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## NebraskaMATH Year 1 Report December 2009

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Nebraska  
**MATH**

*A partnership to improve  
mathematics achievement*



# Year 1 Report

# December 2009

**N**ebraskaMATH is a 5-year, \$9,235,407, Targeted Math Science Partnership funded by the National Science Foundation that began on January 1, 2009. While the University of Nebraska-Lincoln serves as the fiscal agent for the grant, NebraskaMATH is a P-16 partnership that includes the Grand Island Public Schools, Lincoln Public Schools, Omaha Public Schools, Papillion-La Vista Public Schools and Nebraska's Educational Service Units. Overall guidance for NebraskaMATH is provided by a Leadership Team that includes the grant's seven co-PIs, representatives of the ESU and core local school-district partners, and the grant's Program Coordinator and Research Coordinator. Jim Lewis, Aaron Douglass Professor of Mathematics at UNL, is the lead PI for the grant. The UNL Center for Science, Mathematics and Computer Education provides staff support for the NebraskaMATH partnership. For more information about NebraskaMATH, visit our Web site: (<http://scimath.unl.edu/nebraskamath>).



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The overall goal of NebraskaMATH is to **improve achievement in mathematics for all students and to narrow achievement gaps of at-risk populations**. Two important beliefs guide the work of NebraskaMATH:

i. We must develop an active and mature P-16 partnership to improve mathematics education in Nebraska

that links mathematics teachers and school administrators with university mathematicians and mathematics educators and that can be sustained by state dollars after the end of NSF funding.

ii. Good teachers matter. We must provide opportunities for teachers of mathematics to strengthen their mathematical and pedagogical knowledge as well as their knowledge of students and how to motivate them to learn.

NebraskaMATH builds on the foundation laid by the Math in the Middle Institute Partnership (M<sup>2</sup>), which was also funded by NSF. The initial partners for that grant were UNL, LPS and ESUs #6, #7 and #13. Since M<sup>2</sup>'s beginning in 2004, 125 Nebraska teachers have earned a master's degree from UNL, and the partnership has grown to include most of Nebraska's ESUs and more than 65 school districts. A supplement to the grant enabled us to include OPS as a partner, with 32 teachers expecting to graduate by

August 2011. Now, as the first year of NebraskaMATH comes to a close, we can report that between the two grants, teachers from more than 90 school districts have participated in professional development opportunities funded by the two grants, and we are successfully developing a strong partnership among UNL, our core district partners and Nebraska's ESUs. In particular, the involvement of the Educational Service Unit Coordinating Council greatly enhances our ability to offer NebraskaMATH opportunities to teachers from across Nebraska.

Building on this foundation, NebraskaMATH focuses on providing professional development opportunities for K-3 teachers (Primarily Math), Algebra 1 teachers (Nebraska Algebra) and relatively new secondary math teachers (New Teacher Network). This Year 1 Report has articles about these programs and the research initiative that is part of Primarily Math. In addition, the Nebraska Math and Science Summer Institutes is our initial effort to expand opportunities for mathematics teachers at all grade levels using local dollars. In Summer 2010, the NMSSI will offer opportunities for mathematics teachers in six locations around the state.

Over the next four years (2010-13), it is the intent of the NebraskaMATH leadership to expand the partnership, providing opportunities for Nebraska teachers from a growing number of local school districts. The Nebraska Summit on Mathematics Education, jointly funded by M<sup>2</sup> and NebraskaMATH, is part of this effort, as is the NebraskaMATH newsletter. To learn more about becoming involved in NebraskaMATH, contact us at [nebraskamath@unl.edu](mailto:nebraskamath@unl.edu). ○

# Primarily Math

*A program focused on strengthening mathematics education in grades K-3*

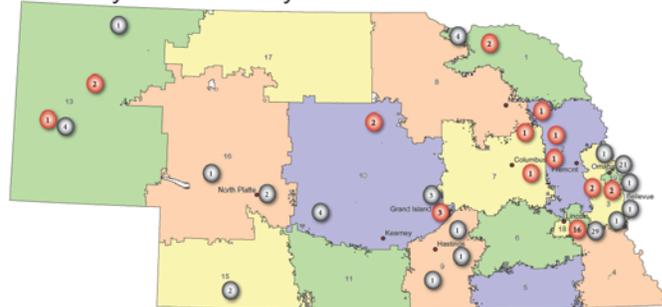
**Primarily Math**, an initiative to strengthen the teaching and learning of mathematics in grades K-3, is NebraskaMATH's most ambitious initiative. This part of the NebraskaMATH proposal was inspired by UNL Dean Marjorie Kostelnik, who argued convincingly that if we are to have high expectations for what can be accomplished with respect to teaching and learning math in our K-12 schools, then significantly more must be achieved in the early grades. Moreover, many students begin formal education well behind their peers with respect to mathematical knowledge, just as there are wide gaps in children's readiness to learn to read. Primarily Math is designed to respond to this need for expertise in teaching mathematics in the early grades.

