

# Columbus State University Columbus Regional Mathematics Collaborative

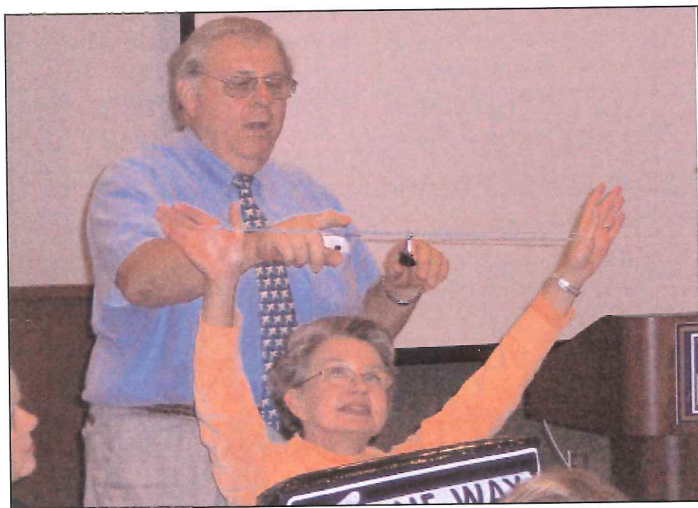
## CRMC News

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### Problem Solving Author Visits CRMC

**“Y**ou have to do problem solving to teach problem solving,” was one of the messages of Dr. Douglas Brumbaugh, Professor Emeritus from the University of Central Florida, who spoke recently at CRMC’s Fall MathFest and Fall Workshop. Dr. Brumbaugh is the author of the *Scratch Your Brain Where It Itches* series, and a variety of articles and textbooks on the teaching of mathematics. He has also worked very closely with CSU’s Dean of Education, Dr. David Rock, in designing the web-based problem solving contest now being hosted on Columbus State University’s website.



**Doug Brumbaugh and Margie Bickerstaff demonstrate the ring on a string problem**

Over 90 area teachers, CSU students and faculty attended CRMC’s Fall MathFest on Thursday, October 4 from 5:30-8:00 P.M. at the Elizabeth Bradley Turner Center for Continuing Education. The theme for the event represented “Traveling the Road to Success in Mathematics,” in the inflatable traffic signs, car-shaped pencil sharpeners, and street sign suckers that decorated the tables. Participants enjoyed dinner and a keynote address, “Motivation is not a Four Letter Word,” by Dr. Brumbaugh. His talk was an entertaining mix of ideas for motivating students, interesting math problems, and techniques for helping students understand mathematics. Dr. Brumbaugh shared experiences from his many years of teaching mathematics and mathematics education from elementary school through college. Following the

keynote presentation, participants attended grade level sessions presented by area teachers and CRMC staff. Nancy Collier from Brookstone School shared an assortment of ideas for using the calendar, money, and a hundreds chart to help early elementary students develop a variety of concepts and skills. Cynthia Hill, CRMC resource teacher, shared a variety of seasonal mathematics activities with upper elementary teachers. Merrie Albrecht from Blackmon Road Middle School shared with middle school teachers performance tasks related to the current units being taught in 6th, 7th, and 8th grades. Gina Yun from Kendrick High School presented the high school session. Sharing several graphing calculator activities that she had gotten at the Teachers Teaching with Technology (T3) Conference last spring. Carolyn Randolph, also from Kendrick, will share additional activities from the T3 Conference this spring at CRMC’s March Mathness event.

On Friday, October 5, 81 teachers from area schools attended CRMC’s annual all-day fall workshop, a part of the Collaborative’s grant projects funded through the Improving Teacher Quality Program administered by the University of Georgia. Dr. Brumbaugh worked with participants during the morning session, investigating the topic of problem solving. He presented a variety of problems designed to capture students’ attention and motivate them to engage in more flexible thinking in mathematics. He spoke about how getting students involved in flexible thinking in problem solving helps them be more successful not only in mathematics but in other areas of their lives. Following the opening session, teachers participated in grade level sessions led by CRMC resource teachers. These sessions were designed to help teachers expand their own understanding of mathematics and to share with them tasks and lessons related to the Georgia Performance Standards that could be used in their own classrooms. A particular focus of the elementary teachers was learning to use children’s literature as a springboard to mathematics tasks. Middle school teachers examined the use of open-ended problems and incorporated the use of the graphing calculator in their solutions. High school teachers looked at several tasks correlated to the new high school GPS curriculum that could be incorporated into current high school courses. The closing session, led by CRMC director, Kenneth Jones, concentrated on using rubrics to assess student work on performance tasks. This session focused on helping teachers understand some of the issues involved in using rubrics and gave them the opportunity to compare using a holistic and analytic rubric to evaluate sample student work.

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# Director's Message

We read that too much fat in our diet is bad for us, so we quit eating anything with fat in it. We read that salt raises blood pressure, so we eliminate salt from our diet. We read that protein is good for us, so we switch to a diet extremely high in protein.

