

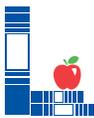


REPORT TO NEBRASKA 12.2011

Nebraska **MATH**

*A partnership to improve
mathematics achievement*





University of Nebraska–Lincoln ○ Center for Science, Mathematics & Computer Education
251 Avery Hall, Lincoln, NE 68588-0131 ○ Phone: (402) 472-8965 ○ Fax: (402) 472-9311
Email: nebraskamath@unl.edu ○ Website: <http://scimath.unl.edu/nebraskamath>

Editor and Photographer: Lindsay Augustyn, UNL Center for Science, Mathematics & Computer Education

Cover Photos, Left to Right: Top Row - Primarily Math Cohort 1, Primarily Math Cohort 2, Primarily Math Cohort 3 LPS; Center - New Teacher Network 2011; Bottom Row - Nebraska Algebra Cohort 2, Primarily Math Cohort 3 West (Ye Xu/UNL CSMCE), Nebraska Algebra Cohort 3



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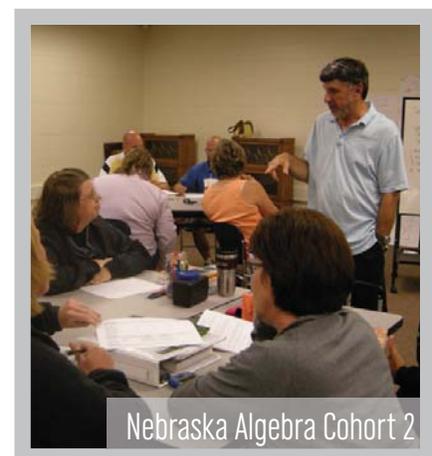
The building of a statewide partnership

NebraskaMATH, a five-year, \$9.2 million Targeted Math Science Partnership funded by the National Science Foundation, has completed its third year since first receiving funding on Jan. 1, 2009. A strong partnership among the University of Nebraska–Lincoln and the core districts of Grand Island Public Schools, Lincoln Public Schools, Omaha Public Schools, Papillion-La Vista Public Schools and Nebraska’s Educational Service Units has enabled NebraskaMATH to extend its reach to mathematics teachers across the state.

This Report to Nebraska after Year 3 highlights the progress of the grant’s three main initiatives, Primarily Math, Nebraska Algebra and New Teacher Network, as well as the Nebraska Math & Science Summer Institutes (NMSSI), NebraskaNOYCE and the online Nebraska Math & Science Network.

An important long-term goal of the NebraskaMATH partnership is to improve achievement in mathematics for all K-12 students in Nebraska and narrow achievement gaps among at-risk populations. NebraskaMATH builds on the Math in the Middle Institute Partnership (2004-2011) and aims to nurture an active and mature K-16 partnership that can be sustained after the end of the grant.

Continued on Page 2



The co-Principal Investigators for Nebraska-MATH are Jim Lewis, Ruth Heaton, Tom McGowan, Carolyn Edwards, Walt Stroup and Ira Papick, all faculty at the University of Nebraska–Lincoln, and Barb Jacobson from LPS.

To develop this statewide partnership, here are a few of the ways in which NebraskaMATH is working to build communication among Nebraska teachers:

1. NebraskaMATH Newsletter: The Nebraska-MATH Newsletter is published electronically each month and emailed to nearly 1,000 teachers and administrators in all of the schools and districts that have participated in Math in the Middle, any NebraskaMATH program, or the NMSSI. It is also sent to ESU staff developers and administrators and selected faculty and administrators in Nebraska colleges and universities who are interested in K-12 mathematics education. Past issues are available to read on the NebraskaMATH website. The website allows any interested citizens to add their name automatically to the NebraskaMATH distribution list. The goal of the newsletter is to contain material that is approximately 70 percent of general interest to the mathematics education community with the balance specific to NebraskaMATH. Thus, the newsletter includes articles about subjects such as the Common Core State Standards. In this way, NebraskaMATH hopes to become a resource that local school district leaders rely on for information about mathematics education. In Fall 2011, the newsletter format shifted from a PDF attachment to a fully-formatted HTML newsletter appearing in the email, at the request of the newsletter audience. Since March 2009, the newsletter has featured 13 teachers in the “Teacher Spotlight,” highlighted the research projects conducted by 10 K-12 teachers and included Math Challenge Corners featuring the work of 11 K-12 teachers, all of whom have earned master’s degrees through a NebraskaMATH program.

<http://scimath.unl.edu/nebraskamath>

2. Dinner and a Math Problem and Math Teachers’ Circles: Efforts to support face-to-face networking among teachers includes the coordination of strategically located regional events titled “Dinner and a Math Problem,” designed to bring together teachers of secondary mathematics and university personnel for evenings focused on problem solving and socializing. The Dinner and a Math Problem events occur once each semester at different locations across the state. Along with this effort, NebraskaMATH has increased the publicity for existing Math Teachers’ Circles, which meet in three Nebraska locations. The

Math Teachers’ Circles convene two or three times per semester in Lincoln, Kearney and Omaha. Attendance at these events is open to all teachers. Nebraska-MATH’s Nebraska Algebra and New Teacher Network participants also use the events to meet professional development requirements. Teachers from four additional locations are planning to coordinate Dinner and a Math Problem events in Spring 2012.

<http://scimath.unl.edu/mathdinners>

3. Website updates: In order to communicate directly and effectively with Nebraska K-12 math teachers and administrators, both the Center for Science, Mathematics & Computer Education website (<http://scimath.unl.edu>) and the NebraskaMATH website (<http://scimath.unl.edu/nebraskamath>) have been revised to make them more attractive and useful to teachers. An online application portal enables teachers to electronically apply for various programs. The website also provides teachers easy access to many resources and includes a feature on Inspiring Teachers that are part of an effort to honor the many dedicated teachers who make important contributions to the education of students in Nebraska and especially to honor the teachers in NebraskaMATH programs.

