues.

Please prepare a sketch of your solution

Arrange 12 craft sticks to form the following figure.

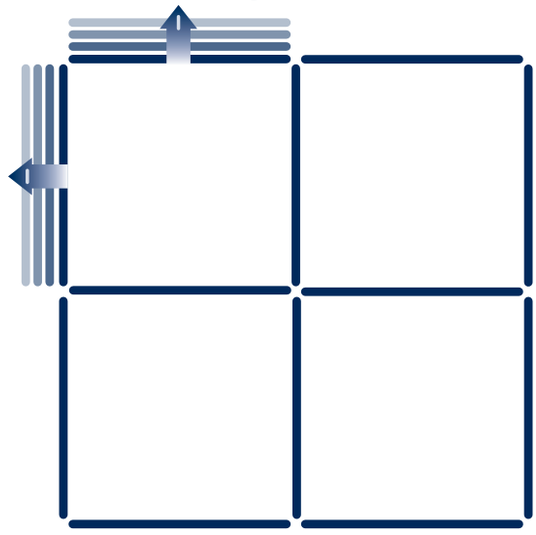


Puzzle: Remove one stick to leave three squares.

Sticks #14 Answer

Arrange 12 craft sticks to form the original figure. Remove two sticks to leave three squares.

Shown is a diagram of **a solution.**

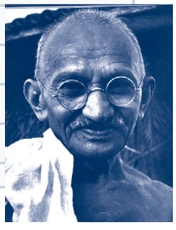


FEATURE

Quotes for Thought

> ***"Live as if you were to die tomorrow. Learn as if you were to live forever."***

- Mohandas Karamchand Gandhi



> ***"The real purpose of books is to trap the mind into doing its own thinking."***

- Christopher Morley, American journalist, novelist, essayist and poet

> ***"A master can tell you what he expects of you. A teacher, though, awakens your own expectations."***

- Patricia Neal, American actress

FEATURE

On the Cover

Find The Mathematics ... in a bridge

Bridges serve one basic purpose, to connect two points that are otherwise difficult to access. Generally it provides the connection between two points, facilitates mobility, and it symbolizes a change on a personal journey.

This iron truss bridge, located in Central Texas, is no longer used for travel but provides us with an opportunity to observe and discuss the mathematics used in its construction.

A truss bridge consists of an assembly of triangles and straight steel bars. The span of a bridge is its length – the distance between the two connecting points.

A glimpse of the mathematics observed on this bridge is:

- Along the left side of the bridge you can observe two straight bars that represent parallel lines .Between the bars are a series of equilateral triangles which create a situation in which angles are formed by intersecting lines (transversals). Name the measure of all the corresponding angles, alternate interior angles, alternate exterior angles, and supplementary angles. Can you locate other examples of transversals on this bridge? Where? What about similar figures? Why do you think the building engineer decided to use triangles as their basic structure?
- If the vertical support for the horizontal railing (along the right side of the picture) is three feet tall, use that scale to determine the length of the boards used for the road base. Would that be wide enough for two 1950 era cars?
- Notice the two solid beams on the right. Using the right most solid beam and the beam made of triangles; assume that those are legs of an equilateral triangle. Determine the height of the bridge. [Use 'x' feet or a value that would result in a reasonable height.]
- If each of the boards used for the road base are 6 inches wide, estimate the total span of the bridge.
- Why does the end of the span appear narrower than the front?

Here are a few websites that will provide additional ideas about the study of bridges.

NCTM Lesson on Bridges:
<www.nctm.org/resources/content.aspx?menu_id=598&id=12174>

Spaghetti Bridges:
<fcit.usf.edu/math/lessons/activities/spaghiT.htm>

Toothpick Bridge Building Lesson Plans:
<chapters.sme.org/061/Lesson.pdf>

PBS video: Bird Brains, Space Storms, Yoky Matsuoka, Smart Bridges
<video.pbs.org/video/1120052998/?starttime=2326000>

Have fun and let us know what you and your students discover.

Mary Alice Hatchett • <mahat@earthlink.net>
Independent K-12 Mathematics Consultant • Georgetown, TX

DEPARTMENT

TCTM Communications

Follow TCTM on Twitter!

Did you know that we now have an official Twitter account? Find out the latest about TCTM and other information just for Texas mathematics teachers!

Follow TCTM on Facebook!

Follow us at

www.facebook.com/l/a9a36;twitter.com/TCTM_Updates

Join the Facebook group "Texas Council of Teachers of Mathematics".

Snail Mail!

The journal is sent to the address you indicated on your membership form or the address that was used when you registered for CAMT. Please update your mailing address if it is not correct. If you have an e-mail address, please be sure it is on file and up-to-date with TCTM. If you do not have an e-mail address, please let us know. You may update your information with the membership chair Martha Godwin at *<mgodwin@qcisd.net>* .