What do our dietary habits have to do with teaching mathematics? A lot! The scenarios above represent extreme reactions to general findings or statements. To be healthy we need fat, salt, protein, and a variety of other things in our diet. Neither totally eliminating something because too much of it is bad for us nor eating excessive amounts of something good for us will likely improve our health. The same is true of improving mathematics instruction.

Much misinformation and misunderstanding surrounds the teaching of mathematics today. Many people view math instruction as an either/or dichotomy. You either use direct instruction or you use discovery. You either teach for conceptual understanding or you teach skills. You either use cooperative learning or whole class instruction. Just as our physical health is not well served by moving towards extremes, our students are not well served when we adopt extreme either/or positions.

Despite what some educational policy makers would like, there are no silver bullets in education. Teachers must make professional judgments about what works in their classrooms. What works in one setting may play out differently in another. The following quote from *A Research Companion to Principals and Standards for School Mathematics* helps make the point. "All too often, a new promising idea is embraced to the total exclusion of alternative possibilities. In this way, what was intended as but an ingredient becomes the whole meal; what was supposed to be an optional technique for those who find it helpful and pleasing gradually becomes the only legitimate way of doing things. Such exclusivity is an effective prescription to failure."

As we move from the old QCC curriculum to the new GPS curriculum in Georgia, it is important that we embrace this new paradigm that asks us to teach more mathematics to all students. It is important that we embrace the development of concepts rather than just memorization of skills. It is important that we engage students in the learning process rather than having them just watch teachers demonstrate procedures on the board. It is important that we give the process standards of problem solving, communication, reasoning, and representation a



Kenneth Jones

prominent place in our classrooms. But valuing and embracing these practices does not mean that we never teach skills, or that students need to be moving around the room or have their hands on something in every lesson in order to be engaged.

Standards-based teaching and teaching all students requires a major shift in our thinking and practice. It doesn't require us to throw out everything we've done in the past. It does require, however, that we look carefully at what we believe has worked and make sure that it works for all students—not

just a select group who "get math." Some of us will need to change our practice more than others. Just as most of us probably can't make wholesale "cold turkey" changes to our dietary habits, we aren't likely to make such rapid and dramatic changes to our instruction either. However, we have to begin to move in the right direction and we have to begin now.

As we continue to work to improve mathematics instruction for ALL students, it is important to remember that balance is the key. Read the NCTM *Principals and Standards for School Mathematics* and the Georgia Performance Standards for Mathematics carefully. I think you'll find that they advocate a balanced diet with regard to instruction. Just as good dietary information taken to the extreme can harm our health, good instructional practices or recommendations taken to the extremes or implemented dogmatically can harm our students' mathematical health. Success won't come easily and it won't happen if we work in isolation. We have to work together and support one another as we move through this change process. Just as many people are more successful in changing their diet if they have the support of a spouse, friend, or mentor, we will all be more successful in developing new strategies for teaching and refining old ones if we work together. One of our goals at CRMC is to promote collaboration and support in the mathematics education community. I hope you will take advantage of some of our opportunities to interact and learn with other teachers. Our staff is here to help support you as you make shifts in your instructional practices.

The success of our students in a new global economy depends on our developing and serving a balanced mathematical diet for ALL students. Don't hesitate to call on any of us here at the Collaborative if we can help you develop and prepare a balanced mathematical diet for you and your students.

## QUOTES

"In a completely rational society, the best of us would be teachers and the rest of us would have to settle for something less, because passing civilization along from one generation to the next ought to be the highest honor and the highest responsibility anyone could have." Lee Iacocca

"The essence of mathematics is not to make simple things complicated, but to make complicated things simple." S. Gudder

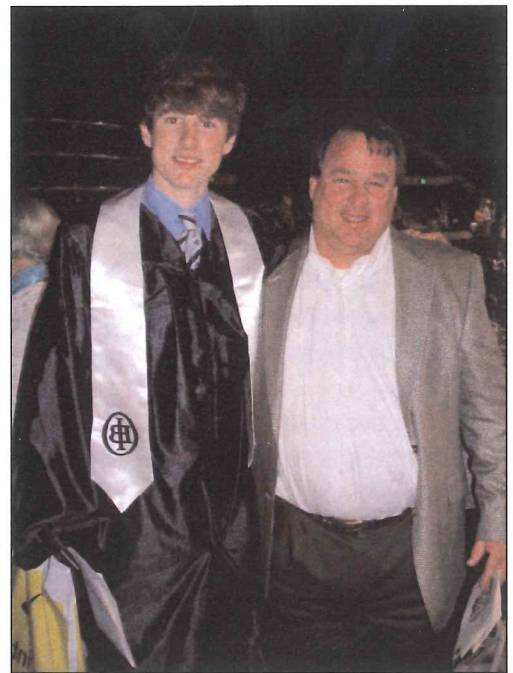
"Each problem that I solved became a rule which served afterwards to solve other problems." René Descartes