4. Leadership roles: K-12 teachers and teacher-leaders are given opportunities to serve on instructional teams for both grant-funded and locally supported courses, such as the NMSSI. Since 2009, 34 K-12 teachers and teacher-leaders (with Math in the Middle and/or NebraskaMATH affiliations) have served as members of instructional teams. Teachers also have served as lead instructors for courses, sometimes even taking a lead role in the development of a course. To name a few:

- Doug Glasshoff (Math in the Middle graduate) served as the lead instructor for the NMSSI course Math 802T (taught in partnership with ESU 7, 80 miles northwest of Lincoln);
- Susie Katt and Tara Zuspan (Primarily Math, see Page 10) were co-instructors for the Fall 2011 Primarily Math leadership course (convening in La Vista);
- Delise Andrews, Kyla Hall and Laura Parn (Math in the Middle graduates and LPS teachers) co-developed and served as lead instructors for four Primarily Math and NMSSI courses for elementary teachers offered in three Nebraska locations;
- LPS math coach Jerel Welker, LPS mathematics supervisor Sue Graupner and retired teacher Linda Hayek are co-instructors for TEAC 991, the academic-year course affiliated with Nebraska Algebra; and
- Welker and Hayek also have been instrumental in the success of the New Teacher Network, as they have developed and taught two pedagogy courses that constitute a core part of the program. ○

Supporting secondary mathematics teachers

With a focus on secondary mathematics teachers, the Nebraska Algebra and New Teacher Network programs have been building a community for teacher collaboration since 2009.

The goal of using grant funds to invest in furthering the education of three cohorts of Nebraska Algebra teachers has provided these teachers the opportunity to take graduate courses designed to deepen teachers' knowledge of mathematics, cognition and motivation, and mathematical pedagogy. The program was designed to support school districts and their algebra teachers as they work to ensure success for all students in the important gateway course of Algebra I. As of December 2011, 113 teachers from 71 schools have taken part in or are currently enrolled in the Nebraska Algebra program.

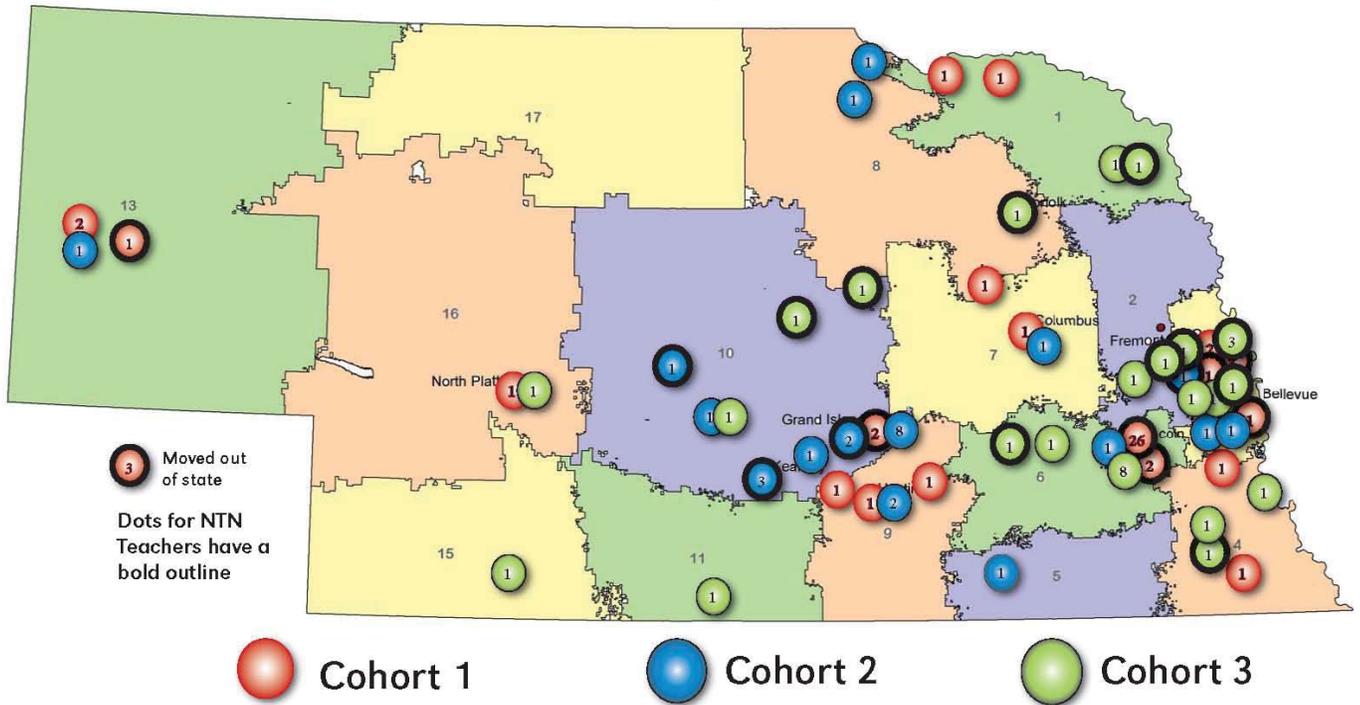
Beginning in Summer 2012, the first two of the three courses specifically designed for Nebraska Algebra will become part of the Nebraska Math & Science Summer Institutes' course offerings and will be available to all teachers in Nebraska, as the grant-funded Nebraska Algebra program ends.

Continued on Page 4



Nebraska Algebra & New Teacher Network by Nebraska Educational Service Units

2011-2012 Teaching Positions



From Page 3

Interest has been growing in the New Teacher Network (NTN) program, and a new cohort of NTN teachers will begin graduate courses in Summer 2012. The NTN supports secondary math teachers who are new to the profession, specifically, in their first three years of their career as a math teacher, through a mentoring and graduate education program designed to support them on their journey to becoming a master teacher. The program offers participants up to 24 hours of graduate credit, tuition-free. Forty teachers from 30 schools/districts have participated in the NTN since 2009, and the cohort that begins in 2012 is expected to be the largest.

Because algebra instruction typically plays a central role in the secondary math teacher's career, NTN participants begin their experience by completing the coursework that constitutes the Nebraska Algebra program. After the two summer courses, Math 810T: Algebra for Algebra Teachers, and EDPS 991: Cognition and Motivation, teachers in Nebraska Algebra and New Teacher Network take the highly-regarded academic-year course TEAC 991: Field Studies in Mathematics Education.

While the overarching goal of TEAC 991 is to support teachers as they implement lessons learned from



the summer courses into their day-to-day classroom instruction, mentoring and networking have become vitally important to NTN teachers as a central part of the course. Participants form strong connections with NTN colleagues, with veteran teachers serving as “Teacher Liaisons,” and with the K-12 teacher-leaders who are the instructors for the course. Interactions are focused on continued growth toward becoming a master teacher through strengthening participants’ professional habits of reflection, collaboration and networking.

TEAC 991 begins with a face-to-face workshop during which participants form small (four- to six-person) study groups based on common professional goals. Each group is assigned to one of the instructors and to a Teacher Liaison (a veteran teacher who has already completed TEAC 991). Groups then continue to hold online meetings and discussions using the Nebraska Math & Science Network (see Page 15). Participants post weekly reflections, react to research papers, update action plans and reflect on video recordings of their own lessons and those of a classmate. The Teacher Liaisons use the Network for general communication with participants and to respond to participants’ weekly reflections.