CAMT Board Update

Did you know…

- TCTM is one of the three sponsoring organizations – along with the Texas Association of Supervisors of Mathematics and the Texas Section of the Mathematical Association of America – of CAMT?
- CAMT is one of the largest mathematics teachers' conferences in North America?
- TCTM is represented by three people on the CAMT Board of Directors: Nancy Trapp, Cynthia Schneider, and Paul Gray?

The CAMT Board of Directors meets three times annually: during the conference, in the late summer after the conference, and during the winter to plan and make decisions for the upcoming conference. At the August 2010 meeting of the CAMT Board of Directors, there were several important decisions that were made, and we would like to share that information with our fellow TCTM members.

First, I am pleased to announce that the CAMT Board of Directors approved contracts for CAMT 2014 and CAMT 2017 to be held in downtown Fort Worth! With about a quarter of the population in Texas – including 25% of the students in the entire state – living in the Dallas-Fort Worth metroplex, it is important to the CAMT Board of Directors to look for ways to better serve teachers who live in this area. CAMT continues to grow, and the Board of Directors continually looks for new venues that may better meet the needs of teachers who attend CAMT. We hope that the move to downtown Fort Worth will enable us to take advantage of the newly remodeled Fort Worth Convention Center, proximity to the Dallas-Fort Worth International Airport, and wonderful restaurants and entertainment that are available just a short trolley ride away from the conference hotels.

Second, the CAMT Board made an important decision to invest in the future of the conference by deciding to leave the overheads behind and use document cameras and LCD projectors in each of the presentation rooms, beginning with CAMT 2011. Technology has literally changed the layout of classrooms across the state, as teachers use interactive white boards, interactive slates, document cameras, and a myriad of digital projection devices to make learning more relevant and exciting for their students. To better help the teachers whom we serve move into this 21st century environment, the CAMT Board feels that it is important for teachers to be able to see firsthand the powerful instructional opportunities that technology can afford them.

Third, CAMT 2011 will be the first conference in recent memory with no Preconference sessions affiliated with the conference. Preconference sessions, offered by organizations such as the Charles A. Dana Center at the University of Texas at Austin or Region 4 Education Service Center in Houston, have provided teachers with the opportunity to spend time experiencing an in-depth study of particular topics and instructional resources. However, as times change, so do the needs of teachers and CAMT attendees. The CAMT Board decided that it would be more advantageous to more teachers to concentrate on providing connected strands of sessions during the conference to meet the needs of particular interest groups. Instead of a Preconference session, we will embed sessions focusing on particular areas of interest, such as administrators, technology, English language learners, and meeting the needs of students with special needs. Look in the program book for CAMT 2010 to see how you can identify those sessions and get the most out of your conference!

Finally, we would like to acknowledge the service of outgoing CAMT Board Chair Jacqueline Weilmuenster of Northwest ISD and CAMT Board Vice Chair Cindy Schneider of the Charles A. Dana Center. Jacqueline and Cindy's visionary leadership has helped CAMT to grow and better serve teachers from literally every corner of Texas – and increasingly, other states from coast to coast. Of course, CAMT would not be what it is without the tireless efforts and hard work of CAMT Executive Director Anita Hopkins and CAMT Conference Director Paula Moeller. We literally could not do CAMT without their countless hours of hard work.

At the August 2010 Board meeting, the CAMT Board of Directors chose two new leaders. I am very honored to have been selected to serve as the new CAMT Board President for 2011 and 2012 in addition to representing TCTM members on the CAMT Board of Directors. Joining me in leading the CAMT Board is the new CAMT Board Vice President James Epperson, of the University of Texas at Arlington, who also represents the Texas Section of the Mathematical Association of America on the CAMT Board. Both James and I welcome your suggestions and ideas to make CAMT 2011 and beyond better experiences for every mathematics teacher in Texas. Please do not hesitate to contact either one of us with your ideas!

Don't forget – visit the CAMT website, www.camtonline.org, for the latest and greatest information about CAMT 2011.

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Recommended Readings and Resources

Never Work Harder Than Your Students & Other Principles of Great Teaching

Author: Jackson, Robyn R. ISBN 978-1-4166-0757-1
Publisher: Alexandria, VA: Association for Supervision and Curriculum Development

Every now and then, you read a book that is simple and straightforward, yet causes you to rethink most – if not everything – that you know about teaching. Robyn Jackson's *Never Work Harder Than Your Students* is one of those books.

Jackson begins this book by outlining seven principles of the mindset of master teachers:

- Master teachers start where their students are.
- Master teachers know where their students are going.
- Master teachers expect to get their students to the goal.
- Master teachers support their students along the way.
- Master teachers use feedback to help them and their students get better.
- Master teachers focus on quality rather than quantity.
- Master teachers never work harder than their students.

