NebraskaMATH February 2010 Newsletter
Study advocates charter schools

NebraskaMATH discusses state issues raised by Platte Institute

Recently, the Omaha World-Herald ran an article revealing the results of a study on education in Nebraska, which was conducted by an organization wishing to promote the development of Nebraska state legislation supporting charter schools. In an effort to keep Nebraska educators informed, NebraskaMATH personnel have chosen to discuss some of the issues raised by the article.

What is a charter school? A charter school is a public school that operates independently of the local school board, with freedom from many of the regulations that apply to traditional public schools. The term “charter” is essentially synonymous with the term “contract,” a document detailing the school’s mission, program, goals and means for measuring success.

Although 40 states, the District of Columbia and Puerto Rico have chartering laws, Nebraska has not.

In honor of Black History Month, teachers may enjoy sharing the problem shown below with their students. This is among the mathematical puzzles studied by the well-known historical figure Benjamin Banneker.

Banneker articulated the problem as follows: “Required the Lengths of the Sides of an Equilateral Triangle inscribed in a Circle whose Diameter is 200 perches, with a general Theorem for all such Questions”

Diameter = 200 perches

Twenty-first century readers will likely need to be informed that a perch, a synonym of a rod, is a unit of measurement equal to 16 ½ feet. Given this information, and familiarity with the 30-60-90 triangle, middle and high school level students may enjoy tackling this problem. (It should be noted that Banneker solved the problem without using this property of a triangle.)

For Banneker’s solution to this problem, along with more resources on Banneker, visit http://mathdl.maa.org/mathDL/46/?pa=content&sa=viewDocument&nodeId=569&bodyId=872. Additional resources for highlighting Black History Month in a mathematics classroom are available at NCTM’s site: http://www.nctm.org/resources/content.aspx?id=22395.

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Featured next month:

Nebraska’s revised State Standards and the statewide assessment instruments: What’s happening now? Deb Romanek, Director of Mathematics for the Nebraska Department of Education, will inform us of the latest in the March issue of the NebraskaMATH newsletter.
Gender studies in the news:

**Confidence, not gender, affects math abilities**

The results of two worldwide studies found few gender differences in math abilities and discovered the gender gaps were related to the confidence levels of girls and boys.

One study assessed students’ level of confidence in their math abilities and how important they felt it was to do well in math in order to have a successful career. While overall similarities in math skills were discovered in the other study, this study found boys felt significantly more confident in their abilities than girls did and were more motivated to do well. This finding could help explain why girls are less likely than boys to pursue careers in science, technology, engineering and mathematics.

The 2003 results were reported in the January issue of Psychological Bulletin, published by the American Psychological Association. Nicole Else-Quest, Ph.D., a psychology professor at Villanova University was lead author of the meta-analysis. Else-Quest and her fellow researchers examined data from the Trends in International Mathematics and Science Study and the Programme for International Student Assessment, representing 493,495 students ages 14-16 from 69 countries.

“Stereotypes about female inferiority in mathematics are a distinct contrast to the actual scientific data,” Else-Quest said. “These results show that girls will perform at the same level as the boys when they are given the right educational tools and have visible female role models excelling in mathematics.”

The researchers looked at the status of the women in each country, such as education, political involvement, welfare and income. They found, for example, in countries where more women held research-related positions, the girls in that country were more likely to do better in math and feel more confident of those skills.


**Girls affected by female teachers’ math anxiety**

Research by the department of psychology at the University of Chicago found that the more anxious female elementary school teachers were about math, the more likely girls (and not boys) were to endorse the stereotype that boys are better at math and the more likely that female students’ mathematical achievement would be lowered.

Early elementary school teachers in the United States are almost exclusively female (>90%), and this research shows the correlation between female teachers’ anxieties and girls’ math achievement through girls’ beliefs about who is good at math. The research assessed the math anxiety of 17 first- and second-grade female teachers from a large Midwestern urban school district and the math achievement of the students (52 boys and 65 girls) in these teachers’ classrooms.

At the beginning of the school year, there was no relation between a teacher’s math anxiety and her students’ math achievement. However, by the end of the school year, the higher a teacher’s math anxiety, the lower was the girls’ math achievement, and not the boys’. One possibility for this is that female teachers’ math anxiety helps to confirm stereotypes about which gender is good at math and this, in turn, has an impact on girls’ achievement.

The researchers tested this hypothesis and found girls who confirmed traditional gender ability beliefs (i.e. they drew pictures of boys representing “good at math” and girls as “good at reading”) had significantly lower end-of-year math achievement.

