R C M L

Intersection Points

The Newsletter of the Research Council on Mathematics Learning

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The Research Council on Mathematics Learning seeks to stimulate, generate, coordinate, and disseminate research efforts designed to understand and/or influence factors that affect mathematics learning.

Visit us on the Web at: www.unlv.edu/RCML

PRESIDENT'S COLUMN

Winter Reflections

Bea Babbitt, President

For some, January snow brings thoughts of new beginnings on a fresh canvas. For others, it is a dreaded sign of three more months of winter. For me, it represents a quiet time to reflect on past experiences and the journey to the present.

As I near the end of my term as RCML President it seems appropriate to reflect on nearly two decades as a member of RCML. I was introduced to RCML as a doctoral student at UCLA when a colleague, Nancy Bley, asked for my help with the 1987 national conference in Lake Arrowhead, California. I remember picking up a total stranger, Jon Engelhardt, at the airport and driving the long and winding road to the conference location while tapping the brain of one of RCML's founding members. My advisor, Barbara Keogh, gave the Wilson lecture that year, I believe. While pursuing a Ph.D. in special education, I focused my research on my mathematics education roots – learning problems in mathematics. I began my career as a high school mathematics teacher but ended up in special education as I later worked with students with learning problems in mathematics at a Reading Clinic. When I found RCML it was like finding a professional home, a place where I could think about the best education for all as well as the special needs of some. At the time, very few colleagues in special education were investigating mathematics learning and RCML probably represented the largest group of mathematics educators in the country investigating problems in learning mathematics.

Much to my surprise, at that first meeting in California, I met many of the people whose work I had studied during my Masters in Mathematics Education. I clearly remember how Jim Heddens' work in defining a sequence of mathematics skills helped me pinpoint missing skills and concepts with struggling students. His work helped me understand the role curriculum plays in supporting or inhibiting math concept and skill development.

I remember the insightful way Robert Ashlock talked about and explained mathematics instruction. He illustrated the use of powerful images and analogies to convey mathematical concepts.

Those are the early sources of influence and the later influential members are too numerous to name. I remember presenters bringing home the power of manipulatives during hands-on activities, or the many approaches to problem-solving and the sometimes heated discussions on "what is a problem"?

Hopefully, I contributed to many of the discussions of current topics over the years. I was right there with many of you investigating how this new technology called a personal computer could assist students in learning mathematics. And many of you joined me in looking at the latest assistive technologies that would be especially helpful for students with physical or sensory disabilities.

As teacher educators, we studied the math concepts and skills of our teacher candidates and shared best practice in teacher education.

I've had the privilege over the years to work with many of you in RCML leadership roles. What alignment of the stars led so many RCML members to UNLV so we could host at least four conferences in Las Vegas? I have served with you on the Conference Committee, worked with our wonderful editors as Vice President for Publications and learned how the entire organization works as President. I have always appreciated the professionalism and commitment of those with whom I have served.

Throughout the years, RCML has always been a gathering place for outstanding thinkers and innovators in mathematics education who remain committed to the success of students and supportive of the endeavors of professional colleagues. While we all recognize the role of larger organizations in terms of political clout and serving the masses, RCML remains a force in fostering professional growth, developing leaders, integrating cross-disciplinary issues, encouraging new talent, while at the same time remaining a comfortable home for making professional connections and conducting honest conversations on important issues in the field.

Election Results

On behalf of the Executive Committee, I would like to congratulate the newly elected officers who will assume their new duties during the Business meeting at the conference in Cleveland.

Vice-President for Publications:
Sheryl Maxwell

Secretary:
Elaine Young

Conference Committee:
Darlinda Cassel
Juliana Utley

A big thanks goes out to all of you who stood for election. We will entertain nominations for the positions of President Elect, Treasurer, and Conference Committee. Please consider running for one of these positions.

– Pat Jordan

Quick Tricks

Squaring a number that ends in 5

step	example
Take the number of tens	For 65^2, take the 6
Multiply by that number + 1	6 x 7 = 42
Write down the product followed by 25... ta-da!	4225

Another example: to square 95, think 9 x 10 = 90, so $95^2 = 9025$. Cool, huh?

Can your students figure out how it works? Does this work for 3-digit numbers?

Thirty-Fourth Annual RCML Conference
Cleveland, Ohio
March 1-3, 2007

The Program is now online! Check it out at

http://www.unlv.edu/RCML/conference2007.html

Schedule of Events

Thursday, March 1, 2007

Registration	1:00 PM – 4:00 PM
Executive Board Meeting	1:00 PM – 3:00 PM
Reception	4:00 PM – 7:00 PM
Wilson Lecture	7:00 PM – 8:30 PM

Dr. JULIAN M. EARLS

Dr. Julian M. Earls is Executive in Residence at the Nance College of Business Administration at Cleveland State University in Cleveland, Ohio. Also, he currently serves as Co-Chair of the Science and Mathematics Education Policy Advisory Council for the State of Ohio. In January 2006, he retired from the position of Director of the National Aeronautics and Space Administration's Glenn Research Center (GRC) in Cleveland. As Director of GRC he managed a budget in excess of $600 million and a workforce of over 3000 employees.