Utilizing the five secondary teachers as the liaisons, from five different locations, allows communication between the liaisons and the teacher participants to operate in an informal and power-free manner to provide basic advice or resources, as requested by the teacher, about mathematics and/or mathematics teaching.

Fourteen teachers have served as mentors or Teacher Liaisons for the New Teacher Network and Nebraska Algebra programs. Nebraska Algebra Cohort 2 participant Alicia Davis, a teacher at Hastings Public Schools and now a Noyce Master Teaching Fellow (see Page 17), said the mentoring experience greatly benefited her as a teacher.

“The ability to have a master teacher come and observe your class, give you feedback on your instructions and support you in your profession is invaluable. Collaborating with another teacher is a great way to continue growing as an educator, and I have been very fortunate to gain new skills under the guidance of committed and knowledgeable mentors,” Davis said.

Marcus Donner, a teacher at Shelton Public Schools and also a NA Cohort 2 participant, said he plans to “continue to turn to (my mentor) for advice on how to continue to improve as a teacher.”

Kelly Gomez Johnson, a participant in the first cohort of New Teacher Network and Nebraska Algebra and a teacher at Papillion-La Vista South High School, continues to work with her mentor through the NTN. Gomez Johnson, who graduated with a master’s degree in August 2011, is one of seven teachers in her cohort



Deb Bulin

After completing the Nebraska Algebra program, Deb Bulin has become a Teacher Liaison for TEAC 991, the academic-year course of Nebraska Algebra and New Teacher Network. She also

will be coordinating a Dinner and a Math Problem event in Spring 2012.

School and District: Thayer Central High School, Thayer Central Community Schools, Hebron, Neb.

Years Teaching: 19

Program: Nebraska Algebra, Cohort 2

What duties do you have in your role as a Teacher Liaison? We are each responsible for a group of teachers, and I respond to their weekly reflections. There are five teachers in my group. We also participate in their large-group activities. It is my hope that my responses to them are helpful and encouraging.

What have you gained from your experience as a Teacher Liaison? I think this has been a great experience. As a teacher, I am always looking for ways to improve. I get a ton of great ideas from my group. When we meet as a large group, there is even more sharing and collaborating.

How has your experience been in the Nebraska Algebra program? I feel it has been a great experience. The classes that I took two summers ago were very good classes. They make you take a step back and look at what you have been doing. We can all improve in some areas of our teaching, and they take you through the process to see what you are already doing that is good and look for an area you can improve on. They don’t expect you to change overnight, but to give it a try and see what things you can do better. Ultimately, it is all for the students, and hopefully they are seeing the benefits as well.

Do you remember your favorite teacher? I had many good math teachers, but Mr. Jim Fraser is probably the one that got me thinking about teaching the most. I try to model several of the things that he did when I was a student of his. (I am even teaching in his classroom!) I will often tell my students things that he

Continued on Page 6



From Page 5

did or said “back in the day.” He, as well as other teachers I have had, taught me to never stop learning.

What is your favorite thing about teaching?

Trying new things to find what best reaches the most students. When the light bulb finally comes on, it is a great feeling. I also enjoy when students come back from college and tell you that they thought you were a good teacher and had them well prepared for college.

What’s your favorite TV show? “Criminal Minds” (it used to be NUMB3RS, but that isn’t on anymore).

What is your favorite thing about Nebraska?

I like the slow pace and friendliness of Nebraska. I also like the fact that Nebraska is not too big, so we can have a lot of collaboration with teachers across the state. Between NebraskaMATH and the NMPDS grant that I am also a part of, I have teachers all over Nebraska that I can contact with questions or bounce ideas off of. I am not sure all states can say that. ○

who have earned a master’s degree primarily by taking NTN and NMSSI courses (see Page 13). Another four teachers are officially in a master’s program.

Of the 15 teachers who began the NTN in 2009, only one has left teaching and 10 took graduate classes in Summer 2011. Of the 19 NTN teachers who began the program in 2011-12, 10 already have begun a master’s program.

“My mentor continues to teach me how to see the big picture of conceptual understanding, get the most out of my students without merely settling for compliance and how passion for my students comes before the math,” Gomez Johnson said.

“She once told me, ‘Success is in the struggle.’ This was a powerful message to me as a young math teacher. It is a natural urge to want to help students immediately when they don’t understand mathematics. My mentor has motivated me to ask more difficult questions and require more thoughtful problem solving without apologizing for making my students struggle. Seeing the discussion, misconceptions and eventually the understanding occur has only made my students stronger in their reasoning and connections.” ○

Learn more about the New Teacher Network:

<http://scimath.unl.edu/newteachernetwork>

Primarily Math grows, delves into research

Three years into NebraskaMATH, 125 outstanding elementary teachers are part of the highly successful Primarily Math graduate program.

Primarily Math, an initiative to strengthen mathematics education in the early grades, provides K-3 teachers with an 18-hour graduate program and a K-3 Mathematics Specialist certificate from the University of Nebraska–Lincoln, approved by the Board of Regents in 2010. After completion of the graduate program, teachers participate in a follow-up program designed to ensure that knowledge gained in the graduate program leads to strengthened mathematics teaching and learning in grades K-3.

Primarily Math includes a major research project designed to inform the nation regarding approaches to strengthening K-3 mathematics education. Emphasis is placed on learning about the comparative benefit of using K-3 math coaches as well as the program’s effect on teachers’ mathematical knowledge for teaching.

In 2011, four different groups of teachers were engaged in Primarily Math:

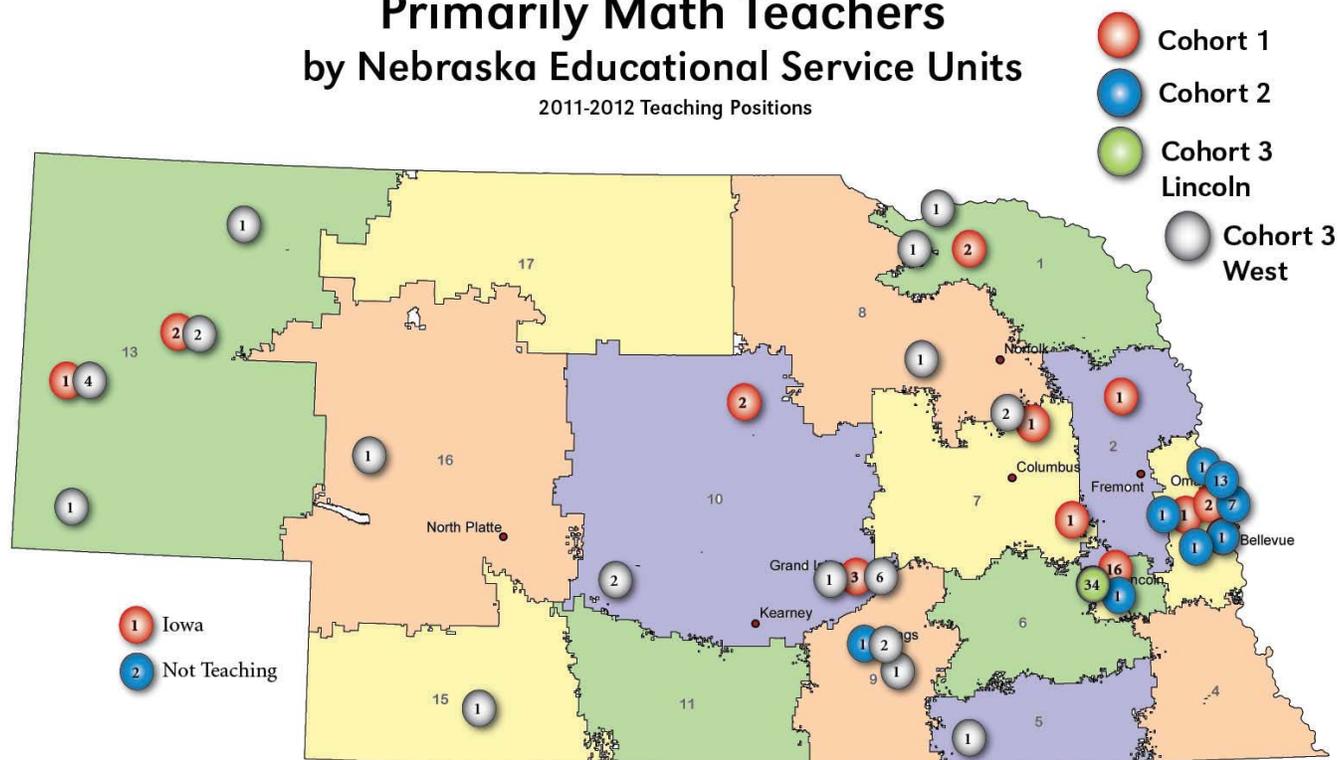


Primarily Math’s Grades K-3 Mathematics Specialist Courses	
Course	Topic
MATH 800P	Number and Operation for K-3 Math Specialists
MATH 801P	Geometry, Measurement and Algebraic Thinking for K-3 Math Specialists
TEAC 808A	Teaching Math K-3: Planning Lessons for Diverse Classrooms
TEAC 808J	Helping Young Children Become Mathematical Thinkers
MATH 802P	Number, Geometry and Algebraic Thinking II for K-3 Math Specialists
TEAC 907	Communities of Practice and Mathematics
TEAC 836B	Professional Development in Education (optional)

Continued on Page 8

Primarily Math Teachers by Nebraska Educational Service Units

2011-2012 Teaching Positions



From Page 7

1. **35 Cohort 1 teachers**, who completed the program in 2010, met regularly in study groups, focusing in the spring on asking good questions to learn what students understand;

2. **28 Cohort 2 teachers**, nearly all from the Omaha area, completed Primarily Math in June 2011 by meeting at ESU 3 in La Vista, and 17 of them chose to enroll in the optional leadership course in the fall (an increase from eight in 2009);

3. **28 Cohort 3 teachers from across the state, but outside of LPS**, known as Cohort 3 West, began the program by meeting in Grand Island in June 2011 and are taking the academic-year courses via distance education; and

4. **34 Cohort 3 teachers, all from LPS**, also began the program in June 2011 and therefore provide NebraskaMATH the opportunity to study the benefits derived from working with teachers from a single district.

Nearly 200 teachers have expressed interest in joining the fourth cohort of teachers in Summer 2012, as participating teachers gave their strong endorsements of the program to their colleagues. The greatest increase in interest came from partner districts Grand Island Public Schools, Lincoln Public Schools, Omaha Public Schools and Papillion-La Vista Public Schools, where the most teachers already have participated.

Survey shows promising results

The major research agenda of NebraskaMATH is in the context of Primarily Math. NebraskaMATH regularly involves teachers and school district leaders, both to gain input into the design of the research agenda and to ensure continued cooperation with the effort. NebraskaMATH's evaluator, RMC Research Corporation, coordinates data collection and minimizes duplication of data collection efforts for participants.

Now that the first two cohorts of teachers have completed Primarily Math, an analysis of the results from the Mathematical Knowledge for Teaching (MKT) survey show that the program has had a large effect on teachers' mathematical knowledge for teaching. When teachers enter the program, their scores are comparable to those of K-3 teachers nationwide, but when they leave the program, their scores are significantly higher.

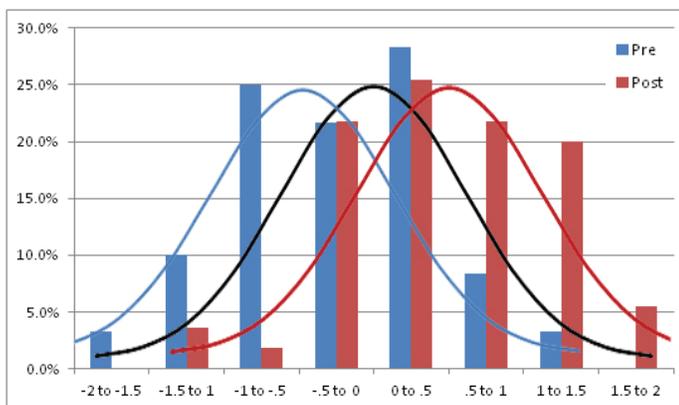
The MKT measures K-6 teachers' knowledge of mathematics as it relates to teaching elementary math. The items include questions about teaching knowledge, such as choosing the best examples or representations to illustrate specific mathematical ideas, and items that ask teachers to interpret examples of student thinking. Scores on the MKT are reported as standardized scores, with a mean of 0 and standard deviation of 1 as compared with a large national sample of K-6 teachers.

The K-3 teachers in Primarily Math take this survey before and after taking Primarily Math courses, as well as one year afterward. Since the first cohort began in 2009, Cohort 1 teachers took the MKT in 2009 (pre), 2010 (post), and 2011 (follow-up), while Cohort 2 teachers took the MKT in 2009 and 2010 (pre), and 2011 (post).

