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Developing and supporting professional communities of mathematics teachers in Nebraska

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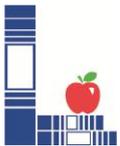


Nebraska
MATH

UNIVERSITY OF
Nebraska[®]
Lincoln

NebraskaMATH: Developing and Supporting Professional Communities of Mathematics Teachers in Nebraska

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Planting the Seeds of Partnerships in Nebraska

- 1990s: NSF-funded SSI
 - Experience working with districts & educational service units (ESUs) in Nebraska
 - Creation of the Center for Science, Mathematics, and Computer Education at UNL
- LPS-UNL Professional Development Partnership
 - Summer PD math workshops
- 2000-2003: Math Matters
 - NSF grant to revise mathematics education of preservice elementary teachers
 - Institutionalized as the “Math Semester”



Growing the Partnerships

- Math in the Middle Institute Partnership
 - 2004-2011
 - \$5.9 million from NSF as a \$5 million Math Science Partnership Institute with \$0.9 million Noyce supplements
- NebraskaMATH
 - 2009-2013
 - \$9.2 million from NSF as a Targeted Math Science Partnership
- NebraskaNOYCE
 - 2010/11-2015/16
 - \$3 million from the Noyce Foundation with \$1.5 million UNL match



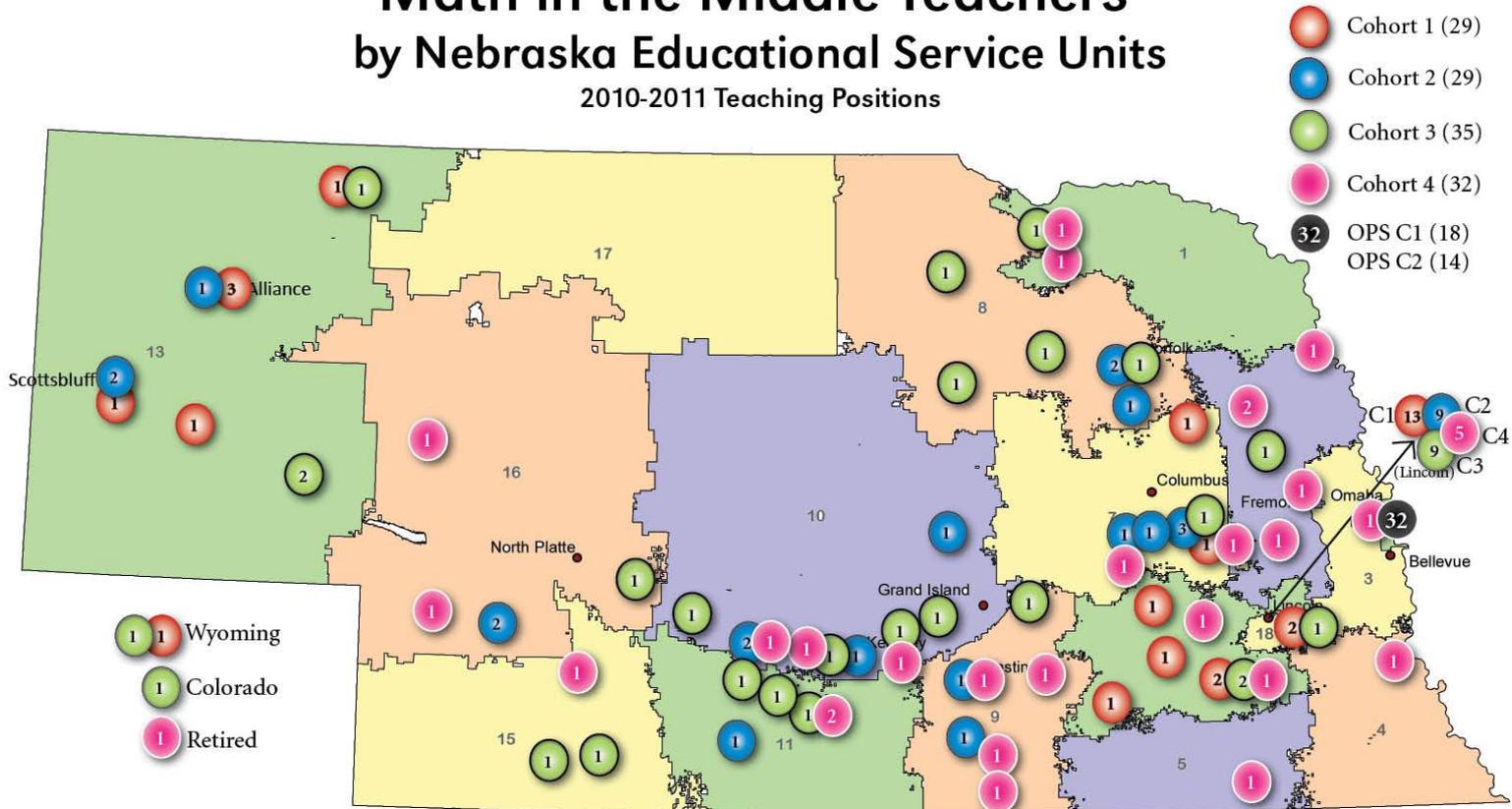
Math in the Middle Institute Partnership

