California Mathematics Council Community Colleges

President's Report

Katia Fuchs, City College of San Francisco

A lot was on my mind as I was writing this report.

Since the last time I wrote a report, a guidance memo regarding the implementation of AB 705 has come down from the offices of the State Chancellor and the State Academic Senate of California Community Colleges. In it community college mathematics faculty were given default placement guidelines as well as an invitation to innovate provided that those innovations stay true to the framework of the law.

I would like to make it clear that CMC^3 as an organization urges its member colleges to abide by the law. Full compliance is required by Fall 2019, and while some of the changes that come with the law may be difficult to navigate, there is also the opportunity to change radically for the better the ways in which we serve our students.

I would also like to invite our member mathematics faculty to work collegially with each other to devise placement and implementation strategies that, while staying within the framework of the law, are uniquely tailored to address the needs of their local institution. We know our institutions and our students and their needs best, and I don't want us to lose sight of that.

I have the great privilege to serve on the Mathematics and Quantitative Reasoning Task Force of the State Academic Senate. On Saturday September 22nd we met in San Diego at San Diego Mesa College to continue working on a report that will be coming out in late October. In it we will summarize our work on the task force, as well as put forth some food for thought on other areas. These will include making sure we remain conscious of our local demographics and continue to work to serve our communities. Also, thinking of our STEM students, we need to continue work to provide avenues for students from traditionally under-represented groups to feel welcome and encouraged to pursue a math-intensive field.

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President's Report

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In closing, I invite you to stay engaged in this time of great change for our discipline. We have a particularly wonderful conference line-up for Monterey this December including a whole strand on AB 705-related topics. I hope to see you there and I look forward to working with you!

2018 Monterey Conference Is Coming Soon!

Jen Carlin-Goldberg, Santa Rosa Junior College

The 46th annual Fall Conference will be held this year on Friday and Saturday, December 7-8, 2018. We will once again be at the Hyatt Regency Monterey Hotel and Spa. Just like last year, we will host all our conference activities on the upper level of the conference center. We will continue to enjoy the free in-room Wi-Fi and free parking. The "Downtown Monterey" shuttle will be available on Saturday night. Our group room rate remains the same at $139 per night for up to double occupancy. You can make reservations online at https://book.passkey.com/go/2018CMC3 (Note that the hotel services fee will be waived at check-in even though it may appear in the projected costs online.) If making reservations by phone, mention "CMC3 Group Rate" when calling Hyatt Passkey Reservations: 888-421-1442. For more information on the hotel, please see the hotel website at www.monterey.hyatt.com/en/hotel/home/html.

There is an exciting program again this year that will offer a wide range of sessions appealing to many areas of professional development and classroom interests. We have an entire strand of talks dedicated to AB 705 with Dr. Janet Fulks representing ASCCC to talk about what is happening at the state level and several speakers describing what they are doing in their own departments.

Our Friday night keynote, titled **"*Sometimes Pi Equals 4*"** will be presented by Dr. Cornelia A. Van Cott of the University of San Francisco. Cornelia is an associate professor and chair of the Department of Mathematics and Statistics at the University of San Francisco. She enjoys working with children at math circles and summer math camps and also serves on the leadership team for the San Francisco Math Teachers' Circle.

Our Saturday keynote, titled "*How to Read a Math Book: Reshaping Math Education Through Primary Historical Sources*" will be presented by Dr. Adam Glesser of California State University, Fullerton. His primary research area is in the representation theory of finite groups, though he also does research in complex numbers, curvature, differential equations, affine geometry, and math education.

Two popular traditions will continue, though this year there will be some changes. The Estimation Run/Walk will be first thing on Saturday morning at 7:30 am, as per usual. Pearson will not host Game Night this year. We are working on another way to continue to host the event, so stay tuned!

The full list of speakers and their titles, as well as the latest information about the conference, will soon be available at the conference website: http://www.cmc3.org/conference/Monterey18/Monterey18.html

You should soon be getting the official mini-program and registration form via US Mail. Please feel free to disseminate the information and copies of the registration form among your colleagues, both full time and adjunct! We continue to offer online registration! We are excited to see everyone in December!

Math Nerd Musings: AB 705, Harmonious Planning, and Inspired Pedagogy

Jay Lehmann, Editor, College of San Mateo

My department has had a jump-start on AB 705, thanks to a supportive dean, vice president, and president, as well as some very energetic math faculty. We have eliminated arithmetic and elementary algebra and now offer corequisite intermediate algebra and corequisite path-to-stats courses. This spring we will offer a corequisite statistics course and will begin offering corequisite precalculus and applied calculus courses in Fall 2019.

> ... two well-experienced faculty members have gone from never having tried group work to using it in all their classes on a daily basis with great success.

In the first phase of our planning, our conversations were about stressful topics such as the law, whose interpretation varied greatly not only throughout the state but from instructor to instructor in our department. To add to the stress, the interpretations evolved on a monthly if not weekly basis. Once we centered on an interpretation, we had to wrestle with how we were going to respond to the law: for which courses would we offer support courses, how many units would those courses have, and on and on.

These conversations could have gone very badly. In fact, our department fought terribly when sorting out our response to math reform in the 1990s. We were bound and determined to be more constructive this time, which consisted of us asking more questions to understand each other, listening better to what everyone had to say, and not rushing to decisions. "Harmonious Planning" in the title is an overstatement—we did have bumps in the road. But we seemed to have succeeded at responding to faculty's concerns about various issues.