# Former POWER Camp Student Finds Success

Teachers who worked the CRMC boy's summer camp around 2000 might remember Matthew Clay - the math wiz kid from Hoover, Alabama who was devouring geometry texts as a seventh grader. Matthew complained of being bored with the middle school camp activities, so Ann Assad, CRMC Director at the time, asked Gary LeMay to work with Matthew one on one. Gary, who was working in CRMC's high school camp at the time, snuck out of the high school session once each day to work with Matthew. The following summer (the summer of Matthew's 8th grade year) LeMay worked with Matthew on Algebra II and some trigonometry. The next summer Matthew audited Dr. Tim Howard's Calculus I class at CSU while Gary introduced Matthew to multivariable calculus in his spare time. Although that was the last summer Gary worked with Matthew they kept in contact though e-mailing each other math problems to solve.

Gary LeMay attended Matthew's graduation last spring. He graduated second in his class with a full scholarship to Georgia Tech where he plans to major in nuclear engineering. According to LeMay, "he promises me he will get a minor in mathematics and is still considering pursuing a Ph.D. in mathematics." Matthew had a perfect score on his math SAT, was a member of Hoover's nationally known math team, and won several math tournaments during his high school career.

Although CRMC has not kept track of all of the students who have attended its elementary, middle school, and high school camps over the years, hopefully there are many more success stories out there where the camp experience has positively impacted students' attitudes towards mathematics.



Matthew Clay and Gary LeMay at Matthew's Graduation

## Math at the Library for Middle Grade Students

As part of its Teacher Quality grant project, *Crossing the Bridge from Instruction to Assessment*, the Math Collaborative will be hosting a series of Saturday morning mathematics events for middle grades students at the Columbus Public Library on Macon Road. The events will provide opportunities for middle grades teachers to try new and engaging lessons with students and to refine the lessons before presenting them in their own classrooms. Students will have opportunities to learn new mathematics in fun and engaging ways. Both students and teachers will have opportunities to participate in some mathematics activities "just for fun" without having to worry about grades or meeting AYP. These sessions are designed to promote interest in mathematics among middle grades students.

"We are excited about this partnership with the Columbus Public Library," said CRMC director Kenneth Jones. "We had several successful mathematics events at the library last year so we decided to try and expand upon those."

The first Math at the Library event will be Saturday, November 17, from 9:30 AM until 12:30 PM. There is no cost for students to attend the event. Teachers who would like to participate in a Saturday session should e-mail [phillips\\_hope@colstate.edu](mailto:phillips_hope@colstate.edu). Additional sessions will be January 19, February 16, March 15, and April 19.

## Participate in Online Mathematics Dialog

CRMC offers opportunities to participate in online dialog with other mathematics educators through its three listservers. The three listservers, **crmc-es**, **crmc-ms**, and **crmc-hs**, provide opportunities for teachers to discuss topics in mathematics education, exchange lesson ideas, share rich mathematical problems, and share effective classroom strategies. Once you join the one of the listservers, the dialog takes place through your regular e-mail account. You can sign up to participate in one or all of the listservers by going to <http://listserv.colstate.edu>, clicking on Mailing List Information, and then clicking on the list you want to join. You will be asked for the e-mail address where you'd like to receive notices and for the name you would like displayed on your postings. All of the lists are closed lists, meaning that they are available only to subscribers. CRMC staff control subscribers to the lists and reject membership requests from anyone not recognized as an educator with a legitimate reason to be a member of the lists. This prevents the lists from becoming a source of spam. You can always unsubscribe from the lists at any time.

Join one of the lists today and begin developing an online support community as you seek to improve mathematics education for your students.

# 2007-08 Academic Year Gets Off to Busy Start

The new academic year started with a flurry of activities and events at the Collaborative. On Thursday, October 30, teachers from schools invited to serve as follow-up sites for this year's Teacher Quality grant projects attended an evening dinner meeting to kick-off the follow-up portion of the project. After the meal, Kenneth Jones presented an overview of the project's goals and objectives, outlined requirements for participation in the project, and discussed the teachers' role in project evaluation. Following the project overview, teachers met with the CRMC resource teachers for their grade level. These sessions helped teachers get a feel for the project by introducing them to a short lesson like the ones they will be involved in during the project.