The overall design of the Primarily Math program includes three phases: i) an investment in K-3 teacher education through a graduate certificate program, ii) support for teachers after they complete the graduate program and work to strengthen mathematics teaching and learning in their classrooms and their schools, and iii) a research study designed to inform Nebraska and the nation regarding the impact of Primarily Math on student achievement.

Based on the response to our initial recruitment of Primarily Math teachers, the program fills an important need. Despite a relatively short application period, 173 teachers applied to participate in the program. Although we could only accept 35 teachers for the initial cohort in Summer 2009, 112 teachers were chosen to begin the program in Summer 2009, 2010 or 2011. The first cohort of teachers met in Lincoln in Summer 2009. Current plans include an Omaha area cohort to be held at ESU #3 in Summer 2010, and two institutes in Summer 2011 – one in Grand Island and second on the UNL campus.

Because of NSF support, Primarily Math teachers receive a stipend during the Summer Institute and are able to earn 18-21 hours in the graduate program tuition-free. The grant also

Primarily Math Teachers by Nebraska Educational Service Units



provides travel and subsistence support for teachers who must travel to the Institute site. To secure additional places in Primarily Math for their teachers, LPS, OPS and PLVPS made the commitment to fund teacher stipends for some of their teachers in Primarily Math. This will enable us to recruit an additional 30

teachers from across Nebraska in Summer 2011, in addition to the teachers already pre-selected for the program. Applications for these additional positions will be accepted in Fall 2010. Plans are currently under way to host a fifth Primarily Math Institute in Summer 2012, but current funding will not enable us to provide stipends for the fifth Institute. It is our hope that the program will have proved so beneficial by the time teachers are recruited for that cohort that additional Nebraska school districts will support their own teachers (just as LPS, OPS and PLVPS have done) by paying summer stipends for their teachers.

K-3 teachers who participate in Primarily Math begin with a six-course, 18-hour graduate program that emphasizes mathematics, pedagogy and working with children in the early grades (see chart on Page 4). An optional 7th course is offered to teachers who will assume a district leadership position, such as math coach, and who want

to prepare for that role by learning about leadership and working with adult peers. All of the courses have been approved by the appropriate department and forwarded to UNL Graduate Studies.

*Primarily Math Continued on Page 4*



# Nebraska Algebra & New Teacher Network

Working to ensure success in the gateway course of Algebra I

**Nebraska Algebra** is NebraskaMATH's initiative to support school districts and their Algebra I teachers as they work to ensure success for all students in this important gateway course. The initiative has a special focus on the goal of extending success to students who historically have not been successful in Algebra I and, as a result, tend to have an unsuccessful mathematics education in high school.

Nebraska Algebra begins with a two-course (six graduate credit) Summer Institute during which participants take two courses, Math 810T, Algebra for Algebra Teachers, and EDPS 991, Cognition and Instruction for High School Algebra Teachers. The algebra course was created by UNL professor Ira Papick, author of an algebra textbook for middle level teachers, *Algebra Connections*.



In the course, teachers are challenged to develop a deep understanding of important topics in modern algebra. The course is designed to assist teachers in seeing the fundamental connections between what they are learning and

what they will be teaching. The educational psychology course was created by UNL professors Roger Bruning and Doug Kauffman. It is a unique contribution to Nebraska Algebra because it recognizes the central importance of understanding the learner and how to motivate Algebra I students in order to be successful in teaching algebra to all of them.

The Summer Institute is followed by a yearlong pedagogy course that supports algebra teachers as they build on what they have studied and enhance their own teaching. The lead instructors are professors David Fowler and Gordon Woodward of UNL and Sue Graupner of Lincoln Public Schools as the K-12 school district representative. A particularly successful part of the course has been a lesson planning cycle where small groups of algebra teachers work together to design a rich lesson plan and then observe one member of their group teach that lesson. In this modified version of what is known as Japanese Lesson Study, teachers focus on student engagement and learning and have the opportunity to reflect on how planning and careful teacher-instructional moves can enhance the learning experience for their Algebra I students.

Nebraska Algebra Teachers by Nebraska Educational Service Units



The NebraskaMATH grant also seeks to learn more about the benefit of supporting teachers with a university mentor and a K-12 mentor. For the current academic year, the Lincoln Public School district has made a major commitment to the use of Algebra Coaches to support their teachers who are participating in Nebraska Algebra. Following this year's experiences, it is likely that Grand Island and Papillion-La Vista Public Schools will make a commitment to Algebra Coaches in 2010/2011. In turn, the Nebraska Algebra initiative is considering what it can do to provide professional development for math coaches.

