

NCMATYC NEWS

Spring 2004

READING FOR ENRICHMENT

by Rob Kimball

There are probably a great many publications that cross your desk any one month. This month, please take a minute to look at NCTM's *Mathematics Teacher* (Volume 97, Number 4).

The first article, "The Triangles of Aristarchus", includes some good geometry as well as some thought provoking calculations with large numbers. The article "Focusing on Students' Mathematical Thinking" offers some insights into how students think and how faculty *think* students think.

Some neat modeling exercises can be used if you look at the article "ABC 1-2-3." Using SCRABBLE as the context, the authors show several ways to compare statistics using letter-tiles. There are lots of possibilities at many levels!

And finally, the article "Building Your Own Regression Model" uses spreadsheets to model data obtained easily from the students in your class. This article is a *must read* if you want to know more about modeling.



NCMATYC CONFERENCE 2004 SPRUCE PINE, NC

Starting on page three, you'll find several articles from members who attended the conference and want to share that experience with you. This newsletter becomes more valuable because of their contributions. Thanks to those of you willing to share, Rob.


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Visit the new site for the
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<http://www.ncmatyc.com>

The NCMATYC NEWS is an official publication of the North Carolina Mathematical Association of Two-Year Colleges and is published by Wake Technical Community College's Mathematics and Physics Department. Questions and comments should be directed to Rob Kimball, Editor, Wake Tech Comm College, 9101 Fayetteville Road, Raleigh, NC 27603-5696. Articles for publication are welcomed and should be submitted electronically to the editor in either Word or WordPerfect format: rkimball@waketech.edu. The deadline for the Fall issue is September 1, 2004 .

Conferences & Other Opportunities

AMATYC Outer Banks Summer Institute Duck, NC		13-18 June, 2004
AMATYC Teacher Preparation Summer Institute Enumclaw, WA		8-12 July, 2004
AMATYC Hawaii Summer Institute Hilo, HI		26-30 July, 2004
10 th International Congress on Math Education, Copenhagen, Denmark		4-11 July, 2004
NCCTM State Conference Greensboro, NC		7-8 October, 2004
AMATYC 30 th Annual Conference Orlando, Florida		18-21 November, 2004
MA/AMS Joint Meeting Atlanta, Georgia		5-8 January, 2005
AMATYC 31 st Annual Conference San Diego, CA		10-13 November, 2005

MAA RELEASES TWO MAJOR DOCUMENTS

by Robert Kimball, Wake TCC

All mathematics departments in the country received two very important volumes from the MAA in March, 2004. Please be sure you see the volumes and talk with your colleagues about the content.

UNDERGRADUATE PROGRAMS & COURSES IN THE MATHEMATICAL SCIENCES: CUPM CURRICULUM GUIDE 2004

This volume is the culmination of work by MAA's Committee on the Undergraduate Program in Mathematics (CUPM). These recommendations are the result of extensive feedback from the mathematics community and represent a major resource for your department's curriculum. The full report, as well as a collection of "Illustrative Resources" is also available online at MAA *Online* <http://www.maa.org/cupm/>. Use these examples to see how the recommendations can be implemented.

CURRICULUM FOUNDATIONS PROJECT : VOICES OF THE PARTNER DISCIPLINES

"Voices of the Partner Disciplines" is a collection of reports compiled by CUPM's Subcommittee on Curriculum Renewal Across the First Two Years (CRAFTY) based on a series of workshops held across the country that brought together colleagues from other disciplines. The reports present recommendations for your department's mathematics offerings during the first two years and complement the CUPM Recommendations. One of these "partners" was the mathematics major. The full report is also available online at <http://www.maa.org/cupm/crafty>.

SUBSCRIBE TO THE NCMATYC LISTSERVE



This email forum allows community college mathematics instructors throughout the state to instantaneously discuss issues of concern and to share ideas. To join, send an email message to majordomo@ncccs.cc.nc.us from your email account. Don't include any subject line and include only "subscribe NCMATYC" in the body of your message. You will automatically receive a response with a welcome message containing instructions for posting to the list.

DEPARTMENT CHAIRPERSONS COLLOQUIUM

by Lee Ann Spahr, Durham TCC

Attending NCMATYC each year is such a highlight for me in that I have the wonderful opportunity to see old friends, make new ones, and get reacquainted with our mathematics faculty from colleges across the state.