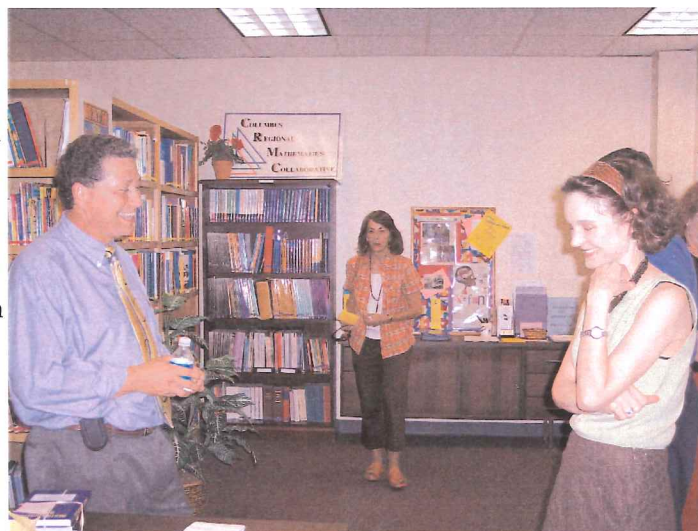
Elementary teachers from Georgetown Elementary and Dimon Magnet Academy attended and participated in several short activities, led by Cynthia Hill, Shannon Lewis, and Kimberly Voltz, that used children's literature as a springboard to geometry tasks. Middle grades resource teacher, Hope Phillips, led teachers from Marshall and Baker Middle Schools through a data analysis task using graphing calculators. High school teachers from Jordan High School, Harris County High School, and Chattahoochee County High School used multiple methods and representations to solve a problem involving quadratic and absolute value equations.

On September 4, several CRMC staff members presented sessions at the Teaching Mathematics in Grades K-8 Workshop hosted by the CSU College of Education through support by the Partnership for Reform In Science and Mathematics (PRISM). Shannon Lewis presented "Line It Up! Number Sense and Literature Aligned to the GPS" to area teachers in grades K-2. Kenneth Jones presented "Developing Conceptual Understanding of Fractions Using Manipulatives" to teachers in grades 3-5. Cynthia Hill presented "Line It Up! Geometry and Literature Aligned to the GPS" for teachers of grades K-2. Other sessions at the workshop were presented by CSU faculty members from the Department of Curriculum and Instruction and the Department of Mathematics.

That same afternoon, several teachers from the PRISM conference and a number of other area teachers attended CRMC's Open House from 3:30-5:30 PM. Teachers enjoyed refreshments, met the CRMC staff, and looked through materials in the resource library, including many new materials that were added during the summer.

CRMC staff also participated in early events at several schools and school systems. Kenneth Jones manned a CRMC table at Muscogee County's new teacher orientation in August. He introduced a number of new mathematics teachers to the resources of the Collaborative and several of them have already utilized those resources. Linda Hayes presented a session to teachers at Central High School in Phenix City during their pre-planning time. Teachers from Park Elementary in Harris County enjoyed a visit from the CRMC elementary resource teachers in August to begin a school year PLU course and to plan a family math night at their school.

If these early activities are any indication, this promises to be a busy year for the CRMC staff. Remember to contact the Collaborative early if you would like staff members to work with you or your teachers.



Dr. Julio Gonzalez and Middle School Resource Teacher Hope Phillips enjoy CRMC Open House

## NEW BOOKS

The Collaborative has recently added a number of new books and materials to its resource library. The list below is just a small sample of new books that are available.

**Statistics in Action: Understanding a World of Data**—this statistics textbook from Key Curriculum Press is written for high school students. It contains a wealth of real-world data and problems. This would be a great resource for teachers getting ready for the statistics that is imbedded in the new high school GPS.

**Coin-Clue Puzzles**—this book from Learning Resources contains a variety of critical thinking activities and puzzles using coins. Students arrange a sequence of coins to satisfy a series of clues.

**Looking at Lines**—this book from the AIMS Foundation contains over 25 lab-type activities and tasks that generate data that can be modeled by a linear equation. The activities would be especially useful with the 8th grade GPS and could be used in algebra courses.

**The 10 Things All Future Mathematicians and Scientists Must Know (But are Rarely Taught)**—This easy to read book by Edward Zaccaro, presents information on a variety of math and science topics with real-world connections. Examples include the Challenger disaster, the math behind the tragic death of Aaliyah, the anti-vaccination movement, being fooled by statistics, the difference between cause and correlation, and many others.

# NCTM E-Workshop Series

Area teachers and CSU students and faculty members are participating in NCTM's E-workshops, hosted by the Math Collaborative. These workshops guide participants to engage in activities and lessons presented by expert teachers throughout the country or by NCTM staff members. Participants are connected to the presenter's presentation via the Internet and communicate with the presenter using a speakerphone. Although participants can't actually see the presenter, they see the presenter's slides and the online computer activities. Two-way communication and interaction with the presenter and participants at other sites throughout the country is encouraged via the phone line or an interactive chat. The workshops use Microsoft's Live Meeting interface.

Each workshop consists of a 90-minute session where teachers have an opportunity to explore particular content strands as they relate to NCTM's *Principals and Standards for School Mathematics*. A few weeks after the original workshop, a follow-up session is held where participants can share comments on how workshop activities worked in their classroom and share student work samples related to the workshop tasks.

Workshops are presented by grade strands, PK-2, 3-5, 6-8, and 9-12 and focus on Reasoning with Data and Probability, Implementing the Algebra Standard, and Geometric Thinking.

