

The ALPHA Connection

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The Newsletter
for the
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Development
of Teachers*

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Views on Mathematics Teaching

With the excitement surrounding the new National Science Foundation Mathematical ACTS (Achievement and Collaboration for Teachers and Students) grant, the Alpha Center is putting much of its energy in providing and evaluating programs for teachers and students designed to improve performance on various standardized mathematics assessments. Therefore the results of the new international study, entitled *TIMSS 1999 Benchmark Study*, released March 28, 2003 by the U.S. Department of Education's National Center for Education Statistics, is particularly noteworthy. The researchers for this study collected and analyzed 638 videotaped lessons of mathematics from seven countries to gain valuable national-level information about classroom teaching.

"The *TIMSS 1999 Video Study* is important to our basic understanding of what happens in the classroom every day," said NCES Associate Commissioner Val Plisko. "It can provide the basis for future research into those aspects of teaching that most influence students' learning." Plisko added that this report offers only initial findings from the new video study. At a later date, NCES will release two additional reports. One, on eighth-grade science teaching, will be a first for the nation and its international partners. Another upcoming report will be on U.S. mathematics teaching as captured in the earlier 1995 study compared to the new 1999 data.

Among the findings in the report was that countries often differed in the way that mathematics lessons were structured and how the content was presented to and worked on by students. For example:

- Review of previously taught lessons plays a larger role in mathematics lessons in the Czech Republic and the United States than in the five other countries where more time is devoted to introducing new content. Indeed, a greater percentage of eighth-grade mathematics lessons in these two countries was spent entirely in review of previously introduced content than in Hong Kong and Japan (28 and 28 percent of lessons vs. 8 and 5 percent, respectively);
- Lessons in Hong Kong included a larger percentage of problems per lesson targeted at using procedures, e.g., applying a formula, (84 percent) than in most of the other countries (ranging from 41 to 77 percent). Mathematics lessons in Japan, on the other hand, included a larger percentage of problems per lesson that emphasized making connections among mathematical facts, procedures and concepts (54 percent) than lessons in most of the other countries (ranging from 13 to 24 percent);
- When the researchers examined the ways in which the mathematical problems in the lesson were actually discussed and worked out during the lessons, they found that eighth-grade mathematics lessons in Australia and the United States were the least likely to emphasize mathematical connections or relationships (8 and less than 1 percent, respectively; other countries ranged from 37 to 52 percent);
- Eighth-graders in the Netherlands were more likely than their peers in four of the other countries to encounter problems

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The Alpha Center Director's Perspective



As I look to the future of an education that is pertinent to the complex, technologically sophisticated society in which we live, one word comes to mind—

Mathematics. Mathematics is the foundation of science and technology and these subjects dominate the world and will for years to come. If we, as a country want to remain economically powerful and internationally competitive, we will need to rely on citizens who are scientifically literate.

- *Mathematics* teaches critical thinking skills which are used to manage and process information and assess it for accuracy. Mathematics is not just memorizing and using algorithms but conceptualizing, understanding and using thinking processes. Thinking transcends all subjects of study.
- *Mathematics* provides a universal language for communicating with people of other cultures and

countries. Our current economy depends on our global relationships.

- *Mathematics* achievement is an indicator of the workforce potential of the area. This indicator is especially important to 'high tech' businesses scouting for a location, which means it is important to the Inland Empire. As one of the fastest growing regions in the nation, we are seeking business growth whose personnel will be motivated by the opportunities available for their families as well as the quality of the local population who will become their workers.
- *Mathematics* underlies the governing theories of science and provides direction for exploration. Ideas in medicine, for example, will dramatically affect our quality of life. As a society we need to make these discoveries and as individuals we need to evaluate the suitability of them to our particular circumstances.

As I look to the future of education, I see different topics in the K-12 curriculum. The traditional adding, subtracting, will be combined with things like topology, dynamic systems, modeling—ideas needing the dreaded *algebra*. Higher mathematics achievement will be expected of our students, achievement that reflects procedural fluency and also conceptual understanding. I see more effective strategies for diverse student populations being utilized by content strong teachers where they integrate hands-on learning, critical thinking and frequent assessment into their lessons and they make mathematics relevant, purposeful and interesting to the learner. If any progress in bringing *all*

our students to a higher level of academic achievement is to be made, there must be focus on the quality of teaching. We must address the ways in which we prepare teachers for the classroom of the future and keep current quality teachers in the classroom.