One of the most beneficial aspects of the conference is the networking among colleagues and the discussions that take place outside of the formal sessions. The Department Chairpersons Colloquium again this year was such an event. We had a group of 10 chairpersons meeting together, and much lively discussion ensued. We shared a lot of ideas including scheduling difficulties, teaching load issues, organizational problems, growth issues, bridging the gap between developmental and curriculum courses and faculty, and handling student complaints. We could have very well continued our discussions well beyond the allotted session time.

The Department Chairpersons Colloquium is indeed an invaluable part of NCMATYC for all chairpersons. I encourage those of you have not previously attended to make plans to participate in this session next year as Durham Tech hosts the conference.



**FEATURED CONFERENCE PRESENTER
LOIS YAMAKOSHI**



Lunchtime at NCMATYC



THE STATE OF THINGS IN NORTH CAROLINA

by Deborah Benton, Wake TCC

Thanks to Edith Lang for attending the conference in the mountains of North Carolina to share with us the state of things at the System office. She was informative as usual.

The newest thing is Biotechnology. This will have a big impact on all our campuses. Instead of needing a four year degree in Biology, many employers will discover a two year degree will do the job. This is expected to greatly increase our enrollment. These students will require a statistics course.

The new system for enforcing pre-requisites is being tested on several campuses. Pitt CC has worked out several of the "kinks." One of the problems has been co-requisites, which the system does not recognize. The good news is that it will not let a student skip a pre-requisite. For example, a student at Wake Tech that has had MAT080 but not MAT095 (both pre-requisites for MAT 171 at Wake Tech) will not be allowed to enroll in MAT171. Only when the student consults a "power user" can that person override the system. Wake Tech will turn on its pre-requisites in the Fall of 2006. We look forward to trying out the system.

The last item discussed was electronic attendance forms. They have been rejected. It seems the system purchased would not do the job. Since this is not a top priority for those who do not have to fill them out, it will be at least 2007 before they will be considered again.

[Editor's Note: AMATYC was awarded a supplemental NSF grant to examine the mathematics for technicians in biotechnology and the related areas. In May, a team of biotech faculty and math faculty will meet at Wake Tech to construct classroom materials that demonstrate the math needed by biotech employees and, at the same time, gives math faculty guidance towards the appropriate content for courses that prepare biotech technicians. More information can be found at

EXCITING TIMES AHEAD FOR COMMUNITY COLLEGES – MAT 141 & 142

by Jo-Ann G. Williams, Wake TCC

Having MAT 141 and 142 become core mathematics classes for the elementary education majors last December is a marvelous triumph for students, community colleges, and universities. We have a tremendous opportunity to affect the cycle of poorly trained elementary mathematics teachers producing poorly trained elementary students who then end up in our developmental classes.

We must stop and ponder what will break this cycle. What do we put into these courses so that the cycle can and will break? How do we teach these future teachers so that we provide them with a deeper understanding of the mathematics they will teach? How do we change their attitude about mathematics so that they include creative, fascinating experiences in mathematics for their students instead of a worksheet with the instructions: "Do these 30 problems."

This summer both AMATYC and MAA are extending invitations to you to experience this transformation in thinking so that you can then begin to transform your students in 141 and 142. We can break the cycle, and it can begin as soon as this summer.

AMATYC is providing "Exploring Measurement Through Geometry" during 8 - 12, 2004 in Enumclaw, Washington for learning, discussion, activities, experiments, and research in the area of measurement and geometry pertaining to the education of our pre-service teachers. The region is charming, the facilitator is outstanding, and the learning is exponential. Registration deadline is May 15th so hurry to the www.amatyc.org for the information and application.

MAA is also providing opportunities through PMET (Preparing Mathematicians to Educate Teachers) which is still supported by a National Science Foundation grant, so the cost is cheaper. You will only be responsible for the travel and incidentals. There are many opportunities available, but the closest one for us is at Appalachian State University in Boone, which will be led by Holly Hirst May 30th through June 6th. This workshop is designed for middle school teachers. Registration deadline is April 9th, but maybe you can beg for leniency. For information on all of the MAA's workshops, go to www.maa.org/pmet/workshops/workshops2004.html.