Part of our relatively smooth ride is that we have been okay with some faculty opting out of ever teaching corequisite courses. But what's striking is that some faculty who don't plan to ever teach corequisite courses have attended our professional development activities.

Which leads me to share about the last phase of our planning, which is the exiting and fun part: our training workshops, which have been mostly focused on creating and facilitating affective domain and math activities. We held four two-hour workshops during the spring and two-day workshops at both the start and end of summer. Attendance at the trainings was quite healthy: 25 of 40 faculty.

The variance of experience in facilitating group work in our department is vast: some of us have been facilitating group on a daily basis for decades and others have never tried it. Throughout the trainings, we have emphasized that we are not asking instructors to throw out all the wisdom they have gained throughout years of dedicated teaching. Rather, they can learn to integrate all their skills within a new modality. This is not rhetoric. In fact, in just the

past six months, two well-experienced faculty have gone from never having tried group work to using it in *all* their classes on a *daily* basis with great success. That would not have been possible if they hadn't had so much experience (at least 20 years each).

During some of the workshops, faculty worked in small groups to create activities and then practiced facilitating them while the rest of us pretended to be students, sometimes even acting out typical student misbehaviors. The faculty group work allows instructors who are inexperienced in group work to learn from other group members who are experienced in group work. This is much like how students with a wide variation in mathematical abilities in a corequisite course can help each other fill in prerequisite gaps. In fact, in the first seven weeks of the semester, I have never had to delegate any of my mini-lectures or activities to prerequisite material.

AB 705 has nudged us to what we should have been doing all along: meeting regularly to discuss our success and failures, and to troubleshoot.

Not only did my department work quite well during the stressful beginning phases of planning, we have gotten much closer during the professional development phase. This is not surprising because we're getting to swap notes on what we love to do the most: teach. Unfortunately, teaching at the community college level is generally very isolating. But AB 705 has nudged us to what we should have been doing all along: meeting regularly to discuss our successes and failures, and to troubleshoot.

Starting this fall, instructors teaching our corequisite courses have been attending bimonthly meetings to discuss how things are going in the classroom. Some of us are having greater challenges than others, the level of challenge stemming mostly from students' preparation and motivation. It has been quite bonding to hear of others' experience and to help each other troubleshoot.

Another gift of AB 705 and offering corequisite courses is that there's more time to include more substantial collaborative learning than ever before. Last spring and summer, I devoted most of my free time to writing hundreds of intermediate algebra activities. Throughout this process, I strove to design activities that embraced productive struggle, low floor high ceiling, rich contexts, and open-end questions. I find writing such activities for statistics to be quite easy due to statistics being married to context, but writing such activities for algebra is a challenging task! But on the basis of how well students in my corequisite intermediate algebra course are doing so far (better than in a traditional course), I believe I succeeded.

It's so rewarding to witness groups of students solving algebra problems with such variance in their approaches—that's a sign that true problem solving is at work. The last time I felt this excited about teaching was when I first started.

I never would've guessed that a law that caused me so much stress and confusion would lead to a closer department, inspire me to write significantly better activities, and raise my excitement about teaching to a level I would've never thought possible after 30 years of teaching.

At the Monterey Conference, I'll be presenting with Chris Walker about our corequisite program, with an emphasis on specific engaging intermediate algebra and precalculus activities.

Good News about Early Implementers of AB 705

Hal Huntsman, City College of San Francisco

If you're like me and my colleagues, you're scrambling to comply with AB 705. We've met to discuss the law and the memos from the Chancellor's office and Academic Senate. We've gone to workshops and sought help from others. Yet, we still have many questions -- the default placement rules show that placing students directly into transfer-level math gives them the best chance of completing their math requirements, but how do we best support students in those classes? What kinds of support will improve the success of students who had trouble with math and lower GPAs in high school? How can we make this happen by fall 2019?

Fortunately, a Public Policy Institute of California (PPIC) study of California community colleges that implemented reforms similar to those mandated by AB 705 sends an encouraging message. The report, released in August, tracks students in the 2016-17 cohort using statewide MIS data. It shows that early implementer colleges had the highest one-year completion of transfer-level math in the state. For example, at College of the Siskiyous, where all students are now eligible for transfer-level statistics with an embedded support lab, 58% of students completed transfer-level mathematics within one year, compared to the statewide rate of only 28%. Cuyamaca College achieved similar results (57% completion) using a combination of multiple measures placement and corequisite support in the transfer-level statistics, precalculus, and applied calculus.

The study also found that about 70% of students in Statistics with corequisite support completed the course within a year – around two to three times higher than students enrolled in an accelerated one-year Statistics pathway at the same college. In addition, outcomes for low income students and students of color in math substantially improved. For low income students, the average one-year completion rate of transfer-level math at early implementer colleges was 49%, compared to 23% statewide. For African American and Latino students at early implementer colleges, one-year math completion was 46% and 48%, respectively. While we're still seeing a gap compared to other students at those colleges, these are huge improvements over the statewide averages of 13% and 19% for those populations.

The takeaways from the PPIC study are significant:

1. Students have the capacity to succeed in transfer-level math when we allow them into those courses.
2. Corequisite remediation can improve success rates significantly for all students, including low-income students and students of color.
3. There are models out there to help us get ready for Fall 2019.