The task of meeting the educational needs of *all* students is enormous and it will require the resources, the ideas and the work of many who have a stake in the success of the system. Therefore, establishing innovative and effective partnerships becomes a necessity. Institutional partnerships need to form between school districts, university/colleges and business to share

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resources, avoid duplication of effort and to align the curricula with standards that are contemporary. Personal partnerships must solidify relationships between parents, students and teachers so that all three entities share in the responsibility of learning.

For people to participate fully in society they must know mathematics or they will be cut off from a whole realm of human endeavors including competence in everyday tasks. As a world power, it behooves us to have citizens who are scientifically literate. It is the responsibility of our educational structure to insure that this happens.

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Voice: 909-787-5425
Fax: 909-787-5465
www.alphacenter.ucr.edu

Articles for this issue were written by the Alpha Center staff.

Alpha Center Summer Academy Offerings

Athena of Inland Valleys Continues Support of GEMS



Thanks to the contribution of Athena of the Inland Valleys, a local chapter of the National Athena Foundation, and the Greater Riverside Chambers of Commerce, the Alpha Center will receive funding for GEMS, a girl's academy of learning in mathematics. Modeled in the format after the national Athena philosophy, girls will be exposed to activities which will: increase their performance and attitude about mathematics, emphasize the importance through demonstrated activity, of giving back to the community, and expose students to mentoring so that they will develop the skills of supporting other women.

The institute will be held at the UCR Student Recreation Center during the week of July 21, 2003. Fifty girls and their parents will participate.

Instruction will be coordinated by Shirley Roath, the director of the Mathematics Academy of Teaching Excellence (MATE) and Dr. Pamela Clute, executive director of the Alpha Center. For more information contact Mary Eggers-Simons (909) 827-7034 or visit our website at www.alphacenter.ucr.edu where an electronic application is available.

CSF and Alpha Jointly Offer Healthy Body-Healthy Mind

Healthy Body-Healthy Mind is a summer program which will be presented in partnership with Dr. Thomas Haider's Children's Spine Foundation.

The goal of this academy is to develop a well-rounded individual by balancing the role of academics, with health education, fitness, nutrition and positive mental attitude. The target audience is students going into the 7th or 8th grade.

The program will be held July 21-July 25 at the University of California Student Recreation Center from 9-12 noon. The program is available through an application process at no cost to the selected participants. Books, bags, t-shirts, calculators, posters and various mathematics, nutrition and health books will be provided. Certificates of completion will be presented at an awards program the last day of the summer academy. Contact Linda Rankin for more information (909) 787-5425 or linda.rankin@ucr.edu or visit our website at www.alphacenter.ucr.edu where an electronic application is available.



Mathematics Academy for Teaching Excellence (MATE) 2003

The Alpha Center is putting the finishing touches on a year's worth of preparations in anticipation of MATE 2003. Approximately 70 in-service teachers and pre-services teachers from the Community Teaching Fellowships in Mathematics and Science (CTFMS) program will participate for two weeks from July 7-11, July 14-18 at the Student Recreation Center on the UCR campus. Dr. Pamela Clute leads the institute designed to increase teacher content understanding while modeling effective teaching strategies.

The goal of MATE is to connect the extraordinary resources of the university with the talents and vision of the

educational community in order to meet the mathematical needs of students, teachers and schools. This collaboration provides participants instruction in mathematics content and pedagogy based on research related to student achievement and teacher professional development. Participants attend with the desire to improve their own understanding of mathematics and to make mathematics more interesting and accessible to their students. The program also provides network opportunities with local, state, and national mathematics leadership organizations. In addition, participants receive a stipend, a professional library of support materials and optional college credits.

NSF Mathematical ACTS Program Updates

Hypothesis Driven, Results Oriented Strategies

Hypothesis: In depth teaching of mathematics standards that are conceptual, strategic, and geared to logical thought and fluency will increase student achievement. The results oriented strategy: use the research literature, respect for teacher time and professionalism, and goal driven planning to create professional development and supports necessary for teachers and students to achieve. Necessary components for this strategy: the talents of three new staff members for the ACTS team.

Three new staff have joined the Mathematical ACTS team of Dr. Richard Cardullo of Biology, Dr. Michael Rettig of Chemistry, Dr. Pamela Clute and Dr. Kathleen

Bocian of Alpha Center, and Dr. DeWayne Mason of the Jurupa USD.

Shirley Roath, Special Projects Director at the Alpha Center and a



former mathematics teacher from Alvord USD, was hired as the Director of Mathematical ACTS. Her primary responsibilities are the develop-

ment of curriculum and instruction to be taught to teachers participating in ACTS, and the delivery of the same through the programs of the MATE summer institute for teachers and the weeklong CHAMP academies for students and teachers.

