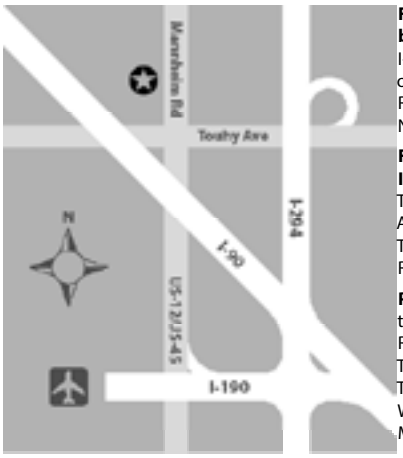
Points & Angles

Newsletter of the Metropolitan Mathematics Club of Chicago
Volume XLV No. 6 March 2016

Looking Both Ways When Crossing The Street -- Lessons Learned From Statistics, Classrooms, & MMC

March Speaker

John McConnell



From I-90 & Southbound I-294: Exit at I-190 West to O'Hare; Exit onto North Mannheim Rd.; Take Mannheim Rd. North 2.25 miles.

From Northbound I-294: Exit at West Touhy Ave.; Take Touhy Ave. to Mannheim Rd.; Turn right on Mannheim Rd.

Public Transit: Take the CTA Blue Line to the Rosemont Bus Terminal; Take Pace Bus #223 to Touhy Ave. & Lee Rd.; Walk East on Touhy to Mannheim Rd.

Friday, March 11, 2016
5:30 PM Doors Open, 6:00 PM Social Hour
7:00 PM Dinner & Talk

Fountain Blue Banquets & Convention Center
2300 Mannheim Rd., Des Plaines
(847) 298-3636
$43 for Members, $49 for Nonmembers

Reserve by Noon, Monday March 7
Online at WWW.MMCCHICAGO.ORG
or by phone at (847) - 486 - 4291

Please make your reservation ahead of time. Remember that fish is only available if you request it with your reservation.

John W. McConnell will be the speaker at our March 11 meeting. His talk is titled "Look Both Ways When Crossing The Street: Lessons from Statistics, Classrooms, and the Metropolitan Mathematics Club of Chicago." Medical and school decision-making will frame the issue of "looking both ways." Diagnostic methods in medicine have traditionally been validated with a positive answer to the question "does the treatment allow us to do good for those designated as 'positive'?" Long-term studies of tests for cancer have established the need for a second question, "Who is harmed by the diagnosis?" John will show some examples of how the second question is relevant in school assessments. He will reflect about the influences his students had in forcing him to look both ways in teaching. Since the problems facing teachers and schools today are multi-dimensional, he promises to generalize to "Look Both Ways When Crossing the Plane" with examples from MMC talks that illustrate orthogonal thinking.

John McConnell has been educated in Cook County. A Thornton Township High School graduate, he earned his B.S. and M.A.T. degrees in Mathematics from the University of Chicago, and his Ph. D. in Mathematics Education from Northwestern University. He is still being educated by MMC. He taught at Hyde Park High School and at Glenbrook South High School, where he was Instructional Supervisor of Mathematics for 27 years. John taught Statistics at North Park University for nine years. He currently works at ECRA Group in Schaumburg, a company he helped start 37 years ago. He is Senior Scientist, a title that allows him to play with statistics, mathematics, and computers every day.

John is a former president of MMC and of ICTM. The Illinois Council of Teachers of Mathematics presented its Distinguished Life Achievement Award to him in 2013. He is a co-author of several books in the Secondary Component of the University of Chicago School Mathematics Project. During the last century, his high school mathematics tests were published successively, and sometimes successfully, by Scott Foresman, American Testronics, and ACT.

Come learn how examples from MMC talks combined with medical and school decision-making illustrate multidimensional thinking. Make your reservation today for our March 11 dinner meeting. This is a presentation you won't want to miss!

Since this meeting is during Lent, fish is available as a dinner option. A name must be given for each fish entree ordered, and these requests MUST be made by Monday, March 7. Fish entrees will not be able to be provided for reservations made after this date. Please note that there is an additional charge of $8 for the fish entree. If you would prefer, you may also order the vegetarian option at no additional charge.