These are seven principles that most of us know – the trick is in the getting there. Jackson provides us with some possibilities by illuminating each of these principles with stories of master teachers with whom she has worked that exemplify one of the principles. In doing so, she underscores the main idea of this book – that every teacher can become a master teacher. Being a master teacher isn't a gift that one has or one doesn't. It is a skill set that can be learned by anyone who chooses to rise to the task.

Each chapter in this book focuses on one of the seven principles of a master teacher mindset. The chapter begins with an exemplar of a master teacher who is demonstrating that principle. Jackson unpacks that story – and the underlying principle – using common-sense language to show how that principle really is important in the mindset of a master teacher. She follows that with some suggestions for ways that teachers can begin to change their mindset to think about how to enact the mastery principle. By alternating between teacher's stories and theoretical constructs, Jackson very powerfully uses the power of narrative to anchor a memory of the experience in our minds, then uses research-based strategies and ideas to ground that particular story.

Perhaps one of the more meaningful parts of the chapter is when Jackson considers several different arguments, in a "yes, but…" style to show how becoming a master teacher really is about a change in mindset from where one is to where one wants to be. Each chapter also concludes with practical suggestions for implementing the principle. Jackson presents a menu of choices that from which a teacher who wants to work on a particular principle can select, along with a rationale as to why that particular choice, or set of choices, might work.

For example, the first chapter brings to life the first principle – start where your students are. Jackson isn't talking about content knowledge; indeed, there are plenty of other books out there that emphasize the importance of honing in on what cognitive knowledge students bring with them to the classroom, and scaffolding from that knowledge to build what students need to learn in a particular grade level or course. Instead, she focuses on the different types of currencies that students bring to a particular classroom. These currencies are based on the values that they learn from home, previous classrooms, and a myriad of other social settings. A master teacher knows how to identify these currencies, and use them to her or his advantage.

One of my favorite parts of the book is when Jackson tells the story of her friend Cynthia, who has several students in her room during her planning period that are making up a test. One student in particular stubbornly refuses to finish the test. Rather than accept the student's failure by omission, Cynthia whispers a promise in the student's ear, and he eagerly gets to work. The promise? Cynthia told him that if he would finish his test, she would make him a peanut butter and jelly sandwich. True to her word, when the student finished the test, she got to work and made the sandwich with a smile. The student's tone and demeanor changed, and he proudly showed his new sandwich off to his friends.

The moral of the story here isn't that master teachers make sandwiches. Rather, Jackson uses this exemplar to show how important it is for teachers to identify things that their students value. In this case, Cynthia took advantage of her nurturing personality to demonstrate how much she really does care for her students – she prepared a meal. We may not all be nurturers and sandwich makers (heaven only knows that I would fail miserably in this task), but the meaning that Jackson extracts from this story is a call for all teachers to find those currencies that our students bring to our classrooms with them, and teach each student how to spend it wisely.

After reading this book, I was left with a sense that becoming a master teacher isn't an event, or even a certification from a state agency. It isn't a moment when you arrive and can add the line "master teacher" to your resume without turning back. Rather, becoming a master teacher is a journey that we can choose to take. And we can all choose to take that journey, regardless of how we came into teaching or how long we have been in the profession.

In *Never Work Harder Than Your Students*, Robyn Jackson provides us with a map for that journey. If becoming a master teacher is like taking a road trip, Jackson's book can serve as a travel guide of sorts, pointing out different teasers and attractions along the way. I once took a road trip with a close friend of mine, and we allowed plenty of extra time to get form one destination to the next so that we could explore those unexpected roadside attractions – what we affectionately began to call "World's Largest Balls of String." In Jackson's book, the principles are like the highways you might select along your journey. And the classroom vignettes are those "balls of string" along the side of the road – little jewels that make the journey that much more memorable. ■

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FEATURE

Voices from the Classroom

It All Started with a Story...

I was sharing an experience with a colleague where my students were struggling with the concept of converting units of area to square inches, square feet, and square yards. Using the tiles on the floor, the visual was just what they needed. With this experience in mind, our Geometry Team started discussing ways to use the tiles on the floor to teach the concept of area of composite figures.

The Planning:

Our first consideration was how to get the figures on the floor. We opted to use painter's tape. Our second consideration was about the type of figures we wanted to have the students discover and discuss. We started by choosing several figures that are composed of several objects put together (see Figure 1).

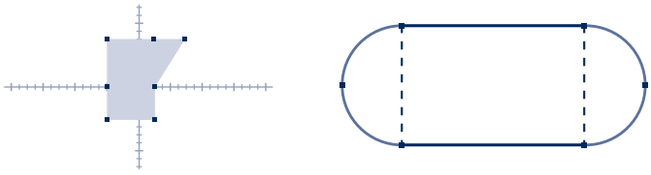


Figure 1

Then we discussed having shapes where they found the area of the un-shaded region (see Figure 2).