I have participated in these opportunities for the last 2 summers, and I can guarantee that you will come away with sound research, marvelous ideas, and a renewed spirit toward improving every mathematics course you teach.

PROJECT FOR DEVELOPMENTAL STUDIES

by Mary Marsha Cupitt, Durham TCC

Do you need a great project for your MAT 060 class? I attended the Developmental Studies Mini-Session at the 2004 NCMATYC Conference and learned of a great one.

Vernon Bridges and Greg McLeod from Durham Technical Community College shared a great idea called "The Great Discover America Project." With this project, students design a two-week trip that takes them from North Carolina to Alaska and back. They must travel by rental car, bus, Amtrak, cruise ship and plane and find the best buy for each of these means of travel. They must research hotel costs, taxes, time in travel, speed (in miles per hour as well as feet per minute), volume of luggage (in cubic feet, cubic inches and cubic meters) and whether the rental car can accommodate the luggage, provide a food budget and a map of their trip. The students work in teams and the team that fulfills the objectives of the project in the most economical way wins a prize. (They did not indicate what the prize was, but knowing these guys, it was a great prize). This project will take the students the full semester to complete, so they must begin within the first few weeks of the semester. They collect their information through internet searches, so this project is encouraging use of computers for information collection.

If you would like a copy of the project, email Greg McLeod at mcleodgk@durhamtech.edu or Vernon Bridges at bridgesv@durhamtech.edu. They will be happy to accommodate you.



PAT MCKEAGUE
FEATURED KEYNOTE SPEAKER

Think about the only course some students will take in college as being a "capstone course in quantitative literacy."

NEWS FROM NC COMMUNITY COLLEGES

DURHAM TECH

Under the direction and leadership of **Chuck Wessell**, Durham Tech's Math Team has again brought home the 1st place trophy from the Gainesville College Mathematics Tournament held April 3-4 in Gainesville, GA. Aside from the team trophy, Durham Tech's **Jun Jian Hou** won first place in the individual competition and a check for \$400. **Austin Lethbridge-Scarl** finished in third place and received a \$100 prize. Other members of the team were **Ben Newlin** and **Matias Garcia Avila**.

CENTRAL PIEDMONT COMMUNITY COLLEGE

Central Piedmont Community College math faculty, under the leadership of **Suzanne Williams** and **Helen Kolman**, have been working to provide opportunities for future teachers. These efforts have resulted in the following initiatives:

1. A 2+2 articulation agreement with UNC-Charlotte including eighteen carefully crafted templates, one for each possible elementary, special education, and middle grades concentration areas;
2. The first annual joint CPCC-UNC-C Future Teacher Conference, attended by 140 students;
3. Establishment of a Future Teacher Club.

Plans are underway to form a regional teacher education alliance to adapt the 2+2 agreement and to share in future development of opportunities for students at seven area community colleges. These initiatives have been funded by participation in an NSF/PTK grant.

WAYNE COMMUNITY COLLEGE

WOW!!!!!! What a great spring conference! Special thanks goes to Sandy Pierce and company, site coordinator at Mayland CC. You did an outstanding job of arranging everything from equipment to rooms to food to whatever was needed. They proved a small community college can do a GREAT job in hosting a conference. Thanks to Sharon Killian, treasurer, for taking our money. Also accolades to Chuckie Hairston, president-elect, and the regional VP's for arranging the wonderful sessions. Conference attendees had many great sessions from which to choose. I heard many positive comments as people made their way from one presentation to another. Presenters, you did an excellent job! And what would the conference be without the support of our vendors? Thank you vendors for your support. Also thanks to Prentice Hall, host of the breakfast at the Friday morning business meeting. When you see the reps, please thank them. Finally, thanks to everyone who attended the conference. I hope you left refreshed, inspired, and motivated to return to your campus to make a difference! Also, consider hosting the NCMATYC conference when it is held in your region. We would love to visit your campus.

When you see Tim Beaver (Western Region VP) and Melissa Staley (Past President) thank them for the outstanding jobs they did as officers. They rotate off the board in May. At this time we welcome the newly elected officers, some being reelected and others being elected to new positions. Good luck to each of you and thanks for accepting the challenge of being an NCMATYC officer.