- Institute of 36 credit hours of graduate coursework leading to a master's degree across two years
- Focused on graduate education of middle level mathematics teachers
- Began as a partnership with Lincoln Public Schools (LPS) and 3 rural ESUs
- Has grown to build partnerships with ESUs and school districts across the state
 - 156 teachers from over 60 districts have earned a master's degree through the program
 - Teachers from all 14 rural ESUs have participated
 - Supplement allowed expansion to Omaha



Math in the Middle Institute Partnership

Math in the Middle Teachers by Nebraska Educational Service Units 2010-2011 Teaching Positions



NebraskaMATH

- P-16 partnership across the state
- Overall goal: to improve achievement in mathematics for all students and to narrow achievement gaps of at-risk populations
- Three main foci at key transition points:
 - Primarily Math (K-3)
 - Nebraska Algebra (Algebra 1)
 - New Teacher Network (secondary teachers in first 3 years of teaching)



NebraskaMATH Partnerships

- Four core partners: Grand Island Public Schools, Lincoln Public Schools, Omaha Public Schools, Papillion-La Vista Public Schools
- Nebraska's 17 Educational Service Units
- Over 90 school districts
- The University of Nebraska-Lincoln
 - Six PIs at UNL represent
 - 5 departments: Math; Statistics; Psychology; Teaching, Learning & Teacher Education; and Child, Youth & Family Studies
 - 3 UNL Colleges: Arts & Sciences, Education & Human Sciences, Agriculture & Natural Resources