Combining cohorts 1 and 2 pre- and post/follow-up survey scores, tremendous growth is evident, especially when compared to the national norm for K-6 teachers (the solid black line in the figure shown below).

While the national sample for the MKT is for K-6 teachers, the MKT creators have recent data showing K-3 teachers are expected to have lower scores than the overall scores for the K-6 population. Since our participants are K-3 teachers, it does not surprise us that prior to enrollment in the Primarily Math program, their mean score (mean -0.28, standard deviation 0.69) was below the national average for K-6 teachers. However, after Primarily Math, our K-3 teachers' mean score is above the national average at 0.47 (with standard deviation 0.70), representing a gain of three-quarters of a standard deviation. While only 16 percent of all K-6 teachers nationwide score above 1.0 (1 standard deviation above the mean), 26 percent of the K-3 teachers who have completed Primarily Math score in that range.

These results demonstrate the Primarily Math program is having a large impact on teachers' mathematical knowledge for teaching. The analyses of student data as part of the Primarily Math research agenda are ongoing, to allow the program to detect whether these large improvements in teacher knowledge are translating to comparable improvements in student success in mathematics.



The blue line (pre) and red line (post) represent scores of K-3 Primarily Math teachers' mathematical knowledge for teaching compared to a national sample of K-6 teachers (black line).

The launch of 'Studio Classrooms'

In Fall 2011, the Primarily Math Research Study also expanded to include the initiation of the "studio classroom experience" (for more see: Linda Foreman's Teacher Development Group at <http://www.teachersdg.org>).



Ruth Heaton (eighth from left) stands with other speakers and graduate students at the Third Shanghai International Forum on Child Development and Early Education held at East China Normal University in September 2011.

Partnership forms in China

The University of Nebraska is in the process of forming a partnership in teacher education and research with East China Normal University, initiated with a meeting between President J.B. Milliken and the president of East China Normal University. It will be based on faculty members' interest and expertise in teacher education and research in the areas of special education, early childhood education, and mathematics education at both universities.

Ruth Heaton, co-PI of NebraskaMATH, made two trips to China (in May and September of 2011), representing mathematics education for UNL. In September, Heaton and UNL colleagues in special education and early childhood education were invited speakers at the Third Shanghai International Forum on Child Development and Early Education held at East China Normal University. Professors from Russia and Australia as well as two other universities in the United States presented. Heaton presented on the theoretical ideas about mathematical content and teaching and learning underlying Primarily Math and offered examples of Nebraska teachers' and young children's learning.

In Summer 2012, Dr. Zhou Xin, a Chinese mathematics educator from East China Normal University, is expected to co-teach a summer class with Heaton for Primarily Math teachers. Long-term plans for the partnership include doing research focused on a comparative analysis of TEMA data collected in Primarily Math classrooms and a comparable set of TEMA data gathered by Xin and her colleagues in Chinese classrooms. The two universities also are making plans for an undergraduate student exchange in the area of special education. ○

Papillion-La Vista Public Schools, a core partner district, implemented studio classrooms in two elementary buildings this school year, and asked NebraskaMATH to fold these into the planned Primarily Math case study research. Each studio classroom involves one teacher, the “studio teacher”; her Primarily Math colleagues; building and/or district administrators; district coaches; and facilitators from the University of Nebraska–Lincoln. In both cases, the studio teacher is a math intensive teacher; one teaches first grade, and the other has a first/second multi-grade class. Five times during the school year, a studio cycle will take place.

The studio cycle includes the following:

- **Lesson planning and meeting with the**

principal: The studio teacher meets with a university facilitator to plan a lesson (the university facilitator may also meet with the building principal).

- **Studio day:** The studio teacher’s colleagues (not all from the same elementary building), administrator(s) and the district coaches observe the studio teacher in her classroom while a university facilitator prompts the studio teacher to periodically explain her instructional decision making, questions her about teaching moves, or calls for limited interaction from the observers.

- **Studio group:** The studio teacher, her Primarily Math colleagues, district coaches, and perhaps administrators, meet to discuss the studio classroom, examine classroom discourse, student learning, and may look at artifacts in the form of student work, teacher plans, or video of the class.

NebraskaMATH co-Principal Investigator and UNL Professor Ruth Heaton of the Department of Teaching, Learning and Teacher Education leads the studio classroom research. NebraskaMATH anticipates one or two math education doctoral candidates will focus their dissertation research on the studio classroom experiences.

Taking on leadership roles

Upon completion of Primarily Math’s six mathematics and pedagogy courses, the participants continue serving their schools or districts in one of three possible roles: as a math coach, as a math intensive teacher, or as a generalist. Teachers interested in becoming a math coach or math intensive teacher have the option to take a seventh course focused on leadership, titled “Professional Development in Education.”

In Fall 2010, Heaton was the lead instructor of the course, along with Matt Larson, Lincoln Public Schools Curriculum Specialist for Mathematics, and Susie Katt, an Instructional Coordinator for Mathematics for LPS and also a Primarily Math Cohort 1 graduate. Heaton focused on the aspect of leading



change, Larson facilitated the section of the course that focused on issues in mathematics education, and Katt’s work focused on math coaching.

TEAC 836B, Professional Development in Education, helps teachers become intentional, effective and instructional leaders. The course curriculum is driven to prepare teachers for new or existing leadership roles that involve leading peers in using effective strategies for teaching and learning mathematics. Embedded in the work are opportunities for teachers to become informed on research related to effective coaching and other forms of leadership.

Katt then went on to co-teach with UNL faculty



Susie Katt

members MATH 800P and 801P to the Cohort 3 LPS teachers in June 2011. In the fall, she became the lead instructor of TEAC 836B for the 17 participating Cohort 2 teachers along with Tara Zuspan, another Cohort 1 graduate and a LPS math coach at Cavett Elementary, and Dr. Deb Rodenburg, director of elementary curriculum, of Papillion-La Vista Public Schools. The Cohort 2

coaches in Papillion enrolled in TEAC 836B and participated in a study group led by Katt.

“The conversations that took place during the on-campus meetings the first year of the course were powerful,” Katt said. “Due to the fact all participants within the second offering of the course had full time classroom positions, course content was modified to explore more broad aspects of leadership. We found we needed to provide support for teachers to realize the influence they can have outside of their own classrooms in regards to mathematics instruction.”

Zuspan said in her work as a coach, she has seen the conversations in her building shift to focus on math, and teachers have been working together with a common goal of improving student achievement in mathematics.