Points From The Interior

By Patricia Trafton

"Educating the mind without educating the heart is no education at all," and "Everyone can be great because everyone can serve." So said Aristotle and Dr. Martin Luther King, respectively. Two ways schools can help educate students and help them become great is through community service and service learning. Community service and service learning is valuable for adults as well, and on April 30, 2016, members of the Metropolitan Mathematics Club of Chicago will have an opportunity to participate in a community service project.

Community service is defined as "school-wide events, separately organized school-sponsored projects that are conducted by other organizations, such as the Boys and Girls Club and National Honor Society. Examples of service activities could include cleaning up a local beach or park, visiting the elderly, or collecting and distributing food to those in need. They are:

- Non-curriculum-based,
- May be arranged by the school or other organizations;
- Generally do not include explicit learning objectives or organized reflection or critical analysis activities; and
- May include activities that take place off of school grounds or may happen primarily within the school.

Service learning, on the other hand, is curriculum-based community service that integrates classroom instruction with community service activities. Like community service, service-learning may be mandatory or voluntary, and may have service activities that take place outside of or within the school. However, service learning also:

- Is organized in relation to an academic course or curriculum;
- Has clearly stated learning objectives;
- Addresses real community needs; and
- Involves students in drawing lessons from the service through regularly scheduled, organized reflection or critical analysis activities such as classroom discussions, presentations, or directed writing" (Community Service and Service Learning in America's Schools, 2008).

School-based community service has grown substantially since the late 20th century. Though service learning began to be incorporated in earnest into grades K-12 curricula in the 1970s, and federal support for service-learning activities in elementary and secondary schools began in the 1990s, school-based service learning hasn't kept pace with the growth of school-based community service. Yet service learning has positive effects on students' academic engagement and achievement as well as on their social, emotional, and civic development. "Service-learning helps young people become strong in the face of adversity by facing real challenges head on. In the process, they come to understand the relevance of their classroom knowledge and the importance of working together to address common needs."

So how can math teachers incorporate service learning into their curriculum and instruction? First learn about the eight K-12 Service Learning Standards for Quality Practice. Next, search for examples of service learning math lessons. Many can found online including about a high school statistics class that learned statistical formulas and concepts by investigating bullying in a nearby middle school (http://nylc.org/). Closer to home, check out the Chicago Public Schools website (http://cps.edu/ServiceLearning/Pages/Curriculum.aspxone (and click on the Mathematics tab), and you'll find four lessons that imbed service learning into Algebra 1 classes and Geometry classes. The lesson that I find particularly interesting and relevant is titled Hunger in Chicago (http://cps.edu/ServiceLearning/Documents/CU_HungerInChicago.pdf). In this lesson, students work with the Greater Chicago Food Depository(GCFD) to learn about the past, present, and future food needs in Chicago. Students construct statistical graphs and calculate rates of changes. In addition, students work a volunteer shift at the Greater Chicago Food Depository and conduct a food drive for GCFD or a local food pantry and. But the community service at GCFD and the school food drive are not the end of students' service learning. They create presentations about food needs in Chicago and the food collected during their food drive and share them with various classes or groups of their school community. Finally, students brainstorm alternative solutions to the hunger problem and write a reflection about the solution they recommend or prefer.

For anyone looking to infuse service learning into your curriculum, particularly if you teach statistical graphs and/or rate of change, consider teaching the Hunger in Chicago lesson with your students in the next couple of months, and then sign up on the Metropolitan Mathematics Club of Chicago website to volunteer with other MMC members and friends and family on MMC's morning of service at the Greater Chicago Food Depository on Saturday, April 30 from 9:00 a.m. – 11:45 a.m. See the announcement elsewhere in this Points and Angles for more information.