I look forward to the day, not too distant, when all 114 California community colleges have fully implemented AB 705. These results suggest that when we do, we will see dramatically improved success rate for our students. That will be a result of which we can all be proud.

Finally, I encourage you to look up your college's results in the PPIC study technical appendix. The data may surprise you.

(see "Good News" on p. 20)

What's Happening at Mendocino College

Leslie Banta, Mendocino College

Like many colleges up and down California, Mendocino College is busy preparing for the implementation of AB 705. The department faculty considered a number of options before deciding on one that involved as little modification as possible to their current pathways, which were recently re-designed.

MC will be keeping their developmental courses for those students who wish to take them. Located in rural areas, MC's four campus sites serve many students from low-income backgrounds, English learners, and returning adult students who did not have algebra in high school. We also serve a good number of high school and homeschooled students through independent study programs. While we will be offering fewer sections of these courses, we felt it important to keep them for those students who would not be best served by being directly placed in a higher-level course, even with support.

Previously, MC had a 3-pathway sequence that included Applied Math, Acceleration to Statistics, and a traditional B-STEM pathway. Placement in these courses already took into account high school coursework but we are looking at revising placement to include GPA.

After much discussion, it was decided to eliminate the acceleration to Statistics pathway in favor of keeping the Applied Math pathway, a two-course pathway which leads to Statistics. This pathway serves students' needs by providing an Applied Math course that meets the institutional math requirement for an AA/AS and prepares students for both the math they will see in their lives outside of math class and transfer-level coursework in Statistics.

The B-STEM pathway will continue to include an Intermediate Algebra class with support for those who are highly unlikely to succeed without it. The support course will be required for students who have not successfully completed a college prep Alg. I or college Elementary Algebra course. This decision takes into account the fact that local feeder high schools have a graduation requirement of 2 years

of math and a minimum of a Basic Algebra course. It did not seem prudent to place all students, many of whom have never been exposed to a rigorous Algebra I course (let alone Algebra II), into a transfer-level B-STEM course as we believe they would be highly unlikely to succeed, even with co-requisite support.

Each of the pathways we will have moving forward allows entering students to have the option of completing a transfer-level math class within 1-year of enrollment. Many students will place directly into transfer-level work and those who still need the foundational skills necessary for success in college-level math will have access to them. MC will collect data on student success and retention to ensure that equitable outcomes are maintained and to compare to the guidelines in the implementation memo from the Chancellor's Office. We have every expectation of meeting (or exceeding) the outcomes in those guidelines with pathways that meet the needs of the students that we serve on our campuses.

What's Happening at Lake Tahoe Community College

Larry Green

ZTC Math Grant

Our mathematics department was awarded a ZTC grant by the CCC Chancellor's Office. ZTC stands for "Zero Textbook Cost" and the purpose of the grant is to provide students with the opportunity to take all of their courses at Lake Tahoe Community College (LTCC) and never have to spend a dime for their textbook or other course materials. For most courses such as the general education history class an instructor can just adopt a free textbook and have a ZTC class, but for mathematics, our classes all have a costly online homework component. Thus, our main challenge was to develop such a system that was as good as or better than what the publishers offered. Fortunately, David Lippman's free MyOpenMath is a strong

platform with a gentle learning curve. There were already tens of thousands of math problems written. We just had to put it all together as assignments connected to the Open Educational Resource textbooks (mostly OpenStax) that we had adopted. The grant funded a wonderful team of fifteen mathematics faculty from several California community colleges to put this all together. They gathered the questions that applied to the textbook sections and authored

many more when existing questions were unavailable. Each question is linked to the textbook, a helpful video and hints if needed. This fall, our LTCC mathematics department will be piloting the open textbooks along with the MyOpenMath assignments for practically every math course taught at our college. Students will no longer drop our courses due to not being able to purchase the homework system license. Moreover, we can now easily add in custom math questions whenever we feel like they will help our students learn. Since this work is part of the OER movement, any college can use the system at no cost to their students. If you have any interest in this for your college I would be happy to help you. Just email me at drLarryGreen@gmail.com.

Math Boot Camp

I am sure that every college is working hard to address the new AB 705 law that requires that we provide our students the maximum chance of getting through their transfer level math course in their first year. Every college is addressing it differently with some getting rid of their

pre-algebra and beginning algebra courses and replacing them with a statistics pathway that is light on the algebra or by including supplement courses for students to go to while they are taking intermediate algebra. At LTCC, we have adopted the boot camp strategy. A week or so before each term, students who need it take an intense one week math boot camp where they are in class each day for several hours straight. The goal is to bring back the mathematics that they have forgotten over the months or years. Every hour we take our students outside to do fun math such as math aerobics and group body graphing so that they are not stuck in a classroom all day. With our instructors working with the students intensely for so many hours, they can easily place the students where they will most likely succeed. We have found that the one week of boot camp saves our students an average of 18 weeks of coursework and maximizes their chances to finish their transfer level class by the end of their first year.

Math Club Tutoring

LTCC has an active math club whose main activity is to organize a volunteer after-school tutoring program for K-12 children. Although they do not receive money for this, tutoring children is a wonderful way to keep up on their basic math skills and personal skills. The club tutors Monday through Thursday each week when school is in session. This is the 23rd year that the club has offered the tutoring; if you go to the K-12 schools, many of the current math teachers were once LTCC math club volunteers.