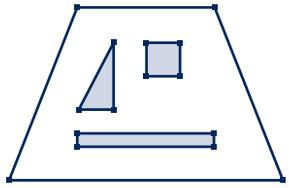


Figure 2

After determining the types of questions found most often on standardized testing materials, we wanted to develop shapes that led to discussion among the students. Our goal was to create figures that could be broken down into several different shapes (see Figures 3 and 4).

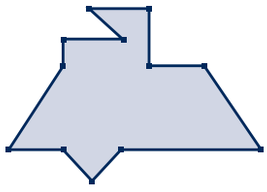


Figure 3

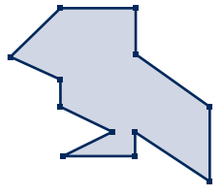
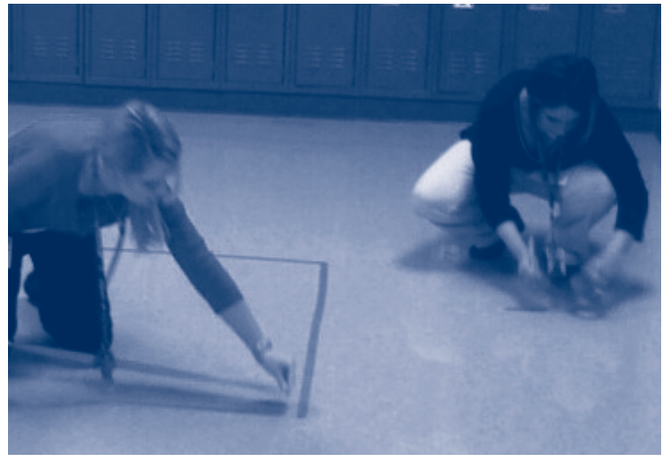


Figure 4

Our Geometry teachers had already decided that this activity was something we all wanted to include in our lesson plans, so we planned it on the same day and taped the figures in our hallways using the tiles as our guide. One teacher drew some shapes on grid paper, and the afternoon before our project we all went out to tape the shapes in the hallway. We had composite figures, easy area figures, an obtuse triangle where the height is measured outside the triangle and a couple where you have to find the area of the un-shaded portion. We used the tiles as a grid but also made sure we did not go through the diagonals of the tiles when placing the side of the triangle and trapezoids so that the students could discuss different ways to divide the shapes

Pearland High School teachers Rebekah Story, Shae Fontenot-Morris, and Marla Hartung create a composite figure on the hallway floor.



Pearland High School teachers Mistie Guerin and Leslie Jarvis lay out the boundaries for a composite figure.

The Activity:

The day of our activity, we had our students fold up two sheets of paper into fourths. They were instructed to draw the shape, divide the shape into smaller familiar shapes and find the area of each shape. They were to find the area of as many shapes as possible in the class period (we had taped and numbered about 15 shapes). Although we had assigned groups, the students started mingling and merging groups within their class and with other classes. I was

Voices from the Classroom

amazed at the discussions. Some looked at Figure 3 and asked each other questions like, "why did you divide that into two triangles and a rectangle (3a) when you could just make it a trapezoid (3b)?"

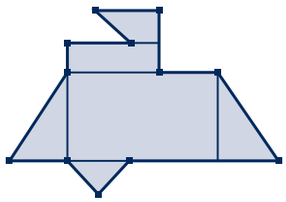


Figure 3a

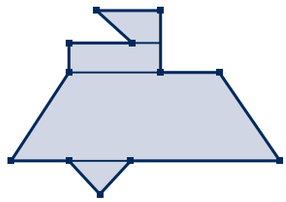


Figure 3b

The trapezoid problem (Figure 2) was taped on the floor such that the sides did not cross the diagonals of the tiles (the slope of the sides was 3/2). While students were discussing the method for finding the area one asked, "Could we just count the squares?" Another countered with, "How would you go about counting the sides?" A third student suggested, "Divide the trapezoid into a rectangle and two triangles because then you would have the base and height of the triangles." Another replied, "Is this one where we could put the two triangles together and make another rectangle?"

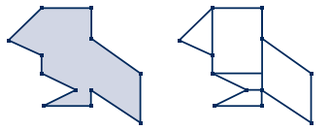
Pearland High School students Alyssa Heider, Rolla Turk, and Lucille Little discuss the problem.

Follow up:

We followed up with a quiz using some of the same shapes. The shapes were drawn on grid paper to imitate the tiles on the floor.

Sample question:

Divide the shape into more familiar shapes to find the total area. Complete the box below. You may not need to use all the spaces depending on how you divide the shape.



Name the shape	Dimensions needed	Process	Area
Triangle (Beak)	Base & Height		
Parallelogram (Tail)	Base & Height		
Rectangle	Base and Height		
(2) Trapezoid – Feet	Base 1, Base 2 and Height	Multiply by 2	
Total			

Students did very well on this quiz overall. The most common question my students asked was about how to feel confident they are dividing the shape correctly. We talked about being able to find the shapes on the TAKS Mathematics chart and focus on dividing the larger figures into rectangles, triangles, and trapezoids because they are the most familiar shapes.