Samantha Scribner, a Ph.D. student in UCR's Graduate School of Education, joins the team as a qualitative researcher. She has worked in the Jurupa USD under the direction of Drs. Rod Ogawa and Judith Sandholtz on a School University Partnership grant, and will work with one school in the ACTS project for a five year case study that examines the impact of ACTS on the school climate. The case study will

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Jurupa MATE Summer Academy and Recruitment

The summer of 2003 heralds the arrival of a new branch of programs at the Alpha Center.

Alpha Center in partnership with Jurupa Unified School District (USD) have created a twin of the successful and popular summer program for teachers, the Mathematics Academy for Teaching Excellence (MATE). Through a grant from the National Science Foundation administered through the Mathematical ACTS program, teachers from JUSD will be invited to participate in a MATE academy designed specifically for their district. "J-MATE" will run from June 23 through June 27 and continue June 30 through July 3.

Teachers from Jurupa USD attended a recruitment workshop on April 15th at Mira Loma Middle School. In attendance were 150 par-

ticipants which included teachers, administrators, district staff and Mathematical ACTS staff. The recruitment was designed to offer teachers a sam-



pling of activities from MATE to encourage participation in the summer academy.

MATE provides teachers with a hands-on learning environment and innovative curriculum that is in alignment with district, state, and national

mathematics standards. Approximately 70 teachers will be invited to explore the interface of academic content with pedagogy under the dynamic guidance of Dr. Pamela Clute. In support of their professional development, these teachers will receive a library of resource materials to be used in the implementation of new ideas in their classrooms.

Ongoing support for "graduates" of the J-MATE program will include coaching and workshops in mathematics and science through two other offshoots of existing Alpha programs; Climbing Higher with the Academy for Mathematics Performance (CHAMP) and Accelerated Literacy Integrating Algebra and Science (ALIAS).

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Interview with Mathematics Professor Dr. Poon



Dr. Poon is Associate Dean, Physical and Mathematical Sciences, Professor of Mathematics and the Director of Mathematics Achievement Partnerships (MAP) which offers in-service training programs through California Mathematics Project and California Profes-

sional Development Institutes for Teachers. The goal of the project is to develop teachers' mathematics content knowledge, pedagogical skills and leadership skills in order to effectively implement California state standards in classrooms.

Question: Do you see the university as having a significant role in K-12 education? If so, what is that role?

Answer: Yes of course. UC is a public institution and it is obliged to serve the public. However, it is also a place for higher education and its focus should be that. I believe the UC mission in outreach should be dual: UC should diversify the eligibility pool and UC should elevate student quality within the eligibility pool.

Question: How long have you been involved or interested in K-12 education?

Answer: Since my son and daughter were born! Which was also the time I joined UCR 12 years ago. My level of involvement has gotten more intensive because of encountering students' lack of undergraduate readiness. I started talking with my colleagues and working through the Academic Senate. We were interested in looking at admission practices and general preparedness of incoming freshmen so my focus started at the freshman level and progressed to High School and Middle School. Soon I realized that K-16 is one entity and in order to improve the general preparedness of students, it would take working within that entire entity.

Question: Was there a single incident or force behind your commitment to K-12 education?

Answer: No single force. I think there are two things behind my commitment. My interest in education and having some sense of a known problem, and then wanting to solve it. I took it as an academic challenge and tried to tackle the problem and at least make a positive impact.

Question: What is the most satisfying aspect of your work with K-12 schools or K-12 programs?

Answer: I see myself making a positive impact on

teachers and students. I feel I have been able to help teachers improve themselves. I have made many good friends from different avenues of education. Also I have learned new ways to teach myself! I see my own teaching evolving quicker in the last 5 years since I have been more involved.

Question: What is the most frustrating?

Answer: This is a gigantic system with which to wrestle. Budgets, inertia, and politics are all extremely time consuming. With all the work, I find I can't make the impact that I want to make. I wish I could do more but I have other obligations as well.

Question: What would you most like to accomplish with K-12 schools?

Answer: I would like to see teachers and students enjoy teaching and learning and I would like to see their academic performance improve. I would like the students to have high expectations of themselves. I'd like every student and teacher to make going to college a goal.

Question: What do you see for the future of university K-12 relations?

Answer: As I stated before, I see it as one entity, K-16. I see the organic whole to include UC, Cal State Universities, Community Colleges and K-12 working well together. I just hope it will continue. We need to work together to provide an excellent teaching and learning environment for all. Mutual support is our future.