Presentation: Things They Don't Teach in College about Mathematics and Science Education

This presentation will focus upon those intangibles that make teachers more effective in teaching mathematics. What are those intangibles and how are they attained? Although content knowledge is necessary, it is not sufficient for the delivery of mathematics education to students. How does the teacher cause students to motivate themselves to better performance? The presenter submits that inspiration is external and motivation is internal. Who inspires and how is the inspiration achieved? Hopefully, the presentation will start to answer these questions.

Friday, March 2, 2007

Continental Breakfast	7:00 AM – 8:30 AM
Session 1-23	8:30 AM – 11:55 AM
Lunch Business Meeting	Noon – 1:30 PM
Sessions 24-46	1:30 PM – 4:55 PM
Keynote Speaker	5:00 PM – 6:00 PM

Dr. JEAN SCHMITTAU

Dr Jean Schmittau is a professor of Educational Psychology and Mathematics Learning at the State University of New York at Binghamton. Her areas of expertise and research are in Vygotskian psychology and mathematics education. Dr Schmittau was in Russia at the invitation of the Russian Academy of Pedagogical Sciences where she researched Davydov's mathematics program. She subsequently implemented the Davydov program in a US school setting. Dr Schmittau is currently the lead mathematics educator of a project to improve middle school mathematics in high needs school districts in upstate New York. Dr. Schmittau also serves as the editor of the journal, Focus on Learning Problems in Mathematics, the official journal of the Research Council on Mathematics Learning.

Saturday, March 2, 2007

Continental Breakfast	7:00 AM – 8:30 AM
Sessions 47-70	8:30 AM – 11:55 AM
Lunch	12:00 PM – 1:30 PM
Executive Board Meeting	1:00 PM – 4:00 PM

Points of Puzzlement

Michael Naylor

Common Cents

You are blindfolded at a table upon which are an unknown quantity of pennies. Ten are face up and the rest are face down. Your task is to separate the pennies into two groups so that each group has an identical number of face up pennies. You may slide the pennies around and flip them over, but you cannot tell by touch (or any other means) which ones are face up and which ones are the face down.

How can it be done? (Yes, it is possible without cheating or supernatural powers!)

Send solutions to mnaylor@cc.wwu.edu. Top entries win valuable intrinsic rewards!

Last issue's Puzzle: Flipping Out. You have two coins, one is a fair coin with heads on one side, tails on the other. The second coin has heads on both sides. You select one coin at random and flip it three times. It comes up heads each time. What is the probability it will come up heads on the fourth flip?

Answer: 17/18.

Solution 1. Each time heads is flipped, it tilts the probability that you've drawn the double headed coin. (Intuitively, think about if you flipped 1000 heads in a row. Pretty darn likely you've drawn the HH coin. Still a chance you didn't, but almost certainly you will get heads next flip.)

Consider all of the possibilities for 4 flips. There are 32.

HHHH	HHHH	HHHH	HHHH
HHHH	HHHH	HHHH	HHHH
HHHH	HHHH	HHHH	HHHH
HHHH	HHHH	HHHH	HHHH

HHHH	HHHT	HHTH	HHTT
HTHH	HTHT	HTTH	HTTT
THHH	THHT	THTH	THTT
TTHH	TTHT	TTTH	TTTT

Given that HHH has already happened, the universe shrinks to these possibilities:

HHHH	HHHH	HHHH	HHHH
HHHH	HHHH	HHHH	HHHH
HHHH	HHHH	HHHH	HHHH
HHHH	HHHH	HHHH	HHHH

HHHH HHHT

There are 18. 17 of these give Heads on the 4th flip.

Solution 2. Bob Quinn writes:

I will risk my previously earned intrinsic rewards by saying the probability of heads on the fourth toss is 17/18.

I base this answer on using Bayes Theorem to determine that the probability of the coin being fair given that it showed heads three times in a row is 1/9. Therefore, the probability of the coin being unfair is 8/9. The probability of the next toss will be (8/9) * 1 + (1/9) * 1/2 = 16/18 +1/18 =17/18.

Solution 3. David E. Boliver writes:

The solution here is obtained by assuming we know that:

$P(A \cap B) = P(A)P(B/A)$;

$P(B/A) = P(B)$ if and only if A and B are independent events;
$P(A \cup B) = P(A) + P(B) - P(A \cap B)$;

$P(A \cap B) = 0$ if and only if A and B are mutually exclusive;

$A \cap B = A$ if and only if $A \subseteq B$.

We also need some notation for the problem. Let F represent the event that the fair coin is chosen and ~F the event that the 2-headed coin is chosen. Let 3H represent the event that the first 3 consecutive flips of a coin produce 3 heads results. Define 4H similarly. The question then resolves into P(4H/3H) = ?
Now $P(3H)\ P(4H/3H) = P(3H \cap 4H)$. Since $4H \subseteq 3H$, this reduces to: $P(3H)\ P(4H/3H) = P(4H)$.

Since $3H = (3H \cap F) \cup (3H \cap \sim F)$ and this is a union of mutually exclusive events,

$$P(3H) = P(F)P(3H/F) + P(\sim F)P(3H/\sim F)$$

$$= (1/2 \times 1/8) + (1/2 \times 1) = 9/16$$

In similar fashion, P(4H) = 17/32.
Our problem then becomes 9/16 x Q = 17/32, so Q = 17/18.

Bob and David, we have shiny bucketsful of intrinsic rewards headed your way! Well done!

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