What's Happening at College of the Sequoias

George Woodbury

These are exciting times at College of the Sequoias!

We now serve three campuses – the main campus in Visalia, as well as sites in Hanford and Tulare. Although we are separated, we still function as a single department over the three campuses.

Our newest hire, David Jones, started as a full-time instructor this fall. David is the fifth full-time instructor who began his college career by taking classes at COS, and we are proud to have so many

former students coming back to join us as colleagues. David was also recently selected to be part of this year's cohort in AMATYC's Project Access. This is a great program for new faculty at the beginning of their careers. (See the article on page 17.)

As a department, our energy has been focused on creating new courses, as well as support courses, to put us in compliance with AB 705 by Fall 2019. Students will begin in one of three entry-level courses: Introductory Statistics, College Algebra, and Math for Teachers. Depending on high school GPA and math classes taken in high school, some students will also take a 2-unit corequisite support course. The support courses will cover prerequisite skills taught in a just-in-time format, study skills, reading comprehension, and developing a growth mindset. We are happy to

(see "College of Sequoias" on p. 20)

The History Corner

Joe Conrad, Solano Community College

This is my first article about the history of mathematics in this newsletter (or anywhere else for that matter). I must admit that I am a bit in awe of John Thoo's long commitment to providing us with interesting and informative columns on math history. I want to thank him for his contributions and I also want to thank Editor Jay Lehmann for having sufficient confidence in my abilities to ask me to take over.

For this first article I should state my philosophy for what follows. I do not consider myself a professional mathematical historian. Therefore, these articles should not be viewed as the result of original research. I view myself here as more a storyteller who is trying to provide fellow math educators with information they can use to enliven their classroom discussion of mathematical topics. I have found that students get more interested and engaged if they see the human side of math with all its weirdness, rather than just the sterile view we usually see in textbooks. Unlike my more erudite predecessor, I will not do much footnoting, but in the interest of inviting people to look more in depth, I will usually provide some references.

Over the years, I have given quite a few talks at conferences and two of my favorite subjects are π and infinite series, so what better way to begin my tenure as the history writer than to discuss the origins of the first series that could be used to compute π. This article will also give a glimpse into the fact that much in calculus predated Newton and Leibniz who are usually credited with inventing it.

As most calculus texts are happy to tell us, the Leibniz series is as follows:

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$$

In Calculus 2, we typically derive this series by computing the series for arctan(x), namely:

$$\arctan x = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \cdots$$

After noting it converges at $x = 1$, we substitute and get the Leibniz series. Some calculus books (e.g. Stewart) tell us that the arctangent series itself is called the Gregory series. Would it surprise you that both of these series were found prior to what is called "the invention of calculus" and that the first one was known in India over 150 years before it was in Europe?

Gottfried Leibniz (1646 – 1716) and James Gregory (1638 – 1675) have both left behind written details of their work that allow us to see what they did and when. Leibniz was not trained as a mathematician, but as a lawyer. He started to study mathematics in earnest after meeting Christiaan Huygens in Paris in 1672. He was intrigued by quadrature problems, what we would call finding the area under a curve, and started to look at the quadrature of the circle. He used geometric considerations which led him to (what he would later call) an integral for arctan x. To evaluate this integral, he essentially used integration by parts to get an integral that he could evaluate using the series that Nicolaus Mercator had developed in 1668 for $1/(1+x)$. (This is another series familiar to Calc 2 students!) He then integrated term-by-term using the formula for integrating powers, namely,

$$\int_0^a x^n \, dx = \frac{a^{n+1}}{n+1}$$

which had been known since Cavalieri published it in 1635. He did just what we do which resulted in the series now named after him.

I should note that the series for π was Leibniz's first significant mathematical discovery. He let Huygens know about it in 1674, but he did not actually publish it until 1682. Word got to Newton who praised Leibniz in a letter written in October of 1676 to Henry Oldenburg, secretary of the Royal Society in London. (It is unfortunate that Newton's positive view of Leibniz was to sour later.)

While Leibniz's discovery was noted throughout Europe, he had actually been beaten to the result by James Gregory. Gregory was Scottish, but had spent 1664 – 1668 in Italy where he was influenced by Cavalieri and his geometric advances. Gregory published two books, one in 1667 and the other a year later, that contained many calculus ideas including the first statement and proof of the fundamental theorem of calculus which was in a geometrical form. (Newton had discovered this earlier, but, of course, did not publish it until much later.) He published another book in late 1668 that had more calculus ideas in geometric form including the indefinite integrals of tangent and secant.

Despite being rather isolated in Scotland, he was kept up to date on the latest advances through his correspondence with amateur mathematician John Collins of London. In December 1670, Collins sent to him Newton's series representations for $\sin x$, $\cos x$, $\arcsin x$ and others and added that Newton had a method that could be applied to any function. Two months later, on February 15, 1671, Collins replied saying, essentially, that he thinks he knows Newton's method and included the series for several other functions including $\arctan x$. There is no record that Gregory ever used this series to find the series for π, but it is hard to imagine that he never plugged in a 1. This is why Leibniz's name is attached to the series for π and Gregory's is attached to the arctangent series.