Affiliate Groups Report

By John McConnell

If you are an ICTM member and haven't yet logged in at the new Illinois Council of Teachers website, do so. It is easy to set a new password and then to enjoy the site's organization and contents. If you are not an ICTM member, you can access the website at www.ICTM.org and browse, or even better, browse and join ICTM.

Although we are not affiliates with the Mathematical Association of America (MAA) or with the American Statistical Association (ASA), publications from those distinguished groups have recently highlighted some hot topics that relate to pre-college education.

The ASA devoted two issues of its journal Chance to "nurturing statistical thinking for college." The breadth of the issues is signaled by the lead article, "The Relationships Between Statistics and Other Subjects in the K-12 Curriculum," by our own Zalman Usiskin. Usiskin argues that statistics belongs in four places in the K-12 curriculum: "(1) its traditional place as a part of mathematics: (2) a more accurate place as applied mathematics; (3) as the science of data studied for its own sake; and (4) across the other main subject of the curriculum, inside the teaching of those subjects to help in understanding them." Other articles are on educating teachers to teach statistics, curricula with a statistical focus, support for teachers, online investigations for students, AP Statistics testing, the future of AP Statistics', debate on what constitutes statistics in a "big data" era, security of educational data, and the role of statistics in mathematical modeling (or vice versa). The articles argue for more statistically oriented opportunities for students at all grade levels.

The MAA Press has published Insights and Recommendations from the MAA National Study of College Calculus (Bressoud, Mesa, Rasmussen, 2015). The study was based on a series of surveys of over 13000 students' achievements, goals, motivation, views of calculus, and opinions of calculus instruction in 231 institutions of higher learning. A sample of 3000 students completed a series of five surveys before, during, and after their calculus course. The results are well presented in the publication and lead to recommendations for changes in calculus placement procedures, curricula, and instruction that will increase the student success rate. The authors are quite blunt in their intent to provide direction for high school calculus by highlighting a section in the introduction as "Why this Report is Relevant for High School Calculus."

An overlapping study "Factors Influencing College Success in Mathematics" conducted at the Science Education Department of the Harvard-Smithsonian Center for Astrophysics surveyed over 10,000 calculus students in 134 institutions. One of the summary articles, "The impact of taking a college pre-calculus course on students' college calculus performance" (Journal of Mathematical Education in Science and Technology, 45:8, 2014) has been widely quoted in STEM related professional journals. The authors, Gerhard Sonnert and Philip M. Sadler, contend that their innovative statistical approach showed that a college pre-calculus course did not improve students' performance in college calculus. Further "there were hints that prior participation in a college pre-calculus course might even be detrimental for the calculus performance of certain groups of students." They invite high school mathematics teachers to ask whether their pre-calculus courses are relevant, particularly to STEM students. They challenge math teachers at college and pre-college levels to consider that "all too often, mathematics is taught as a set of concepts developed by mathematicians pursuing goals of beauty and abstraction, when in reality many students might be more interested in solving knotty, concrete technical problems rooted in the real world."

MMC Scholarship Due March 15! Don't Delay!

The Metropolitan Mathematics Club of Chicago is offering a $1,500 scholarship for a high school senior who will pursue a career in the teaching of mathematics. In addition, up to two Filliman Scholarships may also be awarded for the same amount (funded by a gift from the Filliman estate). The selected students, their parents and their sponsoring teachers will be invited to the May 13th MMC dinner meeting at which time the scholarship recipients will be honored.

A selection committee of MMC members appointed by the Board will determine the scholarship awards. To be eligible, an applicant must submit the application, have an official transcript sent, and request a letter of recommendation from a member of MMC such that all of the materials are *received* by March 15, 2016. Please see the mmcchicago.org for further details and the application.

January Talk Summary

By John McConnell

Our January 8 speaker, Steve Viktora, brightened the New Year with his talk, "Two Chariots Leave Different Cities At The Same Time…A Lively Look At Word Problems Through the Ages." Steve pointed out that word problems that have been manufactured over the ages, particularly for algebra, are ripe for ridicule. Many in the audience (if not all) encountered word problems in their schooling that bear no relation to reality. Steve guided us on a tour through six millennia of word problems and urged us to view them as historical artifacts. He stated that word problems provide evidence of mathematical uses over time; they reveal societal concerns and priorities; they were extensions of oral traditions of learning; and they show how mathematics was used and what its societal applications were.