Alpha's Redesigned Website

Alpha Center's website, www.alphacenter.ucr.edu, was recently redesigned to make navigating through the site a little easier. A new title bar divides visitors into four main categories: teachers, college students, parent and students, and education professionals with each link connecting visitors to a list of appropriate programs.

The site was completely updated with new links to programs such as NSF Mathematical ACTS, Regional Collaborations, and revised program matrices for both Alpha Center and UC Riverside programs. A photo gallery for each program was also included on program pages.

Visitors to the site can also access various applications online, including the GEMS and Healthy Body-Healthy Mind applications, which are electronically fillable and may be e-mailed directly to the Alpha Center. CTFMS participants can access surveys online and submit them electronically. Please visit us online today at www.alphacenter.ucr.edu!

Planning for Wellness Center to Open in Fall 2005

Alpha Center is working with Alvord USD and Riverside Community College to determine the goals, partners, and evaluation of services for a Wellness Center that will be part of the Innovative Teaching and Learning Center next to the La Sierra University campus.

The yet to be built Teaching and Learning Center (open in Fall of 2005) will house an elementary school, a preschool and child care center, and an infant and toddler care center. The Wellness Center will not only be the site for traditional school and public health-sponsored services and outreach for families and children who attend these schools, but will also sponsor classes for parents related to

health education, family dynamics, and parenting. Further, the Wellness Center will extend the field experience opportunities and practicum sites available to college students who are training for careers in education and health related fields.

An Advisory Committee, led by Dr. Kathy Wright of Alvord USD and Dr. Kathy Bocian of the Alpha Center, and composed of public and private agencies, foundations, educational institutions, and parents from the community, has been meeting monthly to discuss the building's layout (make minimal space serve multiple functions), determine what health related services will be part of the Center for the children and families, and create

a schedule of private and public agency contributions of time and talent to provide services.

Committee members are assembling a matrix of services and courses available and are adopting community involvement approaches advocated by established clinics, community centers, and charitable medical services in the Riverside County area.

The commitment of these individuals and the involvement of others interested in the vitality of the Wellness Center are crucial for its ultimate use and success in the community. Persons interested in serving on the Advisory Committee should contact Kathleen Bocian at (909) 787-2961.

Views on Mathematics Teaching Continued

Continued from page 1

during the lesson that included a real-life connection (42 percent of problems per lesson; other countries ranged from 9 to 27 percent). In the other countries, problems were more likely to make use only of mathematical language and symbols; and

- Calculators were used in more lessons in the Netherlands (91 percent) than in the United States and the other countries (ranging from 31 to 56 percent); computers were actually used in relatively few eighth-grade mathematics lessons across all the countries (ranging from 2 to 9 percent of lessons; there were too few to estimate in the Czech Republic, the Netherlands, and the United States).

Copies of the TIMSS 1999 Video Study results are available on request and on the NCES Web site at <http://nces.ed.gov/timss>.

Of particular interest was the online NCES StatChat Live (Hosted by Partrick Gonzales, U.S. National Research Coordinator and report author) available at <http://nces.ed.gov/statchat/transcripts/ts3272003.asp>. Interesting questions were posed by mathematics educators, some examples follow.

Lynn from Brooklyn, NY asked: As a doctoral candidate in mathematics education, I firmly believe in an inquiry-based mathematics curriculum in which children construct mathematical ideas while engaged in problem solving. However, as a mathematics curriculum coordinator for grades 1-8, I hear teacher complaints that there is not enough class time for the demands of the U.S. spiral-based mathematics curriculum that includes so many skills and concepts, unlike countries that scored higher in the TIMSS and in which children cover fewer topics but have more time to

think deeply and take possession of their mathematical ideas.

Dr. Patrick Gonzales: As part of TIMSS 1995, Bill Schmidt at Michigan State University conducted a study of curriculum around the world. One of the conclusions that he reached after analyzing the data was that U.S. curriculum is "a mile wide and an inch deep." His point was that, in the U.S., topics are continually added to the curriculum, but few are ever dropped. This can result in students studying the same topics, over and over, for several years as they move through the school system. In other countries, this may or may not be the case. In Japan, for example, the national curriculum includes some review of earlier introduced topics, but does not spend an inordinate amount of time on them. In that way, students continually "move forward" through the curriculum. They also focus on conceptual development, which ap-

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Views on Teaching Continued

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pears to not always be the case in the U.S. That may be important because, if students understand why they are studying a particular topic, or how it relates to other topics, they may retain the information better.

Results Oriented Strategies Continued

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involve interviews with teachers, classroom observations, and working as a participant observer in the teacher institutes.