Gregory is actually another sad story of promising mathematicians who die too young. After returning from Italy in 1668, he lived in the isolation of seventeenth century Scotland, and we only know of his later work through his correspondences. He died in October 1675 at the age of 37 after a brief illness. To add to the sadness, since he thought he had only rediscovered Newton's method for finding series, he did not attempt to publish it. Since Newton did not publish either, Gregory would not see that his method was different. He had actually discovered what we now call Taylor series 40 years before Taylor. We can only imagine what the development of calculus would have looked like had James Gregory lived a long life.

In the mid-twentieth century, researchers rediscovered Sanskrit texts that show that the series for $\arctan x$ (and other trig functions) were actually known to mathematicians in southern India by the about 1500! In the earliest known manuscript, written by Kerala Nilakantha (c. 1450 – c. 1550), the results are given in verse form without proof. However, a commentary that dates from about 1530 by Jyesthadeva (c. 1500 – c. 1600) includes a proof. These documents were unknown to the west until at least 1835 when a paper by C. M. Whish described them, but the paper went unnoticed for about 100 years. Little is known about these Indian mathematicians, but their work significantly predated their European counterparts. Indian mathematicians had long

known of trigonometry and used it for their astronomical work. This work required an ever-increasing accuracy that better values of π could provide. It is noteworthy that Nilakantha's treatment of the series includes some error approximations that did not show up in the work of Leibniz or Gregory. Like Liebniz, the proof given is geometric, but rather than doing a quadrature, Jyesthadeva's proof comes from trying to find the length of the arc of a circle. To set up his integral, he essentially used a limiting process of smaller and smaller triangles. (Leibniz used a similar idea in his work.)

I should finish with noting that having a series that expressed π gave mathematicians a more efficient way to approximate it than the geometrical methods employed prior to this. Of course, the Leibniz series is terribly inefficient for doing such a computation. While there were others who made progress in this area, the major computational breakthrough occurred in 1706 when John Machin observed that π/4 is equal to 4arctan(1/5) – arctan(1/239). Each of these terms converges rapidly which gave π digit hunters a method that was used for a long time, but the details of that story will have to wait for another column!

References

Beckmann, P., *A History of Pi*, Dorset Press, New York, 1971.

Boyer, C., *A History of Mathematics*, Princeton University Press, Princeton, 1968.

Katz, V., Ideas of Calculus in Islam and India, *Math. Mag.* **68** (1995) 163 – 174.

Roy, R., The Discovery of the Series Formula for π by Leibniz, Gregory and Nilakantha, *Math. Mag.* **63** (1990) 291 – 306.

Recovery after the Tubbs Fire, A Collection of Stories

Jennifer Carlin-Goldberg, Gale Bach, and Kirby Bunas
Santa Rosa Junior College

On October 8, 2017, the Tubbs fire began; ripping through northern Santa Rosa, destroying more than 5,600 structures and causing 22 deaths before it was finally contained on October 31. This was the largest of the five fires in the area around the College.

A few hours later, Santa Rosa Junior College announced the campus would be closed, a closure that lasted two full weeks. Many Santa Rosa Junior College Students, Faculty, Staff, and Administration lost their homes along with all of their possessions.

It has been about a year since this disaster hit our community, and it is important that we remember what happened and what the Santa Rosa Junior College's Mathematics Department did to help our SRJC community recover. Here are a few of those stories:

John Martin and the Math Poster. *By Gale Bach*

On Monday, October 9, 2017, around 1:30 a.m., Sonoma County officials began to evacuate neighborhoods

in and around Santa Rosa due to fires racing through the city. Some had only minutes to escape before flames engulfed their homes; some escaped with only the clothes on their backs. The fire is now known as the "Tubbs Fire." It was the most destructive wildfire in California's history. From the fires, the city lost 3,000 homes and 5% of its housing stock. At Santa Rosa Junior College, hundreds of students, staff, and faculty loss their homes in the fire. In the Mathematics Department, several of our colleagues lost their homes.

One of those colleagues was John Martin and his wife Debra. Many of you know John; you probably have attended one of his many talks he has presented at CMC^3 conferences. John retired this past spring after teaching 37 years at Santa Rosa Junior College and 44 years in all!

One of John's many hobbies was creating the graphic art for the covers of CMC^3 conference programs and t-shirts which were sold at the conference to raise money. Over 17 years, from 2000 to 2016, John made the designs for the conference. He saved and stored many of the t-shirts he made over those 17 years. But they were all destroyed in the fires.

To commemorate John at his retirement, we presented him with a poster of all 17 designs (see right column). He said he will hang it proudly in his new home that he and Debra are rebuilding. In fact, the building plans have been approved by the city and they scheduled construction on their new home to begin by last week.

Dinna Withrich and the Mad Math Textbook Scramble. *By Jen Carlin-Goldberg*

Campus was still closed, but there was work that needed to be done so the SRJC Mathematics Department's Administrative Assistant, Dinna Withrich, came in to the office. Smoke was thick around campus and inside the building it wasn't much better so Dinna donned

her now very fashionable breathing mask and went to work. First, the student employees, the PALS, timesheets were due and Dinna needed to make sure they got paid on time. Second, hundreds of students lost their textbooks in the fires and they all needed new ones.

Dinna and her husband evacuated that first night and did not know the fate of their home for several days. "We had more time than most." Dinna said. "Some people woke up to their house being on fire. We had time to bring a few things." Luckily, by Tuesday they learned

that their house was safe.