With carefully chosen examples, Steve took the dinner guests through word problems from ancient societies of Sumeria, Mesopotamia, Egypt, Greece, and China, then from India, the Islamic world, and Medieval Europe, followed by Japan, England, and United States in recent centuries.

The earliest societies of Mesopotamia, Egypt, and China are called "hydraulic societies." They were dominated by bureaucracies involved with public works projects such as irrigation, grain storage, land usage, and tax collection. Steve challenged the MMC members to solve a Mesopotamian problem from around 2000 BCE: A triangular piece of land [in the form of a right triangle] is divided among six brothers by equidistant lines constructed perpendicular to the base of the triangle. The length of the base is 390 units, and the area of triangle is 40950 square units. What is the difference in area between adjacent plots of land?

Fortunately for the audience, Steve allowed us to work with pen and paper rather than stylus and clay tablet. Steve also asked each table to work on a circle problem from Ancient Egypt and to deduce the Egyptian approximation for pi.

Moving from the hydraulic societies to Ancient Greece, Steve pointed out a transition from applied, utilitarian mathematical problems to increasingly abstract problems. Greek mathematics made a distinction between applied and pure mathematics. Specifically, the Greeks distinguished the art of calculation, logistica, from the theory of numbers, arithmetica. Problems that are riddles or intellectual challenges appear in a Greek anthology of mathematics problems (500 CE) representing another step away from the utilitarian math of the hydraulic societies.

If one were studying history of government, literature, or religion, the Roman Empire would be next in the chronology. Despite the engineering and military feats that demonstrated the mastery of practical mathematics, Romans aren't credited with significant developments in mathematical thought or with innovations in word problems. Apparently no Roman realized that there could be a fortune in publishing scrolls with problems like "Two chariots leave different cities at the same time…"

India and the Islamic World provided the next steps. Examples of ancient (BCE) Hindu mathematics do not exist. The Bakhshali Manuscript (around 400CE) featured arithmetic. Brahmagupta (ca 628 CE) and Bhaskara (ca 1150 CE) compiled collections of problems. There were important mathematical developments in the Islamic world during that Abbasid Caliphate (750-1000 CE), notably the Kitab al-jabr wa'l muqabalah by Musa al-Khawarizmi (ca 780-850 CE). The word "algebra" derives from al-jabr; and the word "algorithm" from al-Khawarismi.

In Medieval times, Alcuin of York wrote Propositions ad Acuendo Juvenes or "Problems to Sharpen the Young" for Charlemagne's court school. This book contains problem types that would be familiar as puzzles today. A few of us were caught by the sample problem "An ox plows the field all day. How many footprints does he leave in the last furrow?" In 1478, the Italian Treviso Arithmetic was the first printed arithmetic book with Hindu-Arabic numerals and a focus on commercial arithmetic. The needs of merchants and military appeared in arithmetic books over the next 50 years in England, Germany, France, Spain, and Portugal.

In the seventeenth century, Japanese mathematicians began being recognized for their contributions in mathematics. Growth of juku schools broadened the general literacy of the country and popularized business and farming arithmetic. By the end of the century gifts to temples included votive tablets with answers to problems inscribed, but not detailed solutions. The tablets, sangaku, were highly artistic. They were hung around and in the temple. Here is an adaptation of a sangaku: "The inscribed circle O(r) of triangle ABC touches AB at D, BC at E, and AC at F. Find r in terms of AD, BE and CF."

January Talk Summary Continued

Steve showed (relatively) modern recreational examples from popular magazines such as the 18th Ladies Journal in Great Britain, propaganda word problems from a 20th century Chinese Communist textbook, and social/political problems from a variety of countries. Some were grim. However, those of us who remember the famous Steve and Wally talk years ago were delighted to see the history of the famous box problem: "Determine an open box of largest volume that we can form by cutting squares out the of corners, folding up the sides, and the gluing or soldering the joints." And Steve reminded us of some satirical word problems by Zal Usiskin and Dan Kennedy that had appeared in MMC talks.