Remember that NCMATYC can only be as strong as its members. It is up to all of us to recruit new members and to serve the organization. Contact any board member if you have suggestions or ideas that will make NCMATYC a driving force in the community colleges.



Pictures from the NCMATYC Conference
are throughout this Newsletter
AND
on the NCMATYC website.

Left: the NCMATYC Board 2001-2003

Thanks!

NCMATYC

TREASURER'S REPORT

	2004 Year - to - Date	Prior Year 2003
6-Mar-04		
Checking Balance-beginning of year	\$4,696.29	\$1,883.65
INCOME**		
Conference Registration	\$3,205.00	\$2,825.00
Membership Dues	\$865.00	\$2,210.00
Vendor's Fees	\$750.00	\$3,650.00
Designated Gifts		
Intrest Income	\$21.49	\$131.61
TOTAL INCOME	\$4,841.49	\$8,816.61
EXPENSES		
AWARDS: Math Contest	\$0.00	-\$700.00
Bank Charge	-\$6.00	-\$6.00
Board Meeting Expenses	\$0.00	-\$343.20
Conference (State):		
Programs	-\$191.10	-\$166.92
Food	-\$3,125.03	-\$1,978.36
Gifts	-\$64.20	-\$21.40
Supplies/Miscellaneous	-\$212.58	-\$67.06
Flowers	-\$53.50	-\$131.27
Rent	-\$150.00	
Projects/Speakers	-\$500.00	\$0.00
Conference (National):	\$0.00	-\$100.00
Donations/Memorials	\$0.00	-\$100.00
Mini-Grants/Designated Grants	-\$142.00	\$0.00
Newsletter: printing and postage	-\$215.69	-\$687.85
Postage and election costs	-\$112.85	-\$70.30
Web Site	-\$500.00	-\$500.00
Professional Services (Lawyer)		
Supplies	-\$55.58	\$0.00
TOTAL EXPENSES	-\$5,328.53	-\$4,872.36
NET CHANGE	-487.04	3,944.25
<i>Transfer to(-)/from(+) Savings</i>		-1,000.00
<i>Report Summary</i>		
Checking Balance	\$4,187.76	\$4,696.29
CD	\$9,697.78	\$9,677.38
Money Market	\$4,297.41	\$4,296.32
Total Cash and Cash Equivalents	\$18,182.95	\$18,669.99
CONFERENCE SUMMARY		
Receipts	\$3,955.00	\$6,475.00
Expenses	-\$4,296.41	-\$2,365.01
Net	-\$341.41	\$4,109.99

MEMBERSHIP REPORT

by Mitzi Logan, Pitt CC

I am proud to report, in my last days as NCMATYC secretary, that we have 311 members from 54 of the 58 community colleges. I want to specially thank the 25 members who are not employed by the NC community college system but interested in being a part of our great organization, including members from Tennessee, South Carolina, Virginia and one as far away as California.

We have only 25 members who are more than a month overdue in renewing their membership. Please check your label from this newsletter to find your expiration date. I would love to RENEW your membership prior to my leaving office. You can find a copy of the membership form on our website.

We are still seeking members from Bladen CC, Edgecombe CC, Johnston CC, and Wilkes CC. If you have friends or acquaintances from those campuses, please help us recruit members. AND recruit on your own campus if you do not have 100% membership from your mathematics instructors. Thanks.

WOW...311 members...this is the largest membership that we have had since I have served as secretary. Also, we have the smallest number of members who are in arrears. I have thoroughly enjoyed serving as your secretary. Peggy Womble, you were very clever 4 years ago asking me to run as President-Elect. When I gasped and said, "I could NEVER do that!" you then cleverly asked if I'd be secretary and I reluctantly accepted, feeling guilty about declining twice. Well, Peggy...THANK YOU!! I have loved serving as secretary (though a writer I am NOT). Please be good to our new secretary, Janet Yates, and keep your membership current so that she will not have to be as pesky as I have been over the past four years.

I will sorely miss being on the NCMATYC board for the next 2 years and am already considering running again for some office in 2006.