What I would do differently:

I think it is important for the students to draw the shapes themselves. Grid paper would be more helpful for the overall effect of this activity as opposed to lined paper which is what the students used. I would still divide my class into groups but would encourage them to mingle with other groups for ideas. Some of my students felt free to talk with others, while some felt they needed to stay with their assigned group.

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Integrating Geometry and Biology in the Secondary Classroom

Integration of mathematics and science education has long been considered a pathway to understanding the concepts in both fields. It has been said that "Science provides mathematics with interesting problems to investigate, and mathematics provides science with powerful tools to use in analyzing them" (Rutherford & Ahlgren, 1990). In my past teaching of Pre-calculus I made many efforts to relate my lessons to physics. I taught lessons based on projectile motion in conjunction with finding extrema and zeros of quadratic functions. I also integrated logarithms and Newton's Law of Cooling to forensics and crime scene investigation. The math involved coincided easily with the science of the physical world. The relationship was also somewhat easy to establish in any of the algebra-based mathematics courses and physical based sciences. When I accepted a new teaching position at a small high school, I was in for a big challenge dealing with this integration.

The small rural district I teach in was beginning work on a program to schedule math and science classes together in a 90 minute block where the courses would be integrated and taught by both a math and science teacher. The school received grant funding to provide excellent summer training from outside consultants. We all realized that current research showed that the integration would be beneficial to the students not only because of the connectedness of math and science, but that the subjects were learned in the same way (Bosse, Lee, Swinson, & Faulconer, 2010). The three course integrations were Algebra 1 with Integrated Physics and Chemistry, Algebra 2/ Math Models with Conceptual Physics and Geometry with Biology. I was assigned the task of working with the last course, Geometry with Biology. The task of integrating Geometry and Biology curriculum into a coherent scope and sequence was daunting, but in hindsight was quite rewarding.

Upon meeting my team teacher, we started out by looking at each curriculum to try and relate anything we could. Our mindset was to keep it simple and address the main concepts needed in each subject area. We spent many hours creating a course structure that would allow us both time to cover necessary material for the Texas Assessment of Knowledge and Skills (TAKS) testing in April. Our first outline for the course was very simple with only five basic units: General Scientific Methods, Plants, Body Systems, Genetics, and Ecosystems. While the other teams were working from the math curriculum to integrate the science, we had made the decision to work in the other direction since out courses seemed so unrelated. Our plan was to tackle the biology objectives and weave the geometry in as I saw fit since the geometry curriculum has a more flexible structure than the algebra courses.

Our plan involved an initial pre-test that would identify general weaknesses in mathematics and science. The test would also be given at the end of the first semester and at the end of the school year to measure growth and improvement. Next, we knew we needed to incorporate as much vocabulary as possible. We also decided that one of our primary focuses needed to be on problem solving. With this plan we designed activities that would address all of the targets.

Just as with any new program, the first year was filled with many ups and downs. We began the year with a pre-test developed by our curriculum director along with outside mathematics and science consultants. The test was combined multiple choice questions, short answer, and some problems involving drawings to illustrate specific concepts. The students who had been assigned to the classes were those who had struggled on previous years' state testing, so this pretest let us see exactly where we were starting. Also worth noting is that almost half of our students required instructional modifications of some sort. These modifications included having tests read to students, providing reduced amount of assignments and reducing the number of answer choices on multiple choice items. After the pre-test, we saw that most of our students were lacking significantly in

both geometry and biology background. The class average was below 50% on this initial assessment. It was tough to see the lack of basic knowledge our group of students had. Immediately we developed a plan to help close the gaps in previous knowledge. We started an intense vocabulary program in which we taught several math and science terms each week. Since vocabulary is such an integral part of both curricula we knew this had to be done. Students were reluctant to do our vocabulary assignments because they were perceived as an English assignment rather than math or science. Each day we would begin class with 5 – 10 important terms on the board that students had to look up in their text and write out a definition. At the end of each week, we gave vocabulary quizzes reflecting all the words from that week's class.

With the vocabulary gaps being addressed, we had to find a way to convince the students to buy into the idea of learning geometry and biology in an integrated setting. Our first unit was Basic Scientific Processes. We introduced a cart full of scientific equipment which included not only the basic beakers, test tubes, microscopes and such, but many of the tools necessary for math as well, such as calculators, rulers, compasses and protractors. This sparked a connection for some of the students who had never even thought of the math tools as real scientific instruments. We showed how all of these instruments connected the two disciplines. Also, in this unit we were able to relate the scientific process to a problem solving model.