So what's the word on word problems? Steve said there were important reasons for math teachers to use historical word problems. They should not be considered "extra content." Problem contexts can motivate students, the problems can lead to interdisciplinary work, and above all, the mathematical content is relevant to instructional needs. I was dazzled by problems from a 1909 book "Problems without Figures for Fourth Grade to Eighth Grade and for Mental Reviews in High Schools and Normal Schools." The number-free style was illustrated on the problem he gave his audience for reflection and discussion.

The upper part of a flag pole is painted blue, the lower part red, and a portion in the middle white. If I tell you the sum of the blue and the white, also the red and the white, and the length of the pole, how can you find how much is painted white?

So take your chariot to the MMC Website to get Steve's long version of his slide presentation. You will find problems that you will want to solve, problems that will entertain you, problems that will bedevil you, and problems that you will want to give your students.

Join MMC In A Service Project!

What: Repacking food, sorting produce, looking over a shipment of bread, or repacking bulk dry goods (cereal, pasta, rice) into smaller quantities at the Greater Chicago Food Depository. The food that we repack will be distributed to food pantries, soup kitchens and shelters in Cook County.

Where: Greater Chicago Food Depository: 4100 W Ann Lurie Place, Chicago, IL 60632

When: Saturday, April 30 from 9:00 a.m. to 11:45 a.m. (plan to arrive at 8:45 a.m.)
We will gather for a casual lunch afterwards, location TBD

How: Sign up on the MMC website – name, email address, and phone number are required. If signing up more than one person, the name and contact information (email address and phone number) and age (if under 18) for each person is needed.

Most importantly: You! MMC members, as well as family and friends who are 14 years and old may sign up. Anyone under the age of 18 must be accompanied by an adult 18 years of age or older.

Volunteers must be able to stand for up to 90 minutes while doing some light lifting and bending. Additional information about dress code will be provided upon signup. Questions? Contact Pat Trafton at ptrafton@sd81.org or 847-687-9624.

Deadline to sign-up: Friday, April 8.

Gratitude For Conference Of Workshops

The MMC Conference of Workshops was held on Saturday, February 6th, at Lincoln-Way Central High School. This was the conference's 24th year, and great things were achieved. We had over 500 attendees. It is wonderful that so many people partook in the fabulous workshops.

We were so fortunate to be at Lincoln-Way Central, because they made everything seem like clockwork. In particular, Lisa Parker was amazing as the site coordinator. In addition, the food service was so helpful and yummy, and the students so generous with their time directing teachers from room to room. Likewise, the school's technology department made so much seem effortless, although it wasn't and required months of planning, loading, and changing. Lisa was the center about whom all these wonderful generosities revolved.

MMC's own volunteer crew was irreplaceable. All the folders were stuffed and labeled with care. The crushes of participants were greeted with numerous helpers to get them their registration materials and on their way quickly to a wonderful day.

Heaps of praise is deserved for our registrar Peter DeCraene. He rolls with every change and strange request with patience and intelligence. We are so lucky to have someone so talented and cool.

It may seem like it can go without saying that speakers who run active and thoughtful workshops really make the day, but it won't be left unsaid here. Teachers have enough on their plates, but fortunately about 100 decided they could do even more. The concept of teachers sharing and helping other teachers is why the MMC Conference has been such a success. The idea that teaching doesn't end at our own classroom door is crucial to bettering Chicagoland's mathematics education. Thank you, presenters. After a very hard day, six more teachers decided they had 10 more minutes in them – and they were brilliant. Special thank-yous go to Annie, Glory, Matt, Paul, PJ, and Sue for their post-session magic.

And to those who attended, spread the word to friends and colleagues, and participated actively, thank you. It takes all of us to make something so special.