NebraskaMATH: Primarily Math

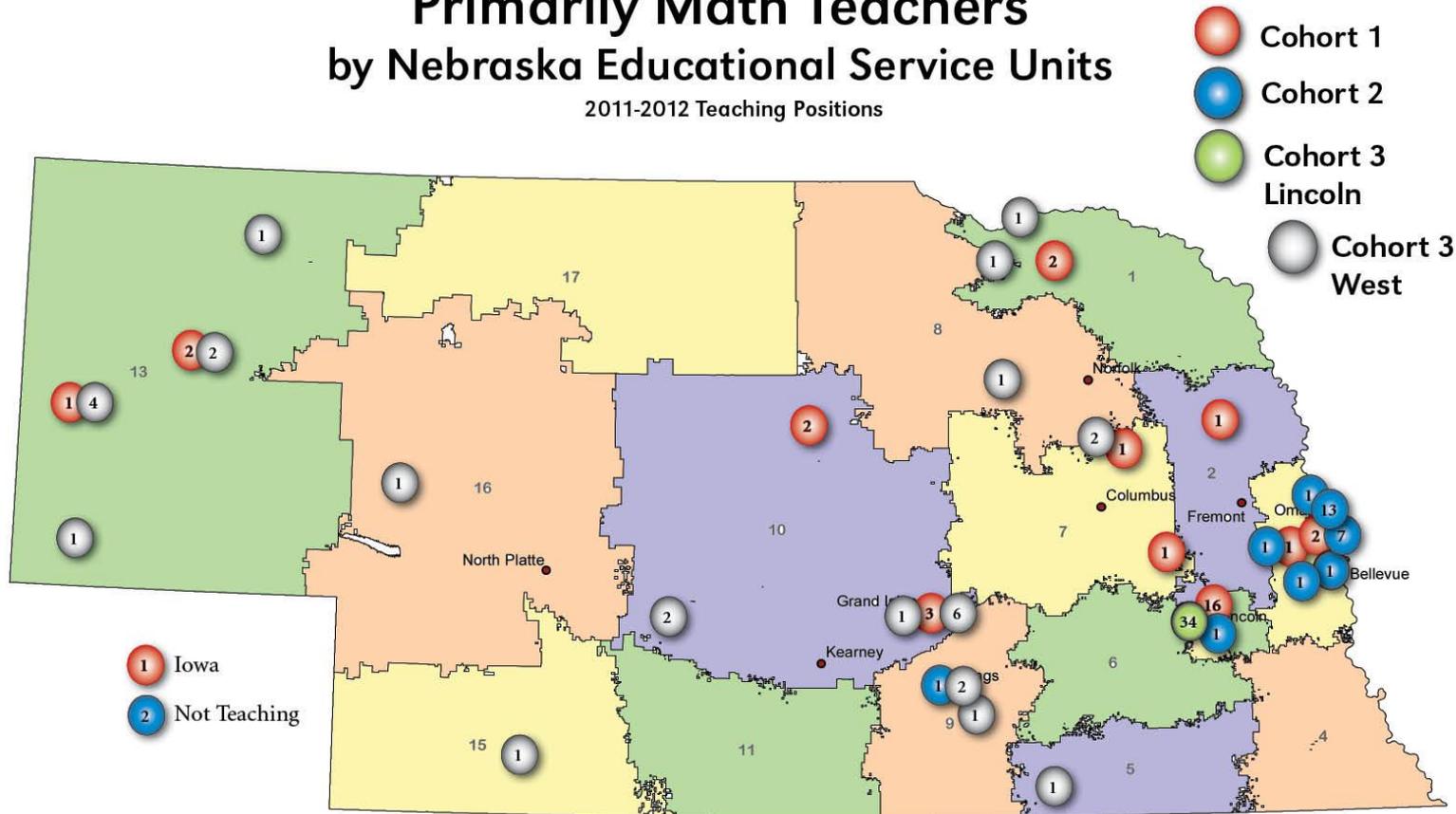
- Focuses on strengthening the teaching & learning of mathematics in grades K-3
- Six course, 18-credit hour program leading to a K-3 Mathematics Specialist certificate
- Optional 7th course focusing on leadership
- On-going support in the form of study groups lasting 2 years after coursework
- Accompanying research project investigating what happens to student achievement as buildings employ math specialists as coaches, to departmentalize math instruction, or to continue as general classroom teachers



Primarily Math Map

Primarily Math Teachers by Nebraska Educational Service Units

2011-2012 Teaching Positions



NebraskaMATH: Nebraska Algebra

- 9 hours of graduate coursework
 - Math 810T: Algebra for Algebra Teachers
 - EdPs 991: Cognition and Instruction for High School Algebra Teachers
 - TEAC 991: Field Studies in Mathematics
- TEAC 991 during the academic year focuses on helping teachers implement what they learned in the 2 summer courses
- Teacher Liaison during the AY
- Districts are encouraged to provide participants with a coach or mentor



NebraskaMATH: New Teacher Network

- Designed for teachers with 0-3 years of experience
- Participants have liaisons (master teacher mentors) as resources for everything related to teaching
- Participants first take Nebraska Algebra courses
- Participants then take 15 credit hours of additional coursework over the next two years



NebraskaNOYCE

- Focus on increasing the K-12 mathematics achievement in high-need Nebraska schools, addressing the large gaps between middle/high class white students and all other groups
- Partnership among UNL and 3 largest high-need Nebraska districts
- Recruited 24 Master Teaching Fellows (8 from OPS, 8 from LPS, 8 from across Nebraska)
- Recruited 6 Teaching Fellows in year 1; goal of 10 in year 2
- Targeted support for high-need schools



Teaching Fellowships

- Goal: recruit 16 individuals with a strong math background who love teenagers to become high school math teachers in high-need Nebraska schools
- 41-credit hour, 14-month Master of Arts with an emphasis on Mathematics Teaching
- 9-month internship with Master Teacher
- Receive free tuition, \$20k during the MAmt program, \$10k/year for 4 years teaching in a high-need Nebraska school