	SCIENTIFIC PROCESS	PROBLEM SOLVING MODEL
1	Ask a question	Read the problem completely
2	Research	Decide what information you are looking for
3	Form a hypothesis	Choose a method to solve the problem
4	Test hypothesis with experiment	Solve the problem
5	Analyze data to draw conclusion	Check solution for reasonableness in problem
6	Communicate your findings	Be able to justify and explain your answer

Logic was another area that was easily integrated between the two courses. We were able to examine logical thought and conditional statements with a look at how pharmaceutical companies market specific products. This also related to making conclusions when using the scientific method. We were able to establish some more foundational relationships with logic and general scientific processes, but there were still struggles and in some cases very vague stretches to make the connections we wanted the students to realize.

A main component for basic biology is classification of organisms, which was the next unit we taught. Now that some students were on board, we had to convince the others that there was a relationship between geometry and biology to be seen. One of the activities that I developed was a dichotomous key for quadrilaterals. As the science teacher was discussing the use of dichotomous keys for classification of leaves, and various other organisms I found myself searching for something to relate these in geometry. I developed an activity where students were given properties of various types of quadrilaterals and had to create a key to classify them. Students took notes over quadrilaterals that included basic properties as well as grouping into "families." It was such a simple adaptation, but again it demonstrated how methods from one discipline could easily be used in another.

As the year progressed, we found that biology was being emphasized somewhat more than geometry. I began putting in geometry lessons just to cover the content without finding the scientific relationship. This imbalance was due in part to standard biology lessons and labs that are very time consuming. Dissection of a fetal pig, for instance, took several class periods during which we addressed little to no math. Also, the study of body systems took quite a bit of time to draw, explain, and discuss. I was able to discuss how some of the body systems displayed various symmetries, but the geometry content was lacking and seemed more of an afterthought than a planned lesson on symmetry.

In an effort to show the connections we wanted to establish, we chose another approach to address real world situations – we took a field trip! We are

fortunate to live in an area where the Texas Parks and Wildlife Department operates a Nature Center that is fully equipped with tools to gather environmental data and analyze such things as water pH, turbidity, soil composition and many others. This was a trip for all three of the integrated classes and each team of teachers developed a hands-on activity to use with each of the groups throughout the day. This was one of our shining moments. As for our biology/geometry activity, nature presented the perfect study. I developed a Fibonacci sequence lesson where students had to find flowers, trees, and other things that represented Fibonacci numbers. Then we identified and discussed the types of plants and various other plant characteristics. It was great to see students engaged in this activity in a nature preserve where they could really see and touch what we were talking about.

As with any new program, a reflection upon its implementation highlights the successful as well as the not so successful endeavors. During each 90 minute block we attempted to cover both geometry and biology concepts in an integrated manner. We tried to stay away from a structure of 45 minutes of geometry and 45 minutes of biology. There were some days where there was no integration such as the lab dissection days and also days as we neared TAKS testing. Each day we would begin with a short set of vocabulary and proceed to the lesson of the day. We tried to spend about 30 minutes on basic notes and then have a lab or activity for the remainder of the class. Our students created interactive notebooks which seemed very beneficial for many of them.

Overall our program was successful, but there is plenty of room for growth and improvement which we plan to address next year. The pretest that was given at the beginning of the year was administered again at the end of the first semester at which point all classes showed at least a 10% improvement. At the end of the school year, the test was administered again with the Algebra and Integrated Physics and Chemistry as well as Algebra 2/Math Models and Conceptual Physics classes again reaching another 10% and our Geometry and Biology students showing a 9% additional improvement. Even though the performance on the test was positive, we had some shortcomings. When we met at the end of the year to reflect, we addressed problem issues such as topics on which that did not get covered and topics on which we tended to spend too much time. We also looked at better ways to teach both subjects each day. We revised our scope and sequence from the five basic categories we had in August, to a well structured week by week outline for use in the next school year.

This experience provided us with a valuable year of learning about curriculum development as well as discovering many ways in which Geometry and Biology can truly be integrated. The future looks promising for our program. The students have bought into the integrated program and are excited about the courses for next year. After the daunting challenge that was presented, it is an amazing feeling to see students experiencing success that they have not seen before. The future can only bring more improvements and more amazing successes.

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Legislative Update and Advocacy

The Texas State Board of Education met in Austin on November 17-19, 2010. The Board approved on first reading new TEKS for a 4th year high school course titled Advanced Quantitative Reasoning. Second Reading on these TEKS will occur at the January SBOE meeting. To view live and archived state board meetings, go to <http://www.tea.state.tx.us/index4.aspx?id=3876>.

The final K-12 Common Core State Standards (CCSS) Mathematics and English Language Arts were released. To see the standards go to <http://www.corestandards.org/the-standards>. An advisory group provides advice and guidance on the CCSS initiative. Members of this group include experts from Achieve, Inc., ACT, the College Board, the National Association of State Boards of Education and the State Higher Education Executive Officers. While Texas and other states have not joined in this collaborative effort, these standards will impact resources and assessments across the nation in significant ways. As of December 2010 forty states have adopted them.