Because of the generous support of the National Science Foundation, Nebraska Algebra teachers receive a stipend during the Summer Institute and are able to take the nine-hour graduate program tuition-free. The grant also provides travel and subsistence support for teachers who must travel to the Institute site. During Summer 2009, 54 Nebraska teachers participated in Nebraska Algebra. Another 30 will be able to participate in a Nebraska Algebra Summer Institute in Grand Island in Summer 2010. Applications are still being accepted from teachers who want to participate in that institute or who want to join the Nebraska Algebra program starting in Summer 2011. It is hoped that current resources will be able to provide the Nebraska Algebra opportunity for between 80 and 100 Nebraska algebra teachers in Summer 2010, 2011 or 2012.

## New Teacher Network

The **New Teacher Network** has the goal of supporting secondary math teachers who are new to the profession (basically those in the first four years of their career as a math teacher). The goal is

*New Teacher Network Continued on Page 4*

An overview of the Primarily Math Institute graduate program is as follows:

Primarily Math Specialist Certificate Program		
Term	Course	Topic
Summer 1	MATH 800P	Number and Operation for K-3 Math Specialists
	MATH 801P	Geometry, Measurement and Algebraic Thinking for K-3 Math Specialists
Fall	TEAC 808A	Teaching Math K-3: Planning Lessons for Diverse Classrooms
Spring	TEAC 808J	Helping Young Children Become Mathematical Thinkers
Summer 2	MATH 802P	Number, Geometry and Algebraic Thinking II for K-3 Math Specialists
	TEAC 907	Communities of Practice and Mathematics
2nd Fall <sup>^</sup>	TEAC 948	Leadership and Mathematics Instruction
<sup>^</sup> = TEAC 948 is an optional course for teachers who will assume a leadership position.		

As part of the Primarily Math graduate program, teachers will earn a K-3 Mathematics Specialist Certificate from UNL. The Certificate program is currently awaiting approval by UNL Graduate Studies. After the K-3 Mathematics Specialist Certificate is approved, NebraskaMATH leaders will propose to the Nebraska Department of Education that the K-3 Mathematics Specialist be recognized as an endorsement that graduates of the program can receive.

Following completion of the graduate program, participating

*New Teacher Network from Page 3*

to offer a mentoring and graduate education program designed to support outstanding new mathematics teachers who want a quick start on the journey to becoming a master teacher. Teachers selected for the program have the opportunity to earn 21 hours of graduate credit focused on mathematics and the teaching of mathematics, beginning with the Nebraska Algebra program the first year they participate in the New Teacher Network. The graduate coursework is free of charge to the teacher and the grant is able to provide the teachers with participant support for

teachers will work for two years with a faculty-graduate student team at UNL with the goal of transferring knowledge gained in the graduate program into teaching practice that leads to increased achievement for all students in the K-3 classroom. During this phase of Primarily Math, teachers will move into one of three roles (math coach, math specialist, generalist) based on their own strengths, their districts' needs and the needs of the Primarily Math research study discussed below. Teachers will be supported through study groups of six-12 members, organized by UNL faculty in collaboration with system administrators and supported by school districts. There will be two types of study groups: 1) Math Coach Study Groups will meet monthly and be facilitated by district math coordinators and university faculty. Participants will focus on issues of mentoring, with the option to receive graduate credit. 2) Classroom Teacher Study Groups will meet monthly and be led by selected school personnel. Discussions will focus on a study of mathematical ideas prompted by the descriptive review of student work and the planning and debriefing of common formal math lessons and activities outside of math class.

Primarily Math also includes a major research project designed to inform the nation as to the most effective (and financially efficient) approach to strengthening K-3 mathematics education. Consistent with a recommendation found in the 2008 National Math Panel Report, *Foundations for Success*, the Primarily Math research team will study the relative benefits derived from utilizing graduates of the program as i) K-3 math coaches, ii) math intensive teachers who teach math to more than one class at the K-3 level, and iii) teachers who remain as generalists in the classroom, especially kindergarten teachers.

The research initiative and the overall Primarily Math program are led by UNL professors Ruth Heaton, Carolyn Edwards and Walter Stroup. UNL's ability to bring together an interdisciplinary team with expertise in mathematics teacher education, psychology and early childhood learning, and statistics is part of the reason that the NebraskaMATH team was able to submit a successful grant proposal. ○

travel and subsistence. In addition to the graduate coursework opportunity, New Teacher Network participants become part of a professional community of their peers. They also have two mentors – a university faculty member and a master teacher. As with Nebraska Algebra, we are encouraging local district partners, where possible, to provide teachers with an instructional coach (instead of a mentor) to better support the new teacher's growth. In Summer 2009, 15 Nebraska teachers became the first cohort of teachers in the New Teacher Network. Current planning is to recruit another 15 teachers to begin the New Teacher Network in Summer 2011. ○








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