JAZZING UP THE CLASSROOM

by Peggy Womble, Wayne CC



What can one say about a T³ Conference in New Orleans except, “So much to see – so little time?!” With the theme of “Jazzing Up the Classroom,” Texas Instruments offered a host of technology presentations. There were 488 presentations for educators of all levels: from elementary school teachers to college instructors...from beginners to advanced users of Texas Instrument technology. If you wanted it, it was there!

My favorite session other than the ones that the Wayne Community College faculty presented (“Curly’s Revenge” – a finance session presented by Jim Godfrey, Kim Clark & Peggy Womble and “Using Apps to Improve Performance in Geometry” presented by Hal Kilpatrick, Kim Clark & Katina Davis) was entitled “**Golf, Anyone?**” Gail Wallis and Kent Reid from Kildonan East Collegiate and Vincent Massey Collegiate respectively in Winnipeg, Manitoba, gave a super presentation on how they had constructed a net and used the CBL to calculate velocity and distance of a hit golf ball. They actually built a frame from PVC and used a net to catch the hit golf ball and gave us the instructions for making it. Students would actually hit the golf ball into the net, using different clubs. Using a microphone to find the time when the ball is hit and using an accelerometer on the net to find the total time in the air, students will be able to calculate velocities for the ball and the predicted distance the ball would have traveled. “With this information, students can use the activity to reinforce the following concepts:

- a. Basic functions of the calculator: entering numbers into lists, displaying plots, performing regression equations, and tracing to specific values.
- b. Mathematical Concepts: recognition of typical curves for various types of functions, the meaning of ‘r’ and ‘r²’ values, and interpolation and extrapolation.”

I envisioned using this activity in my Math 110 class, which has a lot of Turf-Management guys in it. They usually like to play golf and play it well. It would be fun to use this activity to help them determine their average distance for different clubs.

My other favorite session was the reception on Friday night for all of the participants of the T³ Conference. After the “Hurricanes,” which New Orleans is famous for, the WCC participants were given the opportunity to see if playing the band’s washboard was as easy as it looked. NOT! However, Hal Kilpatrick gave it a good try! It was a good conference (even though I really missed NCMATYC) and an even greater place to have a conference.

Things to do at a T³ Conference in New Orleans:

- #1. Have a "Hurricane" in the revolving restaurant at the Hyatt and determine the velocity of the restaurant.
- #2. Swim in the hot tub of the Hyatt and estimate the temperature both in Fahrenheit and Celsius.
- #3. Calculate the amount per person to ride from the airport to the Hyatt in the shuttle and in a limo, and choose the better deal.
- #4. Determine the color pattern of beads thrown while walking down Bourbon Street.
- #5. Calculate the number of times you have to walk down Bourbon Street to walk off the three beignets you ate.



“HOLY CALCULATORS” BATMAN – SOUTHEAST VP REPORT

by Rob Kimball, Wake TCC

“*Where does he get those wonderful toys?*”

Do you remember that line from the Joker in Batman? I used to hear about what was going on in physics classes, and had a similar question, “Where do they get all those wonderful toys that help students learn?”

Alas, and it’s about time, we have some great toys too! Math classrooms are now cluttered with computers, calculators, and calculator-based laboratories; packed with pendulums; stuffed with springs; and bursting with balls, balloons, and buttons. Students are engaged in activities that promote reasoning and critical thinking, data analysis and investigations, and requires them to communicate their results using technology that aids the organization and delivery of their conclusions. Spreadsheets, a common tool in business, is now a common tool in mathematics. The new TI-84 includes a Cell Sheet APP that allows you to put a spreadsheet in the palm of your hand.

And where do you find out about these toys and how to use them? By attending a great affiliate meeting, like yours last month – by attending a summer institute or workshop – by attending the AMATYC national conference in Orlando next November. AMATYC is dedicated to helping you do your job better. You help by participating and by sharing. Thanks! With all the toys at our disposal, you can quote the Joker: “*Wait till they getta loada me.*”

PRESIDENT'S MESSAGE



What a wonderful conference! The attendance was good, the local arrangements went smoothly, and the mountains were lovely. What else could we have asked for? Mayland Community College certainly demonstrated that a small school can host our conference, and do it well. My thanks to the site coordinators Sandy Pierce, Paula Schlesinger, and Larry Shook who worked so hard to make us feel comfortable. Thanks also to the presenters who volunteered their time both before and during the conference to bring us information that we can share with our colleagues. This year, we had two guests from California who helped make the conference successful. Pat McKeague of Cuesta College was not only our keynote speaker; he also presented a session on conic sections. Lois Yamakoshi of Los Medanos College was a featured presenter brought in by the NCMATYC board. She gave a lively session on statistics. I appreciate the work of our conference photographer Ann Lawrence of Wake Tech. She is responsible for almost all of the pictures on the website and in the newsletter.