The E-workshops scheduled for the remainder of the year are listed below. Please call 706-568-2480 or email [crmc@colstate.edu](mailto:crmc@colstate.edu) to reserve your seat in any of the free workshops. All workshops are held in the CRMC office and seating is limited.

- November 13 - Implementing the Algebra Standard Follow-up (9-12) 7:00-8:30 PM
- November 14 - Reasoning with Data and Probability Follow-up (PK-2) 4:00-5:30 PM
- December 5 - Implementing the Algebra Standard Follow-up (3-5) 4:00-5:30 PM
- December 6 - Geometric Thinking (PK-2) 7:00-8:30 PM
- December 13 - Reasoning with Data and Probability (3-5) 7:00-8:30 PM
- January 8 - Reasoning with Data and Probability (6-8) 4:00-5:30 PM
- January 9 - Reasoning with Data and Probability (PK-2) 7:00-8:30 PM
- January 17 - Geometric Thinking Follow-up (PK-2) 7:00-8:30 PM
- January 31 - Reasoning with Data and Probability Follow-up (3-5) 7:00-8:30 PM
- February 5 - Geometric Thinking (9-12) 4:00-5:30 PM
- February 12 - Reasoning with Data and Probability Follow-up (6-8) 4:00-5:30 PM
- February 13 - Reasoning with Data and Probability Follow-up (PK-2) 7:00-8:30 PM
- March 4 - Implementing the Algebra Standard (PK-2) 7:00-8:30 PM
- March 11 - Geometric Thinking Follow-up (9-12) 4:00-5:30
- March 12 - Geometric Thinking (6-8) 4:00-5:30 PM
- April 15 - Implementing the Algebra Standard Follow-up (PK-2) 7:00-8:30 PM
- April 23 - Geometric Thinking Follow-up (6-8) 4:00-5:30

## Congratulations

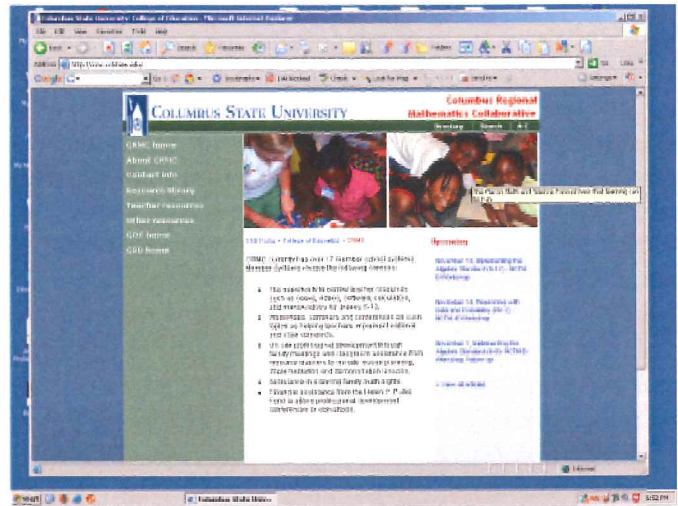
CRMC congratulates Ms. Pearlie Jenkins for being a recent MEA Credit Union Golden Apple Award recipient. Ms. Jenkins teaches at Marshall Middle School and is a participant in our 2007-2008 middle school grant project, *Crossing the Bridge from Instruction to Assessment*. We always enjoy hearing about and celebrating a teacher's excellent work with local students.

The Collaborative also extends its congratulations to Ned Colley from Texas Instruments for receiving the Georgia Council of Teachers of Mathematics' Friend of Mathematics Award. Many of you have met Ned because he has done several TI presentations in our area. He has always been a big supporter of CRMC, providing brochures, catalogs, resource materials, and door prizes for our events. Thank you, Ned, for your support and congratulations on this well deserved honor.

CRMC director, Kenneth Jones, was one of this year's nominees for the Georgia Council of Teachers of Mathematics' Gladys M. Thomason Award. Once nominated, nominees remain in the pool for three years. The award is presented annually at the Georgia Mathematics Conference at Rock Eagle. Dr. Deborah Gober, Chair of CSU's Department of Teacher Education and principal investigator on several of CRMC's projects, was also nominated. This year's recipient was Dr. Barbara Ferguson, President of GCTM. Barbara has been a long time supporter of the CRMC and used it as a model for a collaborative at Kennesaw State University.

# CRMC Launches New and Improved Website

In mid-September the Math Collaborative launched its new and improved website. Jennifer Tant and staff members in CSU's Computer Information Network Services department worked with CRMC during the summer and into September to create a new look for the webpage. The goal was to create a page that more closely matched the look of CRMC's parent organization, the College of Education. The new site has a more professional look, is easier to navigate, and has several new features. One new feature is a link to upcoming events. Upcoming workshops and events are posted there and users can click on an event for more detailed information. The new site also features information and links to contact all staff. Many teachers will be interested in the literature list correlated to math topics that can be found under **Teacher Resources**. The **Resource Library** link connects you to an electronic version of CRMC's catalog of materials. You can use **Other Resources** for quick access to the CSU Problem Solving Contest, the National Council of Teachers of Mathematics, the Teacher Quality Program at the University of Georgia, and others. Take time to explore the new website today. The address is still <http://crmc.colstate.edu>.