The budget will be the most important issue facing the Texas legislature. After reviewing the current list of bills filed for the legislative session beginning January 2011, it appears many of the bills are related to higher education issues. For example, one bill calls for moving the Texas Higher Education Coordinating Board to the Texas Education Agency. In a brief review of the bills filed up to late November, no bills appeared to address issues that have been prominent in the past, such as graduation requirements or the assessment program.

To identify your elected representatives, you may go to *<www.capitol.state.tx.us/Home.aspx>* and enter your address in the box on the right to find out who represents you. Once you have entered your street address, city and zip code, a link will open that identifies your U.S. Senators, U.S. Representatives, State Senators, State Representatives and SBOE member. It is each legislator's prerogative to support feedback through e-mail. If a legislator chooses to do so, you can find an e-mail feedback form on the legislator's home page. You can find your state representative on the house website *<www.house.state.tx.us>* and your state senator on the senate website *<www.senate.state.tx.us>*. Your voice is important. ■

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FEATURE

Tips for Teachers: Friends, Facebook, and NCTM

Social networking is increasingly popular with over 500 million users. College students spend hours interacting on Facebook. We challenged preservice teachers to use social networks in a different way. We wanted preservice teachers to become familiar with professional organizations and resources in education. Many educational organizations share information through Pages on Facebook, and followers can access valuable information. There are many professional organizations for educators and joining all of them would be cost prohibitive. However, accessing the organizations through sites such as Facebook is a way to access valuable resources at no expense. Initial exposure to professional organizations may also prompt preservice and new teachers to become official members.

In a research study, our preservice teachers were required to like the pages of professional organizations such as National Council for Teachers of Mathematics (NCTM). By liking the NCTM page, preservice teachers received notifications for conferences, e-workshops, and the problem of the day. The Facebook notifications often stimulated classroom discussions among preservice teachers. The problem of the day could easily be used with students in the classroom or as a challenge for teachers.

Preservice teachers who followed professional organizations on Facebook were more knowledgeable about the organizations than those who did not. Participants made the following comments:

- Facebook made it easy to keep up with the organizations and post feedback to discussions.
- I liked NCTM and discovered social networking can be used to initiate, develop, and maintain collegial and professional relationships. I benefitted from these relationships.

Facebook continues to gain popularity, and the NCTM page currently has over 5000 fans. Both preservice and inservice teachers can benefit from these resources. Gather your Facebook friends and check out the Facebook page for NCTM. The problem of the day posted by NCTM is thought provoking and entertaining. Other educational organizations with Facebook pages include Steve Spangler Science, Texas Instruments (TI) Calculators, International Reading Association, Reading Rockets, and Edutopia. Educators can use these resources to stimulate discussions with colleagues and find problems or activities for the classroom. Accessing the posts through status updates is a great way to learn about opportunities for professional development and current issues in education. Facebook is an example of a great tool to network and collaborate with other educational professionals. ■

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DEPARTMENT

About this Publication

Since 1971, the Texas Council of Teachers of Mathematics (TCTM) has produced the journal *Texas Mathematics Teacher* for our members. Our mission is to promote mathematics education in Texas. In the journal we accomplish this by publishing peer-reviewed articles by leading authors, state updates from the Texas Education Agency, and local news from around the state. TCTM is committed to improving mathematics instruction at all levels. We place an emphasis on classroom activities that are aligned to the Texas Essential Knowledge and Skills and the NCTM *Principles and Standards for School Mathematics*.

The *Texas Mathematics Teacher* seeks articles on issues of interest to mathematics educators, especially K-12 classroom teachers in Texas. All readers are encouraged to contribute articles and opinions for any section of the journal. Teachers are encouraged to submit articles for Voices From the Classroom, including inspirational stories, exemplary lessons, or management tools. More specific guidelines for submissions may be found on page 3.

In 2004-05, our publication took on a new look. Original artwork on the cover is another appealing change for our readers. We publish the journal twice each school year, in the fall and spring semesters. Next year, we plan to provide our publication in a web-based format as well as print. You will be given the option to decide if you wish to continue to receive the print version or not. Our current website archives the more recent journals in PDF format. Please see

<www.tctmonline.net>

if you wish to view prior issues.

Our current Editorial Board consists of Cynthia Schneider, Mary Alice Hatchett, Geoffrey Potter, Larry Lesser and James Epperson. Larry and James serve as expert advisors; Cynthia is the editor. Mary Alice does many jobs, including requesting articles, serving as an elementary expert, and communicating with authors. Geoff is the layout and graphic designer; he manages to fit all the text into the limited number of pages we have to work with. The TCTM Board wishes to thank them for their leadership in improving the *Texas Mathematics Teacher*.