The other big news is the changing of the NCMATYC board. For the last two years, it has been my pleasure to work with the outgoing board. Without exception, this group has worked hard to guide our organization. To Mitzi Logan, Tim Beaver, and Melissa Staley who are leaving the board, I say thank you for your efforts. Your new board is listed in this newsletter.

I am looking forward to working with and for you the next two years. If you have suggestions or concerns about NCMATYC or about math in our two-year colleges, please feel free to contact me. We value input from you.

President - Elect—Jan Mays
Secretary—Janet Yates
Treasurer—Janet Killian
Eastern VP—Phyllis Patterson
Central VP—Chuck Wessell
Western VP—Ann DeBoever
Past President—Mary Marsha Cupitt



**2004
Board
Members**

STUDENTS AS CUSTOMERS: AN OPINION

by Vandana Srivastava, Pitt Community College

In today's consumer-oriented world, educational institutions are redefining their roles in response to the changing needs of society. Institutions have been applying the consumer model to education and defining students as customers. What assumptions does this model convey? Does the label fit?

Education is much more than knowledge of content in a given set of disciplines. It should be an active and dynamic process that build's character, encourages reflection, prepares individuals to become committed and responsible citizens while providing an opportunity to learn and expand one's horizon. In my opinion, education is not a commodity that can be bought or sold. In particular, labeling a student as a customer creates a misleading perception that money can buy education, without the student actively engaging in the process.

Here are a few of the assumptions. Attendance and participation in the classroom is viewed as being optional rather than essential. Being a customer means all whims and fancies must be met by the instructor to the student's satisfaction. Following basic rules such as coming to class on time, adhering to deadlines, and doing the expected work outside the classroom are unrealistic impositions. The customer ultimately determines his need ("I do not need Math for what I wish to do in life and therefore should not be forced to take math"). And the most troubling of all – enrolling in class is sufficient to receive a passing grade.

While it may be argued that these are incorrect assumptions, the reality is that these are precisely the attitudes that dominate the classroom. These attitudes, in my opinion, are a result of applying the *customer label* to students. Needless to say, these assumptions become added impediments in a process that is already challenging. More importantly, the label shifts the focus entirely to the end result (the grade and the diploma) rather than on the process (education). Growing up as a student in India, I always viewed the ability to attend an institution of higher learning as a privilege rather than a right. Therefore, the responsibility for learning was entirely on the student – the teacher was not the vendor, but the student was clearly the consumer. Personally, I find the pendulum has gone all the way to the other extreme now that I am an instructor! The label of "customer" is a misfit for a student in the classroom.

2004 – 2006 NCMATYC Leadership

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Do you have some thoughts and suggestions to share with the NCMATYC Board? The board will hold its annual spring retreat on May 20-21 during which plans for the upcoming year will be discussed. Please contact any of the board members to share your ideas.

*Rob Kimball
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Mail to:

READING: PROFESSIONAL DEVELOPMENT THAT DOESN'T COST MUCH

by Rob Kimball, Wake TCC

The following excerpts are from articles that contain thought provoking comments from well known educators. One of the things we need to do more of, is talk about mathematics education with our colleagues and determine how what is going on nationally, as well as right around us, should and will affect what we teach and how we teach it. In schools that have large departments, sharing information that we read is something that should take place in regular meetings. In schools with smaller departments, we should make use of the Internet and email to converse with others. Of course, an organization's NEWSLETTER is also a place to bring up questions and make editorial comments – I'd welcome yours!

WHAT MATHEMATICS SHOULD ALL COLLEGE STUDENTS KNOW?

Excerpts from an article by William L. Briggs.