We hope to be able to add additional resources to the site soon, such as links to recommended websites and model lessons and tasks. The Collaborative is also in the process of setting up an online system that will allow teachers to register for events online. Even when that is set up, we will still accept registrations by phone or e-mail since we know everyone is not part of the tech generation.

## CRMC Selects Sites for Project Follow Up

Following CRMC's summer workshop, schools were selected to serve as sites for follow-up activities during the year. Teachers at these sites will participate in two follow-up workshops at CSU during the year. CRMC's resource teachers will meet regularly during the school year with teachers at these schools to continue to work on goals of the projects. The school year portion of the project provides extended follow-up and support to selected teachers from the summer workshop and provides an opportunity to expand the impact of the project to other teachers in the school. Sites are selected based on teacher participation in the summer workshop, CRMC membership, and faculty and administrative support for the project.

Elementary target schools for this year are Dimon Magnet Academy, Double Churches Elementary, Georgetown Elementary, and Reese Road Elementary. Middle school target sites are Marshall Middle School, East Columbus Middle School, and Harris County Carver Middle School. High School sites are Jordan High School and Harris County High School.

A special part of the high school project will be having teachers participate in lesson study during the year. Teachers at the school sites will collaboratively plan lessons that will be taught by one of the teachers and Linda Hayes, CRMC secondary resource teacher. These lessons will be videotaped and later reviewed by all of the teachers with the goal of looking for ways to improve instruction and increase student learning. The process is modeled after the idea of Japanese lesson study which has become a popular model of professional development.

### QUIPS

"If you think dogs can't count, try putting three dog biscuits in your pocket and then giving Fido only two of them." Phil Pastoret

"Black holes result from God dividing the universe by zero." Author Unknown

"I was gratified to be able to answer promptly, and I did. I said I didn't know." Mark Twain

"I told Michael to go into math because that's where the money is." Former math teacher of basketball player Michael Jordan

# Using Rubrics in Mathematics Assessment

One focus of the Collaborative's Teacher Quality grant projects is to help teachers use rubrics to assess student work. This focus was chosen to help teachers develop ways to assess the types of open ended problems and performance tasks called for in the new Georgia Performance Standards. Additionally, because the process standards—problem solving, reasoning, communication, and multiple representations—aren't easily assessed by simply looking at correct answers, CRMC recognized the need for teachers to have additional tools available for assessment. This article summarizes some of the content that was shared with teachers in our summer workshops and our Fall workshop.

What are performance tasks and why do they need rubrics? Performance tasks involve significant mathematics, can be solved in a variety of ways, elicit a range of responses, require communication, and stimulate best performance. In mathematics, they require students to show that they can apply and do mathematics in a context. Because performance tasks don't have an answer key in the sense that short answer or multiple choice tests do, scoring a performance assessment necessarily involves making some subjective judgments about the quality of a student's work. Although no assessment can be completely objective, rubrics help at least reduce potential subjectivity in assessing performance tasks.

Why should we use rubrics to evaluate performance tasks? One benefit of rubrics is that they ensure that all student work is judged by the same standard. Often, perception of quality is influenced by the halo effect. This means a product may seem better or worse depending upon the quality of the product that was assessed prior to or after it. Rubrics help disengage this halo effect. Rubrics provide a way to communicate expectations and progress to students and parents. A good rubric communicates clearly the expectations and quality required for success. This makes it easier for the teacher to provide specific feedback to the students about the quality of their work. These factors often help motivate students toward more quality work and produce improved student learning.

What types of rubrics are useful in mathematics? The two basic types of rubrics are holistic and analytic. Holistic rubrics seek to evaluate a product or task as a whole. They are generally less specific and may be generic in nature. They tend to be less time consuming

to develop and use but they also offer less specific feedback to students. Analytic rubrics evaluate different aspects of a task or product separately. As a result they provide more guidance and feedback to students. With an analytic rubric it is easier to assign different weights to different parts of a task.

What are some of the dangers and pitfalls when using rubrics? Sometimes there is a tendency to try and use rubrics just to be using rubrics. One misuse is to use rubrics to assess items, such as worksheets, that could more appropriately be graded as right or wrong. Having too many categories and trying to assess too many aspects of a task makes the rubric difficult and time consuming to use. Having too many or too few descriptors that distinguish between levels of quality may make a rubric difficult to use. Three to five descriptors in each category is usually sufficient to adequately distinguish levels of student performance. Another pitfall when using rubrics is having vague or overlapping descriptors of levels of quality. This makes it more difficult for students to use the rubric to guide their performance and leads to a lack of consistency when evaluating students' work. Perhaps the greatest pitfall if you are just beginning to use rubrics is trying to do it all alone. Moving from just counting the number of correct items, or taking off points for specific things to effectively using rubrics requires a paradigm shift that is easier to make when working with others. If you are interested in incorporating more effective use of rubrics into your class, recruit a partner to undertake the journey with you.