While we'd like you all to enjoy the glow of success for a great conference, know that the work for next year's is already underway. We encourage you to start thinking about that workshop you're going to run next year. We'll be in touch.

Gratefully, Carol Nenne and Mary Wiltjer

Post Session Speakers From Left To Right: Glory Jurich-Sama, Annie Forest, Susan Brown, Paul Christmas, Paul Karafiol, and Matt Moran.

2016 - MMC Candidate Statements

Please Mail Your Ballot by March 31 Or Bring To The March 11 Dinner Meeting!

Jeff Harding – Jeff teaches at Mundelein High School and is in his 28th year of teaching. "I am an avid reader and researcher about the best practices in education and grading, especially in the field of mathematics, and would be excited to bring that perspective to the MMC Board."

Karen Lopez – Karen is the Math/Science Divisional at Larkin High School. "I am passionate about math and actually do math when I am stressed. I am constantly championing for students to have the opportunities to see the beauty of mathematics and my goal at this time is provide equal opportunities for ELL students that have low socioeconomic status."

Matt Moran – Matt teaches at Whitney Young High School. "I am running for the MMC board to continue the work I have been doing on the board for the last three years." Note: This would give Matt voting power as a member on the board of directors while he is serving as President.

Nicolette Norris – Nicolette teaches at Chicago Vocational Career Academy and she has been teaching for 20 years. "I have served for the past year on the board. I want to serve on the board again because I want to continue to support an organization that has given me so much support over the years."

Rose Sterr – Rose teaches at Benet Academy and has been teaching for over 30 years at various levels. "I find the events, members, and traditions of MMC to be so valuable to me and my teaching. I want to support that however possible, and if being a board member helps sustain this wonderful orgination, I would be honored."

Mary Wiltjer – Mary teaches at Glenbrook South High School and is in her 23rd year of teaching. "I have been a member of MMC for 18 years, during which time I served numerous terms including current roles of Membership Coordinator and MMC Conference of Workshop Co-chair. I am most proud of my energies helping make high-quality professional development available to all Chicagoland mathematics teachers at very low cost.

MMC Membership and Change of Address Form

Mail completed form and check to:

MMC
7339 W. Ibsen St.
Chicago, IL 60631

NAME

PREFERRED CONTACT
Check one:
☐Home ☐Work

HOME ADDRESS

CITY | STATE | ZIP

HOME PHONE | HOME E-MAIL

EMPLOYER

WORK ADDRESS

CITY | STATE | ZIP

WORK PHONE | WORK E-MAIL

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Check the box below for electronic-only membership. You will receive an email with a direct link to each issue of Points & Angles when it is posted on the web site, often before paper copies are mailed. You will no longer receive Points & Angles by mail.

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☐2 years ($57) ☐1st yr teacher*, 1 yr ($20)
☐3 years ($80) ☐retired, 1 yr ($25)

MEMBERSHIP COST $

DONATIONS

SCHOLARSHIP FUND $

SPEAKER FUND $

TOTAL AMOUNT OF CHECK $

* The student and 1st-year teacher memberships are only available as electronic-only.

Make check payable to *MMC*

Upcoming Events

Mon., Mar 7	*Last date to register for fish for the MMC meeting on Friday. See the front page for more details including a vegetarian options.*	
Fri., Mar 11	John McConnell	**Looking Both Ways When Crossing The Street -- Lessons Learned From Statistics, Classrooms, & MMC**
Tue., Mar 15	*Your MMC nomination and the student application form should be turned in!*	
Thu., Mar 31	*Have you turned in your MMC Ballot yet? If not, mail it in today!*	
Sat., Apr 30	Service Project	**Greater Chicago Food Depository**
Fri., May 13	Zal Usiskin	**The Real Big Ten: The Toughest Mathematical Ideas For High School Students To Learn, And How To Approach Them**

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Send upcoming event items to jomalley@glenbrook225.org no later than the date of the MMC dinner meeting preceding the issue in which the item should appear. All items are subject to editing.

Your membership renewal date appears in the upper right corner of the label.

Mailing Label

Stamp

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c/o MMC
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