During the second week of campus closure, she started making phone calls and sending e-mails to publishers with one simple question, "What can you do for our students?" Most publisher reps were generous, offering books and other materials to help students get back on track. There was one hold-out, but Dinna was quick to point out how generous their competitors were being and they had a change of heart.

Books for our students poured in and Dinna, with the help of our faculty, distributed the books to our students. Between the generous efforts of the SRJC bookstore and Dinna's mad math textbook scramble, all of our students were able to re-acquire their course materials.

What do you do when two weeks are gone?
By Kirby Bunas

What would your department do if your college were to shut down for two weeks mid-semester? I guess I can't say what your department would do, but I'll tell you what we did, October 2017, when the fires ripped through Santa Rosa.

Initially, we sent out e-mails to our students with a simple message: Don't do schoolwork; don't worry about school. Stay safe, and keep others around you safe. As instructors, we had to follow the advice we gave our students. We didn't know when we'd be back teaching because the fires were still raging, but we also had to keep safe and do what we could to help others.

When it became apparent that the closure would last two weeks, a few of us began talking about our mathematics courses. Should we expect our students, still in various states of shock, to finish all course topics and to cover eight weeks of material in only six? At first, we collaborated over e-mail and google docs. More instructors joined in, and we decided to call a meeting for the Friday before classes resumed. We made it clear that the meeting wasn't obligatory: several colleagues had lost homes and others were caring for families who had lost theirs. Incredibly, almost our entire mathematics department was present, including one instructor who had lost his home.

During that meeting, we created a document which included recommendations of one or two topics per course that could be cut or lightly covered. The purpose of the document was to guide us both during that semester and in subsequent semesters. For example, if we cut linear inequalities in two variables from elementary algebra, then an instructor teaching intermediate algebra the following semester would know to include that topic. We also talked about pedagogical changes. Take-home tests and supplemental video assignments were two of the many ideas that were discussed, but we also realized that these, if overused, could lead to covering eight weeks of material in six weeks' time—the very thing we were trying to avoid.

Personally, it was extremely difficult to come back to my classes that following Monday, but I was grateful that our department had prepared for it together.

Making Cultural Assets Count: Lessons from a Yucatec Maya Village

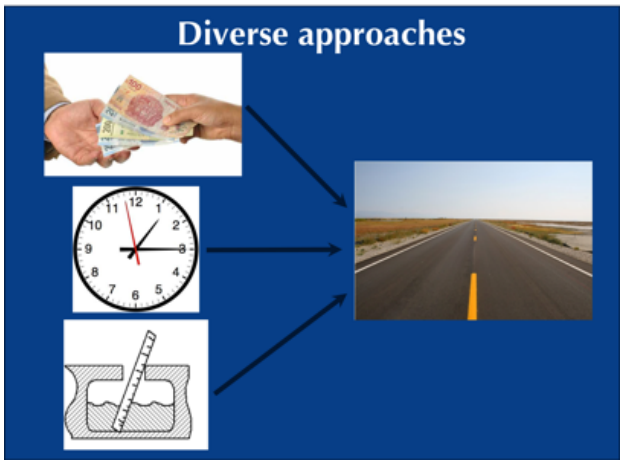
Felicia Darling, Santa Rosa Junior College

A Yucaten Maya carpenter from Tunkurunchu (pseudonym) remodels a kitchen without standard tools like a ruler or a level. Instead he is armed with a piece of string, a plastic pvc pipe with a bubble of water, and local knowledge of the 3-4-5 triangle. This specialized, practical engineering expertise is exceptional. However, he believes that he cannot do math, because he did not go to school.

This story underscores the cultural incongruence between home and school math knowledge that exists in many communities. This is a particularly relevant issue for Yucatec Maya math students, because math scores among the indigenous in México are low and high-school dropout rates are high. Perhaps developing math instruction that is more culturally compatible could improve students' sense of belonging in school and thus improve retention rates and math scores.

In this 6-month ethnographic study, over 50 people, aged 10 to 90 years old, from a Yucatec Maya village were asked, "How do

you use math in everyday life?" It was evident from their answers that they regarded "math" as arithmetic that you learn in school and believed that if a person did not go to school, then they were not good at math. However, when villagers were asked, "How do you improvise in everyday life? They



responded with innovative approaches to solve math problems in their daily lives. For example, with no gas gauges, speedometers, or odometers on their motorcycle taxis, mototaxi drivers improvised innovative methods to calculate mileage and to ensure that they did not run out of gas. José, for example, had a complex system of checks and balances. He used three different quantities as proxies for kilometers driven: (1) money, (2) time, and (3) centimeters. He surmised that if he collected 100 pesos in fares or if it was 1pm, then it was time to fill up his gas tank. When I asked him if he could take me to the next village, he unscrewed his gas cap, and eyeballed the level of gas in there, and said yes.

In another example that illustrates the community's autonomy and improvisation, two Yucatec Maya boys, aged five and nine, want to fly a kite, but they have no money. They engineer a kite using hand-torn, black plastic garbage bags, salvaged fragments of wood, and mixed remnants of red, blue, and yellow cotton twine and fishing line. For an hour, they pilot their construction at the ocean's edge, without adult supervision. They experiment with launches: tossing the kite up against the wind, with the wind, from the top of a stone wall, and from inside an abandoned boat. They innovate and improvise. They lengthen the kite line by adding salvaged beach string; add weight to the tail; and adjust how the kite line is attached to the cross spar. Three times, they extricate the kite from the branches of an Uva del Mar tree. When these boys arrive in the local middle school classroom, to what extent will math teachers capitalize upon this wealth of practical problem-solving expertise? This is one of many examples that illuminates the practical mathematical expertise local students possess that may not be capitalized upon in the local math classroom.