Where can you find information on using rubrics in mathematics? If any teachers at your school attended CRMC's summer workshop they received a copy of Eileen Depka's book, *Designing Assessment for Mathematics*. This book contains some very useful information on designing and using rubrics. A copy of this book and a number of others on the subject are available for checkout at the Collaborative. There are also a number of websites that provide very helpful information on using rubrics. A very helpful site is <http://rubistar.4teachers.org>. This site has pre-made rubrics for many subjects, including math, and has a feature that helps you design and customize your own rubrics.

If teachers at your school are interested in further investigations in using rubrics and would like to schedule a professional development opportunity at your school, please contact the Collaborative.

# Columbus Regional Mathematics Collaborative

## Web Links

<http://www.mathopenref.com/index.html>

Find everything you could ever want on this site about plane geometry in the middle and high school curricula. There are step-by-step examples of constructions; parallel lines cut by a transversal; congruence and similarity; circles and ellipses; triangles; polygons; and quadrilaterals. These are just a few examples, as the site's index is vast. Put this one in your favorites. You'll visit often. This site might be especially useful for the middle grades GPS.

[www.thefunworks.org](http://www.thefunworks.org)

Highlight careers for your students that require mathematics. This site interviews real people about their jobs, from roller coaster engineer to civil engineer, from nurse to traffic planner. This site has many good answers to the question, "When will I ever use this again?" Use one of the web pages as a class opener when the concept you are teaching matches one of the occupations on the site.

[www.algebracomplete.com](http://www.algebracomplete.com)

Find complete resources for the teaching of algebra concepts for teachers of eighth-grade GPS or high school teachers. Graphing calculator (TI-83+) step-by-step instructions for a variety of topics are included.

<http://www.pbs.org/teachers/math/>

This site has a variety of mathematics lessons and tasks across all grade levels. Many activities relate to recent news stories. The site includes lesson plans and downloadable copies of handouts for students as well as answer keys for the teacher.

<http://www.geogebra.org/cms/>

This site has free geometry construction software. You can use the software on the Internet or you can download the software to your computer. Use the software to construct interactive geometric objects, measure lengths and angles, and discover properties of geometric figure.

<http://roobrix.com/>

Do you have to convert scores from a rubric to a grade for your grade-book? Adding up the points and dividing by the total possible does not produce valid scores for rubrics. This site can help. It contains a calculator that allows you to specify the number of criteria and levels on your rubric and the minimum passing score. You then select the point total from the rubric and roobrix converts this to a percent score. The site also contains a link to a variety of pre-made rubrics sorted by subject matter.

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## New Grant Projects Begin with Summer Workshops

While most teachers were sleeping late or relaxing on the beach, 66 area teachers were attending CRMC's annual summer workshop, June 11-15. The workshop was the first phase of the Collaborative's three grant projects funded through the Improving Teacher Quality Program at the University of Georgia.

This year's elementary project, *Building Bridges and Digging Deeper: Phase II*, builds on last year's project.



William Burkhardt and Rosa Patterson decide which container, cylinder or cube, will best house a softball

Teachers in the workshop participated in a variety of activities and tasks designed to help improve their mathematics content knowledge, a requirement of all Teacher Quality projects. CRMC's elementary resource teachers, Cynthia Hill and Kimberly Voltz, worked with teachers in identifying children's literature that can serve as a springboard to mathematics lessons. They also guided teachers through a variety of hands-on lessons and tasks related to particular children's literature. Teachers in the workshop each received the appropriate grade level copy of Marilyn Burns' *Math and Literature* book. The thirty-two teachers in the workshop represented Muscogee, Troup, and Talbot counties; Ft. Benning, Ft. Rucker, and Maxwell AFB Department of Defense Schools; and Brookstone, Wynnbrook Christian, and St. Anne Schools.

*Crossing the Bridge from Instruction to Assessment* is this year's middle school project. Middle grades resource teacher, Hope Phillips, worked with 18 middle school teachers during the week to improve their content knowledge related topics in algebra and geometry. Teachers worked through lessons and performance tasks from the Connected Mathematics Project units *Filling and Wrapping* and *The Shape of Algebra*. Teachers in the workshop received a copy of the student texts and teacher's editions for each of these units. Teachers in the workshop represented Muscogee, Quitman, Harris, and Marion counties and Ft. Benning schools. Ann Assad, former CRMC director and now a faculty member at Austin Peay State University, served as a special presenter at the middle grades workshop as well as a participant.