Importantly, these differences were not seen at the beginning of the year; at that point, teachers presumably had not had ample time to influence gender ability beliefs or relations between gender ability beliefs and math achievement.

**Full text of this article (“Female teachers’ math anxiety affects girls’ math achievement” by Beilock, et al) is available at [http://www.pnas.org/content/early/2010/01/14/0910967107.abstract](http://www.pnas.org/content/early/2010/01/14/0910967107.abstract)**

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Highlight on Action Research

Precise Mathematical Language
by Jill Kranda, M² Cohort 3

Abstract: In this action research study of my classroom of fifth grade mathematics, I investigate the relationship between student understanding of precise mathematics vocabulary and student achievement in mathematics. Specifically, I focused on students’ understanding of written mathematics problems and on their ability to use precise mathematical language in their written solutions of critical thinking problems. I discovered that students are resistant to change; they prefer to do what comes naturally to them. Since they have not been previously taught to use precise mathematical language in their communication about math, they have great difficulty in adapting to this new requirement. However, with teaching modeling and ample opportunities to use the language of mathematics, students’ understanding and use of specific mathematical vocabulary is increased.

To read Jill’s full paper and other action research papers from the Math in the Middle Program, see http://scimath.unl.edu/MIM/ar.php

Resources

Book compiles essays from Seeley’s Messages

“Faster Isn’t Smarter: Messages About Math, Teaching and Learning in the 21st Century” is a collection of essays based on Cathy Seeley’s award-winning NCTM President’s Messages. It is a valuable resource for K-12 teachers as it offers words of wisdom regarding some of today’s most important issues in education. Topics range from the role of technology to the impact of rising expectations, from the trap of timed tests to whether teachers bear the responsibility of keeping students interested (or, is boredom a developmental stage?).

Each message includes recommendations for how to address the issues, along with discussion points for teachers of all grade levels, families and policy makers.

Additional reviews and information about the book, along with free, downloadable copies of some of the messages, are available at the following Web site.

For more details on “Faster Isn’t Smarter”, please visit: http://www.mathsolutions.com/index.cfm?page=wp18&contentid=994&crid=294&mcrid=107

Sign up for a summer course! See NMSSI Web site for updates

Through the Nebraska Math & Science Summer Institutes (NMSSI), UNL is offering intellectually rich professional development and graduate coursework for Nebraska’s K-12 teachers of mathematics and science. There are more than 20 courses from which to choose, designed especially for teachers, and offered both in Lincoln and five other locations across the state. The Web site has been updated recently to include more information about each course (see: scimath.unl.edu/nmssi).

Nebraska teachers who take NMSSI courses qualify for reduced tuition rates and fellowships to cover the cost of fees. In addition, Nebraska math and science teachers are eligible for supplemental fellowships that should make the program even more affordable.
CALENDAR

NebraskaMATH Summer 2010

**Math in the Middle OPS**
- May 26-28: Capstone (Cohort 1)
- June 7-11: STAT 892 (Cohorts 1 & 2)
- June 14-18: MATH 806T (Cohorts 1 & 2)
- July 12-16: MATH 808T (Cohort 1)
- July 19-23: MATH 804T/TEAC 801 (Cohort 2)
- July 26-27: Master’s Orals (Cohort 1)

**Primarily Math**
- June 7-11: MATH 800P (Cohort 2 - Omaha)
  MATH 802P & TEAC 907 (Cohort 1 - Lincoln)
- June 14-18: MATH 801P (Cohort 2 - Omaha)
  MATH 802P & TEAC 907 (Cohort 1 - Lincoln)

**Nebraska Algebra**
- June 21-25, June 28-July 2: MATH 810T & EDPS 991 (Cohort 2 - Grand Island)

**New Teacher Network**
- June 7-11, June 14-18: MATH 896 & TEAC 892 (Lincoln)

NCTM president advises math in early childhood

The NebraskaMATH leadership team has taken a serious interest in early childhood education. The Primarily Math program, which has created a K-3 Mathematics Specialist certification, was developed with a goal of getting children started on the right path toward mathematical learning. The idea is to begin working with children at an early age since many of them, particularly those with low socioeconomic backgrounds, begin formal education well behind their peers.

In the February issue of the NCTM newsletter, NCTM President Henry (Hank) Kepner addresses the importance of exposing pre-school children to the kind of experiences which support the development of mathematical concepts when they arrive in school. These experiences can be as simple as counting collections of objects, sorting them according to various attributes, or asking the question “who has more?” Because of our interest in the mathematical development of the young child, we believe the article is worth calling to your attention. You may read Kepner’s article at [http://www.nctm.org/about/content.aspx?id=25054](http://www.nctm.org/about/content.aspx?id=25054).