The Editorial Board wishes to acknowledge the contributions - time, effort, and expertise - that our volunteer reviewers make to our final journal. Those that reviewed for the journal and deserve our thanks for their support last year, in 2009-10, were:

Katy Arrington
Nancy Trapp
Faith Schwope
Cindy Schimek
Barbara Long
Butch Sloan
Dessie Sherrill
Ted Hull
Karen Anders
Sue Brown
Cindy Boyd

Advertising Guidelines for the Texas Mathematics Teacher

All advertising is subject to the approval of the publisher. The journal staff shall be responsible for ascertaining the acceptability of advertisements. All advertisements should be sent "copy-ready" by the closing dates of September 1 for the fall issue and January 15 for the spring issue. Position preference, such as right-hand pages or first half of issue will be honored on a first-come basis. All advertisements must be pre-paid by the closing date with a check made payable to TCTM, and mailed to our current treasurer, Rebecca Ontiveros. Rates for the *Texas Mathematics Teacher* per issue are: full page $500.00, half page $250.00, quarter page $125.00.

All advertisers must adhere to the following guidelines:

- Advertisements should focus on marketing products and services that pertain to the teaching and learning of mathematics.
- The design of all advertisements should be in harmony with the artistic appearance and technical level of the publication.
- Those placing an advertisement must be able to verify their claims.
- Advertising copy should be dignified and professional. Derogatory and inflammatory statements should be avoided, and all advertising copy should be nondiscriminatory with regard to national origin, gender, marital status, race, or creed.
- The journal staff shall be responsible for placement in the publication.

Advertising that elicits significant reader complaints will not be rerun before the complaints have been investigated by the journal staff and the advertiser.

TCTM 2010-11 Mission, Focus and Goal Statements

Mission of the Texas Council of Teachers of Mathematics:

To promote mathematics education in Texas

To support this mission, TCTM has five **focus areas:**

Recruit and Retain Mathematics Teachers	Curriculum and Instruction Support	Advocacy	Promote Communication among Teachers	Serve as Partner Affiliate for NCTM

TCTM activities will align to the five strategic goals. **Goals** of the organization include six strands:

Administration

- Streamline online membership registration through CAMT

Publications

- Survey membership to identify what they want in the *Texas Mathematics Teacher* (*TMT*)
- Review and refine the *TMT* journal and the TCTM website
- Improve the review protocol, establish criteria for reviewers
- Provide tips for new teachers in the *TMT* and on the website

Service

- Increase the donations toward Mathematics Specialist College Scholarships
- Staff CAMT with volunteers as necessary
- Advertise affiliated group conferences on the TCTM website, in the TMT and at CAMT

Communication

- Maintain an e-mail list of members for timely announcements
- Communicate with affiliated groups in a timely manner

Membership

- Encourage affiliated groups to include TCTM registration on their membership forms

Public Relations

- Sponsor and staff the TCTM booth at CAMT
- Follow NCTM Advocacy Toolkit (2004) for increased voice of TCTM membership on issues relevant to our mission

TCTM Past-Presidents

1970-1972	James E. Carson	1984-1986	Ralph Cain	1998-2000	Pam Alexander
1972-1974	Shirley Ray	1986-1988	Maggie Dement	2000-2002	Kathy Mittag
1974-1976	W. A. Ashworth, Jr.	1988-1990	Otto Bielss	2002-2006	Cynthia L. Schneider
1976-1978	Shirley Cousins	1990-1992	Karen Hall	2006-2008	Jo Ann Wheeler
1978-1980	Anita Priest	1992-1994	Susan Thomas	2008-2010	Paul Gray
1980-1982	Patsy Johnson	1994-1996	Diane McGowan		
1982-1984	Betty Travis	1996-1998	Basia Hall		

CAMT 2011: The Start of Something Big

The Conference for the Advancement of Mathematics Teaching (CAMT) 2011 will be held July 18-20, 2011, at Gaylord Texan in Grapevine, Texas. For more details visit the CAMT website at *<www.camtonline.org>*

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Austin, TX 78701

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Mark your calendar for these important dates!

Conference for the Advancement of Mathematics Teaching (CAMT 2011)	
Gaylord Texan, Grapevine, TX	July 18-20, 2011
NCTM 2011 Annual Meeting & Exposition	
Indiana Convention Center, Indianapolis, IN	April 13-16, 2011

2011 NCTM Regional Conferences	
Atlantic City, NJ	October 19-21, 2011
St. Louis, MO	October 26-28, 2011
Albuquerque, NM	November 2-4, 2011

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Valid Through July 31, 2011
Membership Card
Nancy Trapp — President

Use the membership form online at <*www.tctmonline.net*> to renew or join TCTM for the first time.

If this journal is addressed to you, you are a current member of TCTM. Here is your membership card.