Susan Calhoun sorts animal crackers to gather data for a statistics activity

Through this year's high school project, *Building Bridges to Performance Standards: Phase II*, CRMC is working to prepare high school teachers for the transition to the new high school courses based on the GPS. Linda Hayes, secondary resource teacher, worked with 16 teachers to help them deepen

their content knowledge in the areas of functions and statistics. She also shared a variety of tasks that could be used with students in both current QCC-based courses and the new GPS-based courses. Troup High School mathematics teacher and workshop participant, Peter Anderson, served as a special guest presenter as he helped teachers work through the IMP unit, *The Pit and Pendulum*. Teachers collected data and explored mathematical models for predicting the period of a pendulum and later tested their predictions as Peter created a human pendulum and swung from a tree. Workshop participant Yusef Yildirim, a faculty member from Lane College in Tennessee, presented a special workshop session on developing the chi square statistic. In addition to Lane College, workshop participants were from Harris, Troup, Chattahoochee, Talbot, and Muscogee counties and Pacelli High School.

Each morning participants in all three workshops met together to explore using rubrics to assess student work. Kenneth Jones led these sessions which focused on developing an understanding of holistic, analytic, and weighted rubrics and the advantages and disadvantages of each. Teachers had opportunities to examine a variety of rubric formats and to practice using those rubrics to evaluate sample student work. All teachers received a copy of the book *Designing Assessment for Mathematics*, by Eileen Depka which served as the major resource for this portion of the workshop. Teachers in each workshop also had the opportunity to explore tasks and evaluate sample student work from the Exemplars<sup>®</sup> Standards-Based Assessment and Instruction database.

These projects will continue during this school year with two all-day follow up workshops at CSU and after school meetings at selected schools led by CRMC resource staff.

## CRMC Staff Participate in Family Math Nights

Staff members from CRMC have been involved in Family Math nights at local schools recently. On October 11, Kenneth Jones and Hope Phillips assisted with Double Churches Middle School's Family Math Night. This was the first time that Double Churches had attempted a Math Night. Kenneth met with Double Churches teachers several weeks prior to the event and helped them plan the event, providing some examples of the types of activities they might use. At the actual event, Kenneth presented a probability activity related to the lottery and Hope presented an activity using playing cards to practice order of operations and problem solving. Several teachers from Double Churches also presented activities. About 30 students and parents

attended the event. Most impressive and heartwarming to watch was one particular student who enjoyed the mathematics activities with his family, which included his father who had just arrived home from an extended stay in Iraq earlier that morning.



Family Math Night at Double Churches Middle School

October 25 was a popular night for Math Nights, with CRMC staff participating in events at Martin Luther King Elementary and Muscogee Elementary. Shannon Lewis and Cynthia Hill presented mathematics activities with a Halloween theme at Martin Luther King Elementary. Kenneth Jones shared games to practice addition, subtraction, and multiplication skills with students and parents at Muscogee Elementary. There were well over 100 students and parents at each of these events.

If you would like assistance planning a family math event at your school, please contact any of the staff at the Collaborative. CRMC resource teacher Cynthia Hill said, "Be sure to plan early, though, because our calendars are filling up quickly."

## A Few Problems from Dr. Doug Brumbaugh

Dr. Douglas Brumbaugh, Professor Emeritus from the University of Central Florida, recently visited the Collaborative and served as the keynote speaker for Fall MathFest and our Fall Workshop. Here are a few good problems and mathematical teasers courtesy of Dr. Brumbaugh. Try them with your students. Just be sure to give credit to Dr. Brumbaugh.

**PATTERNING** - Place the first 10 counting numbers, one each on a card. Arrange the cards so that when you start with the top card and spell the number word "one," moving a card to the bottom of the stack for each letter said, after the card for "e" is moved to the bottom of the stack, the numeral 1 is showing. Remove the 1. Spell "two," and after the third card is placed on the bottom of the stack, the numeral card 2 is showing. Remove it. Continue through all 10 counting numbers, spelling each and removing the card associated with the word spelled. What is the original sequence of cards that makes this work?

**THINKING SKILLS** - How do you show 15 minutes with only two hour glasses, one that goes for 7 minutes and one that goes for 11 minutes?

**NUMBER THEORY** - Ask someone for a 2-digit even number. Ask them to add all the even numbers from 2 through the selected number. You will give the answer before the sum can be done on a calculator. How do you do it? Divide the even number by 2. Multiply this:  $(X)$  by  $(X+1)$ . For example, the chosen 2-digit even number selected is 24. You divide by 2 and get 12. Add 1 to get 13. Multiply  $12 \times 13 = 156$  or  $(X)(X+1)$ . (You could square 12, then add 12.) The sum of all the even numbers from 2 through 24 is 156 (from <http://jjj.mega.net/BEATCALC>). **EXTENSIONS:** Prove it. Is the selected number limited to 2-digits? What happens if you sum all evens from 6 through your selected number?

Looking for the answers? Email [crmc@colstate.edu](mailto:crmc@colstate.edu) if you can't figure them out.