Marie and Alex just paid \$250,000 for a house. They made a down payment of \$50,000 and assumed a 30-year \$200,000 mortgage with a fixed annual interest rate of 7.50%. The house will serve as a residence for several years, but Marie and Alex also view it as an investment, as property values in the neighborhood are projected to increase at a rate of 5% per year in the near future. Suppose the couple sells the house after eight years. Neglecting income tax deductions, do they come out ahead on their investment?

This question doesn't sound like one encountered in most mathematics courses. First, while it is a problem in words, it is not the dreaded word problem that many of us remember from high school mathematics courses. Second, the problem is relevant and immediate; it is unlikely that a student would respond to this question with the familiar "tell me what this has to do with my life." Third, while the solution involves fairly elementary mathematics, it is a multi-step process that requires organizing several pieces of information. Fourth, the solution requires some understanding of home mortgages and appreciation of property values; these topics are not considered mathematics, but they represent *applications* of mathematics. Finally, the problem invites discussion and extensions: What assumptions were made in arriving at an answer? How would the answer change if Marie and Alex are in a 28% tax bracket and income tax deductions are considered? How would the answer change if the interest rate were 8.00% or the appreciation rate were 4% per year? What is the minimum time that Marie and Alex must they live in the house before they break even?

<snip>

There are several observations that bear on the teaching of liberal arts mathematics and explain why it is so challenging. First, teaching such courses is not a high priority of many mathematics departments, and it is not the concern of many full-time faculty members. As a result, the design and teaching of these courses is often neglected.

Second, students who take liberal arts mathematics courses often are victims of previous mathematics courses and instructors. Not surprisingly, they harbor genuine fears of mathematics, have lost confidence in their quantitative skills, and have little belief that mathematics might be of use in their future. It is unfortunate that because of poor advising or lack of alternatives, many of these students mistakenly end up in the calculus pipeline, taking a college algebra course. The outcome is invariably catastrophic.

Third, because of the second observation, providing liberal arts students with a worthwhile experience in their last mathematics course requires overcoming significant psychological obstacles. It *cannot* be done by subjecting students to more of the same experiences they have had in previous mathematics courses. It *can* be done by demonstrating the breadth and utility of mathematics with compelling examples of how it affects students' lives in immediate ways.

Finally, most mathematics educators have a shared understanding of the content of an algebra course or a calculus course. By contrast, there is no common agreement, at the moment, about the content and expectations of a liberal arts mathematics course. Indeed, transferring such courses between institutions is often difficult.

The task is further complicated by the *algebra dilemma*, one side of which is the belief that a minimally educated person must be proficient with the abstractions and manipulations of algebra. Risking analogies with other disciplines, this claim might be compared to the belief that a student must be able to identify a diminished seventh in order to have a lifelong appreciation of music, or that Sartre must be read in French in order to understand his philosophy. For calculus-bound students, there is no question that algebra is a gatekeeper and its thorough mastery is essential. For a more general audience, such as liberal arts students, competence with selected algebraic skills is important. But it is quite common for mathematics teachers to err on the side of too much of a good thing.

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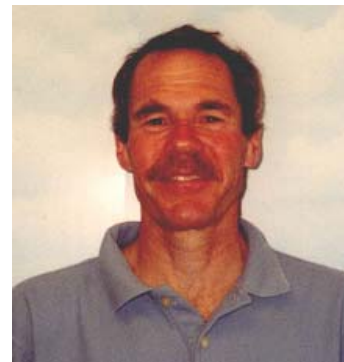
For those of us who have spent much of a lifetime studying, using, and teaching mathematics, it is difficult to concede that when it comes to algebra, less could be better. However, this concession is an important key to designing a successful liberal arts mathematics courses.

<snip>

The consequence of being selective about algebra and including a variety of practical topics is not a watered down mathematics course. The tradeoff is that mathematics becomes part of a larger set of skills, often called *quantitative literacy* or *numeracy*, which involves critical thinking, problem formulation, and written and oral communication. The quantitative reasoning approach allows students to see mathematics in a larger interdisciplinary setting that provides new problem-solving and decision-making powers. It presents mathematics *in context*, as a discipline that is connected to the world around them and essential to an understanding of that world. It also provides students with a much broader survey of mathematics and statistics than afforded by other courses.