“The idea of a building instructional coach was completely new to my school and staff. It was a big part of my job in 2010-11 to create a positive school culture with regard to coaching. Looking back, I realize how important it was to build strong relationships with teachers. The trust we build together will guide us smoothly in the future so we can continue to focus on improving math instruction,” Zuspan said.



Tara Zuspan

Kellie Joy, Cohort 1 graduate and 2010 TEAC 836B participant is a full-time coach within one school, Clinton Elementary in LPS.



Kellie Joy

Joy said the most rewarding coaching experience has been the connection she built with the kindergarten and first-grade teachers.

“I have developed trusting relationships with the teachers, and we work together as teams to plan instruction. I have been able to model and observe lessons in which students and teachers have grown

mathematically and changed practices to enhance student learning,” Joy said. “However, the most challenging part is understanding the content for six different grade levels and being able to give effective feedback related to instruction.”

Grand Island coaches Cindy Beaman and Linda Woitaszewski currently meet in study groups with Primarily Math classroom teachers. The information

gathered through these means helps create a project description of expectations for coaches, thereby creating more consistency in the role of coaches across the project, providing districts with more direction, and allowing NebraskaMATH to determine suitable ways of providing support.

Study groups support classroom practice

During Fall 2010, Cohort 1 participants began working in study groups, an initiative that will last for two years. Study groups are intended to promote the development of a professional community network among Primarily Math participants in both face-to-face and online formats.

A broad purpose of the study groups is to promote a discourse where primary level teachers seek to ask and answer provocative questions about mathematics teaching and learning, press on one another’s thinking, and critically analyze classroom events they observe or classroom artifacts they examine. Each study group has four to eight participants and meets six times per year. During the meetings, participants discuss mathematical learning goals, work of the teacher and student learning outcomes associated with a video clip of their teaching and a submitted lesson plan.

During 2010-11, study groups met either in Lincoln or online. For 2011-12, with two cohorts of teachers now participating in study groups, regional study groups will occur in-person across the state. The pool of study group facilitators will expand beyond UNL personnel to also include selected master teachers.

Papillion-La Vista Public Schools has designated

Northwestern survey examines school culture

Northwestern University, with a sub-award from the NebraskaMATH grant, administered a Social Network Survey to elementary schools in the core partner districts. The survey was first administered in Spring 2010, and then followed up in Spring 2011.

The survey focuses on two dimensions of the school organization that are critical to the growth of a professional community. First, the survey examines school culture: the norms and beliefs of people in the school, and the extent to which these norms are held in common. Second, the structure of interactions among school staff is studied: the patterns of relationships that are built as staff seek advice and information about their teaching, including the frequency and influence of the interactions and the extent to which they span grade levels.

Members of the research team at Northwestern traveled to visit each of the partner districts. Principals each received a confidential report showing responses for their building and district administrators received confidential reports showing responses from their district as a whole. Both received aggregated responses from all districts. The reports also included data showing change among 2010 and 2011 patterns of responses for each building/district.

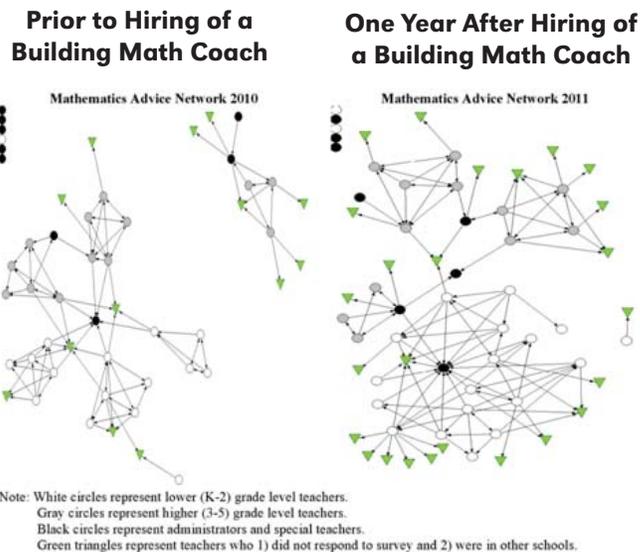
Papillion-La Vista Public Schools set aside two hours of a district-wide professional development day so all of the teachers could complete the Social Network Survey; district leaders also were quite deter-

its seven Cohort 2 teachers as building math coaches. While they remain full-time elementary teachers, two are serving as math intensive teachers.

Meeting the demand

Originally, NebraskaMATH planned to recruit 120 teachers to participate in Primarily Math by the time the program was offered to a fourth cohort of teachers, starting in Summer 2012. As reported earlier, the program already has exceeded that number. This has been possible because of the support received from partner districts, efforts to use resources efficiently (such as geographically-based cohorts to minimize travel, housing and subsistence costs) and the popularity of the program with K-3 teachers.

The first three cohorts of Primarily Math teachers have been involved in both the research initiative and study groups. Now, as the program approaches a fourth cohort of Primarily Math teachers, NebraskaMATH also is beginning a transition to a sustainable gradu-



mined to have all buildings reach 90 percent response rates, and communicated this expectation to principals. Thus, PLVPS saw the highest response rates.

Planning far in advance with district administrators and building principals for its administration, the survey will be repeated in Spring 2013, with the hope that the presentations from Northwestern will encourage higher response rates. LPS is so interested in the changes to professional networks that they have requested the survey also be repeated in Spring 2012 in the buildings with math coaches, to better study the impact the coaches are having on their buildings. ○

ate program. For one, the next cohort of Primarily Math teachers will not be required to participate in the Primarily Math research study, and the study groups following the graduate program will be optional.

Primarily Math currently is recruiting for the fourth cohort, and nearly 200 teachers have expressed interest in participating. Because of this strong interest, NebraskaMATH leaders are examining the NebraskaMATH budget and seeking new options for supporting teachers to determine how many additional teachers can be served, either through multiple cohorts in Summer 2012 or by offering a fifth cohort starting in Summer 2013. It is possible that by the end of the grant, Primarily Math will have served more than 200 and as many as 250 teachers rather than the 120 originally envisioned for the program. ○

Learn more about Primarily Math:
<http://scimath.unl.edu/primarilymath>

Programs allow teachers to earn master's degrees

Opportunities for graduate courses through the Nebraska Math & Science Summer Institutes, in conjunction with Primarily Math, Nebraska Algebra and New Teacher Network, have helped 15 teachers from across the state earn a master's degree from the University of Nebraska–Lincoln. Several other teachers earned graduate degrees by utilizing an NMSSI course to complete their programs, and we are pleased to have assisted them in this goal.