To explore if math instruction could be more culturally relevant for these Yucatec Maya, middle-school, math students, I piloted two math tasks. I worked with a cultural insider to incorporate cultural knowledge into these tasks, which referenced aspects of local life. Also, because the tasks were completed in groups, they invited students to collaborate to use their autonomy and improvisational expertise to solve the problems. One task was based on calculating mileage without gauges or indicators, and asked students to devise a plan to make sure their relative, who was a mototaxi driver, would not run out of gas. The second task asked students to identity three community issues and then design a community center that could address these

issues. The community center must have a right triangle in the middle that is an ecological center. Then they could design three rectangular spaces of any size to surround it. Ultimately, the plan was that they would re-discover the Pythagorean theorem. The Pythagorean theorem was chosen because the instructor said it was a topic that needed reteaching. The tasks were fairly open-ended with multiple solutions, entry points, and acceptable methods for solving them. The students enjoyed both tasks, and the majority of the students persisted in solving them. Students said they liked that they could use *sentido común* (common sense) and did not have to rely on math equations in the mototaxi task. Also, they liked the idea that they could work together, and that they worked on real problems in the community, too.

In conclusion, frequently instructors have a deficit mindset when it comes to students of certain cultural groups—particularly low-income students. Some research emphasizes how poorer students are not prepared for school. For example, "Poor students should know more words." and "Their brains are not the same as more affluent students." This study indicates that students from communities with fewer resources may actually possess specialized, practical math expertise that more affluent students do not possess. They may have more innovative approaches to problem solving, because they solve a wide variety of problems every day with few resources. Also, study results suggest that math instructors could move toward capitalizing upon these approaches involving autonomy and improvisation in the classroom rather than overwriting them.

CMC^3 Region Well-represented with Project ACCCESS

Leslie Banta, Mendocino College

Project what? AMATYC's Project ACCCESS is a mentoring and professional development initiative for two-year college mathematics faculty who are in their first three years of a full-time position. The project's goal is to provide experiences that will help new faculty become more effective teachers and active members of the broader mathematical community.

Fellows participating in Project ACCCESS gain knowledge of the culture and mission of the two-year-college and its students, acquire familiarity with the scholarship of teaching, commit to continued growth in mathematics, and participate actively in professional societies. They attend two consecutive AMATYC national meetings where they participate in a program developed particularly for new faculty, as well as in regular conference activities. In the intervening year, Fellows are required to attend an AMATYC affiliate meeting (such as a CMC^3 conference), MAA Section meeting, or NCTM Regional meeting.

ACCCESS links Fellows with each other and with a group of distinguished mathematics educators. As an integral part of their professional development during the Fellowship year, Fellows are expected to develop, implement, and evaluate a project at their home institution. In addition to learning and networking opportunities, Fellows receive one-year memberships in AMATYC for each year of their Fellowship.

Colleges in the CMC^3 region have been well-represented in the ACCCESS program over the years. Cohort 14 Fellows include Michael Peterson (Las Positas College) and Casey Terrill (Mendocino College). Cohort 15 Fellows include

(see "Project ACCESS" on p. 20)

CMC³ Foundation Report

James Sullivan, Foundation President, Sierra College

The CMC³ Foundation is currently accepting entries for this year's Student Poster Contest. Please announce this invaluable experience to your students and encourage them to take advantage of this unique opportunity. Every student team (with a maximum of two students per team) that presents their Poster Contest entry at the Monterey Conference will share a $150 scholarship and compete to receive a portion of an additional scholarship pool of $500.

To be eligible to present their Poster Contest entry, students must (1) be enrolled in a mathematics course at a California Community College in the Fall of 2018, (2) be accompanied by their faculty sponsor who is registered for the Monterey Conference, (3) submit their Student Poster Contest proposal online at http://www.cmc3.org/conference/callForPosters.html by November 22, 2018, and (4) arrange for their own transportation and accommodations at the conference.

Student posters can explore any topic related to mathematics. Entries will be evaluated on the accuracy of the mathematical content, the quality of the student presentation of their poster, and the overall poster design.

The CMC³ Foundation is able to offer scholarship opportunities, such as the Student Poster Contest, to our students thanks to the generous donations and support of our members like you. Please consider supporting our scholarship fund benefiting deserving California community college mathematics students by making a tax deductible donation today either by credit card or PayPal using the "Donate" button on the CMC³ Foundation website at http://www.cmc3.org/foundation.html or by mailing a check to Leslie Banta, CMC³ Treasurer, Mendocino Community College, 1000 Hensley Creek Rd, Ukiah, CA 95482. You can also support our scholarship fund by attending the Annual Fall Conference held in Monterey this year on December 7 and 8 and purchasing raffle tickets or merchandise (sweaters, shirts, and hats) at the CMC³ Foundation booth. This year the Foundation raffle will feature themed baskets filled with a variety of interesting items. Be sure to drop by and check them out.