Michael Bryant, a Lecturer in Biology at California Institute for the Arts and a former UCR graduate student in Biology, has joined the team to plan and implement the statistical analysis of the data to be collected from teachers and students. Professors Dr. Kim Hammond, Dr. Cardullo, and Dr. Mason are working together to strengthen the research design and to anticipate both the data and questions that will be needed over the course of the project. Bryant has worked with teachers and students in ALIAS science summer programs and will be part of the instruction to teachers during the academic year.

The Advisory Council of Mathematical ACTS met to review progress on the grant from the team. To date, the team has developed, submitted and revised the strategic plan requested by National Science Foundation (NSF), and attended a major conference hosted by NSF, as well as conferences hosted by RETA (Research and Evaluation Technical Assistance). We have selected and/or are piloting instruments for teachers and students, and have begun data collection from teachers and analysis of past data from student files. We have visited and met with teachers from 9 of the elementary schools, 3 middle schools and 1 high school, and from the 4 matched pairs of elementary schools, randomly selected schools to begin in the summer of 2003 or the summer of 2004.

Jurupa MATE Academy Continued

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The goal of CHAMP is to create an environment where classroom teachers can work collaboratively with University faculty to design innovative curriculum and instructional strategies in mathematics based on research in best practices of teaching. Students in grades 4-8 will be the beneficiaries of this collaborative effort as teachers "test" these lessons in lab school settings.

ALIAS also adopts a favored form of Alpha Center professional development; students and teachers working together on academically rigorous projects. ALIAS provides a forum where students, teachers and University faculty can engage together in scientific inquiry that is imbedded in real-life contexts. Dr. Richard Cardullo, UCR Professor of Biology and Dr. Michael Rettig, UCR Professor of Chemistry, will tailor their popular programs to address district, state and national science standards and curriculum for the students and teachers in Jurupa USD.

Alpha Directory

Pamela S. Clute, Ph.D.
Executive Director
909-787-5425
pamela.clute@ucr.edu

Kathleen M. Bocian, Ph.D.
Director, Academic
Research Initiatives
909-787-2961
kathleen.bocian@ucr.edu

Jacqueline Adkins
Budget Analyst, Fiscal Services
909-787-7362
jacqueline.adkins@ucr.edu

Linda Rankin
Assistant to Executive Director
909-787-5425
linda.rankin@ucr.edu

Shirley Roath
Director, NSF Mathematical ACTS
909-787-2963
shirley.roath@ucr.edu

Janice Carter
Coordinator, CTFMS
909-787-2962
janice.carter@ucr.edu

Kathleen Mattson
Liaison, CTFMS Science
909-787-5425
kathleen.mattson@ucr.edu

Mary Eggers-Simons
Coordinator, CSMP-Mathematics
909-787-5425
maryes@pop.ucr.edu

Judy Lee
Evaluation Researcher
Editor, *The Alpha Connection*
909-787-2002
judylee@pop.ucr.edu

Calendar of Upcoming Events

MAY

- 21 Athena of the Inland Valleys Luncheon
- 23 NSF Mathematical ACTS Advisory Committee Meeting

JUNE

- 23-7/3 Jurupa MATE
Contact: Kathleen Mattson
- 23-27 MAP Algebra Academy
Contact: Mary Simons
- 23-7/4 Frontiers in Nanotechnology and Engineering for Teachers

JULY

- 7-18 MATE, Student Rec. Center
Contact: Kathleen Mattson
- 21-25 Healthy Body-Healthy Mind, Student Rec.Center
Contact: Linda Rankin
- 21-25 GEMS Desert Sands
Contact: Mary Simons

21-8/1 MAP Algebra Institute
Contact: Mary Simons

AUGUST

- 4-8 GEMS, Palm Desert Middle
Contact: Mary Simons
- 4-15 MAP Upper Elementary Institute
Contact: Mary Simons
- 4-15 MAP Middle School Academy (Linear)
Contact: Mary Simons
- 4-15 MAP Middle School Academy (Non-linear)
Contact: Mary Simons

OCTOBER

TBA Jurupa CHAMP
Contact: Shirley Roath

NOVEMBER

TBA Jurupa CHAMP
Contact: Shirley Roath

Please visit us on the web at our newly redesigned site:

www.alphacenter.ucr.edu

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Adventures in Learning

ALIAS

APOLLO

Catch the Bug

CHAMP

COMPASS

CTFMS

Everyone Counts

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GEMS

Healthy Body-Healthy Mind

MATE

MATTS

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The Alpha Center

900 University Avenue
University of California, Riverside
College Building South
Riverside, CA 92521

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