Kelly Gomez Johnson, a teacher at Papillion-La Vista South High School, already had a master's degree prior to joining the New Teacher Network. Gomez Johnson used NTN, Nebraska Algebra and NMSSI courses to earn her Master of Arts for Teachers from the UNL Department of Mathematics in August 2011.

Continued on Page 14



NTN: Kelly Gomez Johnson (center)



Cindy Settje

After completing the Primarily Math program, Cindy Settje has continued

on a journey to earn a master's degree from the UNL Department of Teaching, Learning and Teacher Education. She graduated with her MA in August 2011.

School and District: Leigh Elementary, Leigh Community Schools

Years Teaching: 29

Program: Primarily Math, Cohort 1

You stayed in Lincoln for a whole month in Summer 2010 to complete two Primarily Math courses and two NMSSI courses designed for elementary teachers. How was the experience?

Taking 12 credit hours with some of my fellow Cohort 1 members helped a lot. Our "Husker Village" crew grew pretty close and helped each other out. I decided to take the NMSSI courses since they may not be offered again the following summer, and, at that time, there weren't classes offered in nearby towns like Columbus and Norfolk [as were available in 2011]. I feel the added course [locations] will be helpful for many teachers across Nebraska. It also was a big plus that UNL was offering fellowships for taking these classes.

Continued on Page 14

From Page 13

In Fall 2010 you took TEAC 800 via distance education and in Spring 2011 you took in TEAC 889, also as distance education. How did you balance those classes while teaching?

Besides teaching full time, I am also the Cheer and Dance Sponsor for our school, Music Department Accompanist, give piano lessons, and play for various churches, so I must admit that taking classes has been a balancing act and quite a challenge. TEAC 889 online was especially time-consuming since we read a new book every two weeks and then blogged every day besides doing research papers. I found myself getting teased a lot since I would be reading my book on the way to a ball game or between games. My students always asked me what book I was reading this week and what I was learning about. I think it helped them to know that Mrs. Settje was reading and learning, too.

Do you remember your favorite teacher?

I didn't really have one favorite teacher, but my elementary teachers made a big impact on me. I went to a country school for kindergarten through eighth grade, so I had the same teacher for three years. The relationships I established with these teachers made a big impact on me. Also, in the country-school setting, you were able to work with and teach the students in the grades below you, as well as learn from the grades above you. This setting fostered my desire to become a teacher.

What is your favorite thing about teaching?

I have always enjoyed being with children. I love to hear what they have to share. It always amazes me the insights that kids really have when we give them a chance. I am so lucky to have a job that I enjoy so much, and I can learn right along with the students.

What's your favorite TV show? I'm afraid I do not have a lot of time for a favorite TV show, but I do know that my favorite show when I was a kid was "The Brady Bunch." I think I had just about every line Marcia said memorized.

What is your favorite thing about Nebraska?

I am a farmer's daughter and now a farm wife from a town of 440 people, so I feel the closeness Nebraskans have with their neighbor is probably my favorite thing about Nebraska. We know just about everyone in our communities and are willing to help one another in any way possible. ○

From Page 13

"I don't think when I started this program that I realized how much it was going to impact me as a teacher and mathematician. Instead of taking random graduate courses, I was able to take 36 high-quality graduate hours connected to my craft, at barely any cost to me. This enormous gift I was given was only through the hard work of so many at the Center, especially Jim Lewis," said Gomez Johnson. "The networking with other teacher professionals, challenging coursework and support are characteristics of this program for which I'll be forever grateful."

The complete list of teachers who have earned an MAT or a Master of Arts degree from the Department of Teaching, Learning and Teacher Education through NebraskaMATH and the NMSSI are:

August 2010

Scott Burns, Lincoln Pius X High School, MAT
Katie Soto, Park Middle School, Lincoln Public Schools, MAT
Ryan Shuman, Pound Middle School, Lincoln Public Schools, MAT

May 2011

Danielle Buhrman, Grand Island Senior High, Grand Island Public Schools, MAT
Meagan Stobel, Bayard Jr/Sr High School, Bayard Public Schools, MAT

August 2011

Angela Blank, Cedar Hollow School, Northwest Public Schools, MAT
Kelly Gomez Johnson, Papillion-La Vista South High School, Papillion-La Vista Public Schools, MAT
Kellie Joy, Clinton Elementary, Lincoln Public Schools, MA
Kathleen Klein, Horizon Middle School, Kearney Public Schools, MAT
Holly Liibbe, Culler Middle School, Lincoln Public Schools, MAT
Molly Orton, Adams Elementary, Lincoln Public Schools, MA
Cindy Settje, Leigh Community Schools, MA
Tara Zusan, Cavett Elementary, Lincoln Public Schools, MA

December 2011

Eric Lockert, Lincoln North Star High School, Lincoln Public Schools, MAT
Katherine Norman, Lincoln Southeast High School, Lincoln Public Schools, MAT ○

Learn more about master's degree options:
<http://scimath.unl.edu>

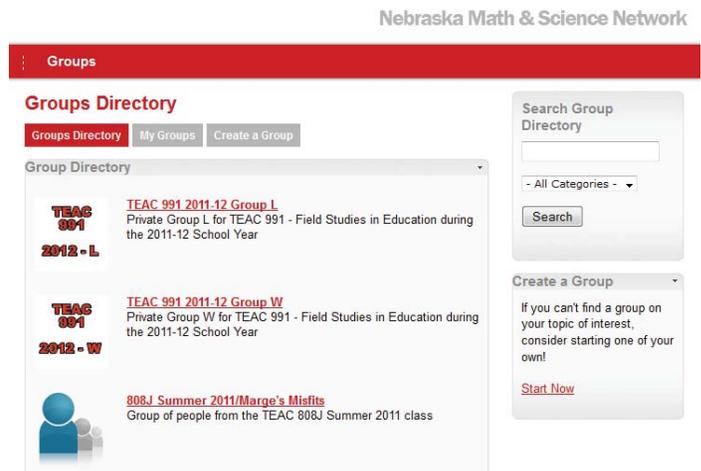
Network connecting state's teachers online

Since late 2010, the Nebraska Math & Science Network, <http://www.nebsciathnet.org>, has served as a vehicle to connect mathematics and science teachers through an online, social networking platform. After attending a Math for America meeting, Jim Lewis identified that Nebraska teachers would benefit from access to such a private, online community for making professional connections statewide.

The Nebraska Math & Science Network, hosted by the MemberToMember™ organization, provides NebraskaMATH the opportunity for: continued mentoring of participants, continued opportunities for participants to remain in contact during and after courses, and the building of a statewide community of mathematics teachers and educators interested in improving mathematics education. The Center for Science, Mathematics & Computer Education manages this secure site, allowing members to collaborate and share lessons and other resources privately.