Please consider putting one or two newsletters in the copy room for other instructors to read.

The Pleasures of Problems

Kevin Olwell, San Joaquin Delta

Fall 2018: Jack and Jill live in the suburbs. Every afternoon Jill takes the train from the city to a station in the suburbs and Jack drives from home to pick her up. Both always arrive at the station at exactly 5pm. One day Jill gets off work early. She gets to the station in the suburbs at 4pm and decides to walk home along the route Jack takes. As expected Jack meets her along the way and drives her the rest of the way home. Jill gets home 10 minutes earlier than usual. How many minutes did Jill spend walking?

Assume that Jack's (constant) driving speed is the same every day. Also assume that no time is spent when Jack picks Jill up and turns around, both at the station and on the walk home.

Summer 2018: How many solutions does the following equation have:

$$\frac{1}{5}\log_2 x = \sin(5\pi x).$$

Thanks to Carlos Valencia, John Burke, Fred Teti, Joe Conrad and Chuck Barnett for submitting a solution.

Consider the problem graphically: How many times does the the graph of $f(x) = \log_2 x$ cross the graph of $g(x) = 5\sin(5\pi x)$? Since $f(x)$ is monotonically increasing, it will intersect $g(x)$ twice between any pair of consecutive maxima of $g(x)$ provided

$$-5 \le \log_2 x \le 5 \quad \Rightarrow \quad \tfrac{1}{32} \le x \le 32.$$

The 80 maxima of $g(x)$ in this interval occur when

$$x_k = \frac{1}{10} + \frac{2}{5}k, \quad k = 0, 1, \cdots, 79.$$

Between the last maxima at x_{79} and $x = 32$, $g(x)$ decreases from $5 \to 0$, as $f(x)$ increases from $\log_2 x_{79} \to 5$. Thus there is one more point where the two graphs cross for a total of 159.

All are invited to submit a solution to the Fall 2018 problem either via email or US mail at the address below.

Kevin Olwell
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Good News

(continued from p. 6)

See the entire PPIC study at http://www.ppic.org/wp-content/uploads/remedial-education-reforms-at-californias-community-colleges-

Project ACCESS

(continued from p. 17)

Jim Bigelow (Shasta College), Marat Bulut (Cabrillo College), Chantal Cimmiyotti (Mendocino College), David Jones (College of the Sequoias), Ana Mello (Shasta College), Neeti Mittal (West Valley College), and Gabriel Porrata Vallejo (Mission College).

We hope to see these and other ACCCESS Fellows present their projects at future conferences and welcome them to explore leadership positions in CMC^3. Applications for future cohorts are usually available in early March on the AMATYC Project ACCCESS website.

Anyone is welcome to attend our board meetings. If you'd like to attend, please contact anyone on the board. We'll be happy to tell you the date and location of our next meeting.

College of Sequoias

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share what we are doing, and we look forward to working with colleagues from other colleges as we enter the AB 705 era.

Our division chair, Jared Burch, is in the last year of his second term. His leadership and guidance have helped us to navigate our way through these challenging times. Following in his shoes will not be easy, but he has us in a great position as we look to the future.

Mark Your Calendar:

46th Annual CMC^3 Conference December 7th and 8th, 2018

Hyatt Regency

Calendar

October 5, 2018: ArizMATYC Meeting, GateWay Community College, Phoenix, AZ. Contact: Shannon Ruth Website: http://arizmatyc.org/

October 5 - 6, 2018: NDMATYC Fall Conference, Chieftain Conference Center, Carrington, ND. Contact: Michael Kern, michael.kern@bismarckstate.edu

October 12 - 13, 2018: 2018 MichMATYC Conference, Kalamazoo Valley Community College Contact: Kelly Digby Website:

https://sites.google.com/view/michmatyc2018/home

October 13, 2018: Managing the Numbers , CMC^3 South, Newport Beach, CA Contact: Lawrence Perez Website: http://www.cmc3s.org/conferences.shtml

November 2—3, 2018: California Mathematics Council—South 59th Annual Mathematics Conference, Palm Springs. Website: http://www.cmc-south.org/conference.html

November 15–18, 2018: AMATYC Conference, Orlando, FL. Website: https://amatyc.site-ym.com/?2018ConfHome.

November 30—December 2, 2018: CMC North 61st Annual Conference, Student Voice: Let's Hear It!, Pacific Grove, CA. Website: http://cmc-math.org/cmc-north/

December 7–8, 2018: CMC^3 45th Annual Conference, Hyatt Regency Monterey Hotel and Spa, Monterey, CA. Contact Jen Carlin-Goldberg, Santa Rosa Junior College (707) 527-4746, jcarlingoldberg@santarosa.edu

February 23, 2019: MAA Golden Section Meeting at the American Institute of Mathematics in San Jose. See http://sections.maa.org/golden/index.html.

March 16, 2019: SVCCM Conference at Sierra College, Committee Chair Donna Smith, email: dosmith@sierracollege.edu

April 25 - 27, 2019: ORMATYC Meeting, Inn at Spanish Head, Lincoln City, OR. Website: www.ormatyc.org

April 26-27, 2019: CMC^3 23rd Annual Recreational Mathematics Conference, Lake Tahoe CC, South Lake Tahoe, CA. Contact: Mark Harbison (916) 558-2687, mark.harbison@losrios.edu

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