In addition, the National Research Council (NRC) recently released a report entitled, “Mathematics Learning in Early Childhood: Paths Toward Excellence and Equity,” which can be accessed online, free of charge. The report provides guidance to families, teachers and caregivers on ways to expose young children to activities which will prepare them to become lifelong learners of mathematics.

Two advisory board members schedule UNL talks

Two members of the NebraskaMATH advisory board will be visiting UNL in March.

Deborah Loewenberg Ball, dean of the School of Education at the University of Michigan, will be giving a presentation on March 1 on whether research universities should have colleges of education. Her lecture, in Teachers College Hall Room 105, from 1:30 p.m. to 2:30 p.m. with an informal discussion afterward, will be open to the public.

Roger Howe, a professor of mathematics at Yale and elected member of the National Academy of Sciences, will have a talk on math education at 9:30 a.m. on March 9 in Avery Hall 347. He speaks again at Colloquium about Representation Theory at 3:30 p.m. in Avery 106, followed by a reception. For more on these visits, visit [scimath.unl.edu](http://scimath.unl.edu).
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Rico now have legislation supporting charter schools, Nebraska does not.

In January, the Platte Institute for Economic Research released a study promoting the need for charter schools in Nebraska. The institute commissioned the conservative, charter-school proponent Pacific Research Institute in Sacramento, Calif., to conduct this study, entitled “Race to the Top: Can We Compete, Nebraska’s Charter School Initiative.”

The 52-page report criticizes Nebraska’s public education system, and study author Vicki Murray, associate director of education studies at Pacific Research Institute, said the state’s public schools are “not serving anyone particularly well.”

The study claims charter schools can provide quality education at lower cost because of reduced bureaucracy.

John McCollister, the Platte Institute’s executive director, told the Omaha World-Herald he hopes the study will cause state lawmakers to pass charter school legislation. The study believes that the Obama administration favors charter schools, and thus, Nebraska will be at a competitive disadvantage for federal grants.

Murray wrote in the study that in Phoenix, competition between charter schools and public schools for students boosted achievement in surrounding public schools.

To read and download the full study, visit the following link: http://www.platteinstitute.org/publications/time-is-now-for-charter-schools-in-nebraska.

Whether one believes charter schools can or cannot improve student achievement in Nebraska, we do agree that action is needed to raise the levels of student achievement across the state. We are working to support teachers, schools and districts who share this belief.

NebraskaMATH personnel believe the best way to improve student achievement in a school, whether public, private or charter, is to provide the right kind of support for teachers. In short, good teaching matters. Consider the following quotes from research in mathematics education:

- Quantitative studies have found that the effect size of good teaching is greater than any other educational variable, including students’ socioeconomic status (e.g., Wenglinsky, 2002)
- Teachers are crucial to students’ opportunities to learn mathematics, and substantial differences in the mathematics achievement of students are attributable to differences among teachers (National Mathematics Advisory Panel Report, 2008)
- Students who have several effective teachers in a row make dramatic gains in achievement, while those who have even two ineffective teachers in a row lose significant ground, which they may never recover. Indeed, students who achieve at similar levels in the third grade may be separated by as many as 50 percentile points three years later, depending on the quality of the teachers to whom they were assigned (Haycock, 1998).

The challenge here is to determine what support is needed for teachers to ensure that all of Nebraska’s teachers are “good teachers” of mathematics. This is a complicated task.

Well-known researchers of mathematics education have been studying the types of mathematical knowledge needed to be effective instructors of mathematics. This knowledge differs from that of the mathematician or other users of mathematics in that it requires the teacher to figure out student errors and misconceptions.

According to Stylianides & Ball (2008), mathematical knowledge for teaching “is the particular form of mathematical knowledge that is useful for, and usable in, the work that teachers do as they teach mathematics to their students.” Furthermore, teachers with greater mathematical knowledge for teaching are better able to listen to student reasoning and to help students build conceptual understanding of mathematical concepts (e.g., Ball, Thames, & Phelps, 2008),

Thus, NebraskaMATH personnel believe that the most efficient way to increase student mathematics achievement is to invest in the education of mathematics teachers, focusing on building practicing teachers’ mathematical knowledge for teaching. As a result, we have made high quality professional development and graduate level courses accessible to Nebraska teachers through NMSSI (see scimath.unl.edu/nmssi).

NOTE: The charter schools article appearing in this newsletter has been edited for length. To read NebraskaMATH’s full article on charter schools, please visit: http://scimath.unl.edu. The full article found online delves into the pros and cons of charter schools and provides excerpts from the study.