A concern among teachers with social networking sites is the public access component, such as search engines. Teachers need a place to share lesson plans or discuss the best way to accomplish a task, without their comments showing up on the open Internet accessible to students, and the Nebraska Math & Science Network provides this opportunity. Currently, there are 486 members of the Nebraska Math & Science Network.

The CSMCE's main site administrator, Jerel Welker, a math coach at LPS' Lincoln Northeast High School, creates groups or allows other members to create groups on specific topics. Groups are the main mechanism for bringing together



members with similar interests. The Geometry and Algebra groups are a place to discuss questions related to those topics, including lessons plans or other resources that teachers are willing to share. Within a group, members can see and communicate with other members, invite colleagues to join a group, and participate in discussions. Each group also has its own discussion board.

Discussions exist in the Nebraska Math & Science Network both as a stand-alone feature that can be viewed by all community members and within the groups function. Members can browse and search existing discussion threads or choose to create their own. Discussions function much like traditional bulletin boards where a member posts a comment or question and others can respond.

The Network also allows members to have their own personal blogs. The presence of active bloggers within a community encourages members to return to the site to read and comment on the latest posting. The CSMCE can utilize a blog in order to share course schedule information with different groups, and other organizations, such as the Nebraska Association of Teachers of Mathematics, can send notices about conferences and membership information. ○

<http://scimath.unl.edu/network>

NMSSI, Noyce further grant's long-term vision



NMSSI 2011: MATH 896 Elementary Problem Solving

Master Teacher role emphasized

Several Nebraska teachers have served on an instructional team for a NebraskaMATH course as a "Master Teacher," supported either partially or fully by grant funds. Four current or former Lincoln Public Schools math coaches (Delise Andrews, Susie Katt, Laura Parn and Jerel Welker) have co-instructed a NebraskaMATH course with UNL faculty members. For the Nebraska Math & Science Summer Institutes, more than a dozen teachers have either co-instructed or served as a Master Teacher for courses in locations across the state and were funded by university dollars. Through the growth of the NMSSI, we hope to offer this opportunity to additional teachers in the future. ○

The long-term vision of NebraskaMATH is to develop a partnership that can be sustained after the end of NSF funding. NebraskaMATH continues to expand and include additional districts, schools, administrators and teachers in the partnership, therefore enabling more opportunities for high-quality professional development programs for teachers, outstanding research initiatives and a strong, sustainable collaboration of educators that is Nebraska's catalyst for improvements in mathematics education.

The Nebraska Math & Science Summer Institutes (NMSSI) is central to the NebraskaMATH vision to create a long-term partnership, offering a coherent professional development program for K-12 mathematics (and science) teachers in Nebraska.

The NebraskaMATH proposal included a commitment to develop this program as a way to offer a teacher-friendly approach to graduate education for math teachers that did not depend on NSF funding. The program benefits from the fact that UNL made a commitment to discount tuition for these graduate courses (by 20 percent). UNL also provided fellowships to cover the cost of fees from 2008 to 2010.

Even with tuition discounting, NebraskaMATH has learned that the cost of graduate education can be a significant barrier to teachers, especially those early in their careers. In Summers 2010 and 2011, several sources of UNL funds provided fellowships for teachers. To support our work in 2011, the University of Nebraska Foundation developed proposals to seek an endowment for the Center for Science, Mathematics & Computer Education. The largest came from State Farm®, which donated \$20,000 to help 32 teachers take NMSSI courses tuition-free.

The recent adoption of the revised Nebraska mathematics standards, along with the first implementation of a statewide assessment of student achievement in mathematics, represents a special and immediate challenge for mathematics teachers, and it is essential to increase capacity to serve mathematics teachers in Nebraska. Thus, the NMSSI offers courses designed to strengthen teachers' mathematical content knowledge in addition to courses that aim to deepen teachers' pedagogical skills.

Since 2008, 252 distinct teachers have taken an NMSSI mathematics course. In Summer 2011, nine locations and 21 course offerings in mathematics and mathematics education courses, most originating from Math in the Middle, reached 160 distinct teachers. The final total for registrations in math and science courses was 216, as many teachers took two or three courses. In Summer 2012, special emphasis will be placed on offering courses in 11 sites around the state.

NMSSI courses use a concentrated immersion approach developed by Math in the Middle. Classes meet for either one or two weeks. Teachers are usually able to earn at least 6 graduate credits during a single summer. Research has shown that for professional development to have an impact on teaching practices, teachers must be engaged in the professional development for 80 hours. The NMSSI's intense 40-hour-per-week summer courses provide the kind of professional development teachers need to increase student learning and academic success.

In 2010, faculty at UNL secured a new \$3 million NSF grant to support K-12 math teachers in Nebraska, this time from the Robert Noyce Teacher Scholarship Program. The NebraskaNOYCE grant, or the "Noyce grant," has a special mission to strengthen mathematics teaching and learning in high-need school districts. In Nebraska, this primarily means school districts that have a large percentage of their students qualifying for free or reduced lunch. As such, the grant extends the work being done by NebraskaMATH in partnership



with GIPS, LPS and OPS, as well as smaller high-need school districts across the state.

Jim Lewis, NebraskaMATH PI, is also PI for the Noyce grant. Noyce co-PIs include UNL professors Wendy Smith (NebraskaMATH Research Coordinator), Steve Swidler (Teaching, Learning and Teacher Education) and Doug Kauffman (Educational Psychology), as well as retired professors Ira Papick (Mathematics) and David Fowler (TLTE).

The Noyce grant has two key programs. One seeks to identify and support 24 of the state's best master teachers who make a commitment to their district and to helping their peers strengthen math teaching in the state. The other provides fellowships to help attract recent graduates or career-changers in STEM disciplines (science, technology, engineering and mathematics) to enter a graduate program leading to a master's degree with certification to teach mathematics.

The grant was timely, as UNL's Department of Teaching, Learning and Teacher Education was ready to launch a new Master of Arts with emphasis in mathematics teaching (MAmt), which enables graduate students to earn a master's degree and certification to teach secondary mathematics in 14 months.

During Spring 2011, the grant's Principal Investigators recruited, reviewed and selected the first cohort of MAmt graduate students and the NSF Master Teaching Fellows (MTF). Each MTF made a commitment to participate actively in a professional development program and to teach for five years in a high-need school district while significantly contributing to strengthening mathematics teaching and learning in their school and district. ○

Learn more about the NMSSI and Noyce:
<http://scimath.unl.edu/NMSSI>
<http://scimath.unl.edu/noyce>

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