<From an article by William L. Briggs, Mathematics Department, University of Colorado at Denver. The full article can be found at: <http://www-math.cudenver.edu/~wbriggs/qr/chronicle.html>>

William L. Briggs



BACK TO THE FUTURE IN MATHEMATICS EDUCATION

Excerpts from an article by William L. Briggs.

<snip>

The purpose of the two recent studies is to clarify just what constitutes high-quality preparation—both for higher education and for the world of work. The first, “Standards for Success”, is a 2003 project of the Association of American Universities that claims to describe the “content knowledge and habits of mind that are valued by leading research universities” and that are necessary “to succeed in entry-level university courses.”

As befits its wide-ranging role in society, mathematics appears in “Standards for Success” both in its own chapter and in adjacent chapters on science and social science. The mathematics chapter emphasizes primarily just one of the four objectives named in “A Nation at Risk”, namely, the algebraic and geometric skills required to succeed in university mathematics courses. Other content goals of mathematics suggested in “Risk” (probability, applications, and estimation, for example), as well as uses of high school mathematics in subjects other than college mathematics, are left to these other subjects.

Standards for Success moves beyond Risk in two noticeable ways. First, unremarkably, it acknowledges that the study of calculus requires specialized mathematical preparation that is not a universal requirement for success in college. Examples of such topics (irrational and complex numbers, polynomial arithmetic, trigonometric identities, for example) are marked with an asterisk.

Second, and well worth remarking on, is a strong emphasis on what Success calls “habits of mind.” Some are of special importance in mathematics:

- Make and use estimates in appropriate contexts;
- Understand the roles of proof and counterexample;
- Calculate fluently;
- Use mathematical terminology correctly;
- Employ multi-step methods;
- Translate words into equations; and
- Use calculators accurately and appropriately.



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Others, while important for mathematics, apply to all subjects:

- Think conceptually, not just procedurally;
- Demonstrate flexibility and adaptability;
- Reason logically and use common sense;
- Demonstrate inquisitiveness and think experimentally;
- Revise unproductive strategies;
- Take risks, accept failure, and then try again;
- Question results, explain and defend answers;
- Write clearly (an "important indication" of understanding); and
- Work effectively both in groups and alone.

Lynn Steen



The second recent study, released in early 2004, is "Ready or Not: Creating a High School Diploma That Counts," from the American Diploma Project. This study seeks to document "must have" competencies needed for high school graduates "to succeed in postsecondary education or in high-performance, high-growth jobs." ("States Must Beef Up Diploma Demands, Study Maintains," Feb. 11, 2004 -- <http://www.edweek.org/ew/ewstory.cfm?slug=22Diploma.h23>.)

The contrast between "Ready or Not" and Standards for Success is instructive.

Both outline required programs in high school mathematics that for average students would require three years of study. Both also signal the importance of certain advanced topics that are required for the study of calculus, but that lie outside the boundary of "must have" competencies for all students. This "asterisked" emphasis on preparation for calculus highlights the importance (some argue, stranglehold) of calculus in the transition from school mathematics to quantitatively intensive college majors.

A major difference between these two reports is their outlook on the school subject called "mathematics." Standards for Success identifies school mathematics primarily with topics in algebra and geometry needed for college mathematics. "Ready or Not" adds aspects of data analysis, statistics, and other applications that are vitally important for other subjects as well as for employment in today's data-rich economy. These additional topics (data representation, scatter plots, normal distribution, correlation, sampling bias, conditional probability) were documented by the American Diploma Project as essential for high-performance work and higher education.

As Standards for Success moves beyond A Nation at Risk, so "Ready or Not" moves beyond Standards for Success. Yet neither report adds much new to what the authors of A Nation at Risk said so forcefully 20 years ago: All districts should require three years of high school mathematics including algebra, geometry, and statistics; all mathematics courses should be equally demanding; and all students should learn the habits of mind and data-oriented skills that are widely used in society.

<From an article by Lynn Steen, St. Olaf College. For the full article, see "Education Week", Wednesday, April 7, 2004, Volume 23, Number 30, p. 34,36. Or see <http://www.edweek.org/ew/ewstory.cfm?slug=30steen.h23>>

Orlando 2004