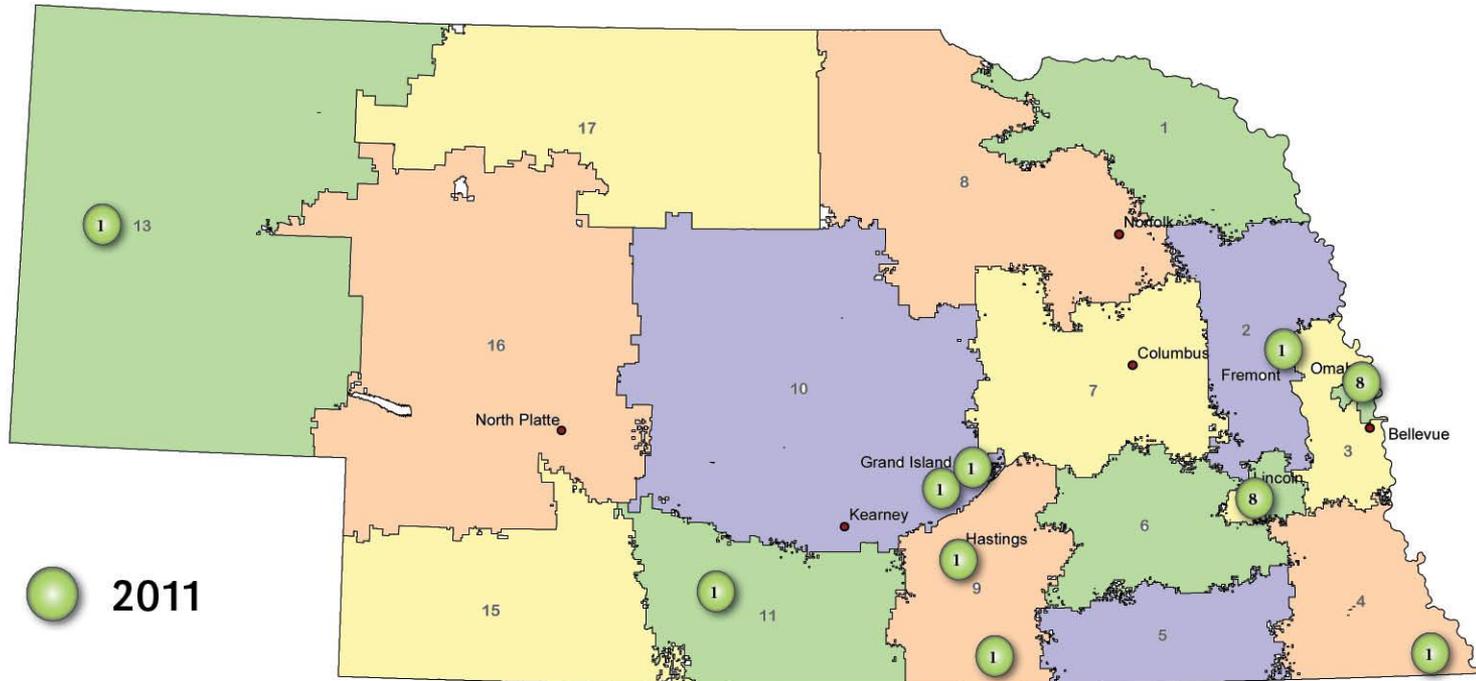
Master Teaching Fellowships

- Goal: recruit 24 master teachers to provide leadership to Nebraska's high-need districts to help close Nebraska's large achievement gap
- Teachers agree to continue teaching in high-need districts for 5 years
- Receive 24 credit hours free tuition, \$10k/year for 5 years, opportunity to teach on NMSSI instructional teams
- Mentor new teachers & Teaching Fellow interns



NebraskaNOYCE Map

Robert Noyce NSF Master Teaching Fellows by Nebraska Educational Service Units



Arapahoe (ESU 11): Daniel Schaben

Fremont (ESU 2): Edith Ronhovde

Falls City (ESU 4): Jason Vitosh

Grand Island (ESU 10): Danielle Buhrman

Hastings (ESU 9): Alicia Davis

Lincoln (ESU 18): Delise Andrews

Garold Furse
Patrick Janike
Darla Kelberlau-Berks
Anne Schmidt
Katie Soto
Sherry West
(one more to be chosen)

Omaha (ESU 19): Tanya Archie

Connie Colton
Katie Garcia
Philip LaFleur
Brent Larson
Jill Luschen
Paula Millerd
Gregory Sand

Scottsbluff (ESU 13): Shelby Aaberg

Superior (ESU 9): Jessica Thompson

Wood River (ESU 10): Jill Edgren



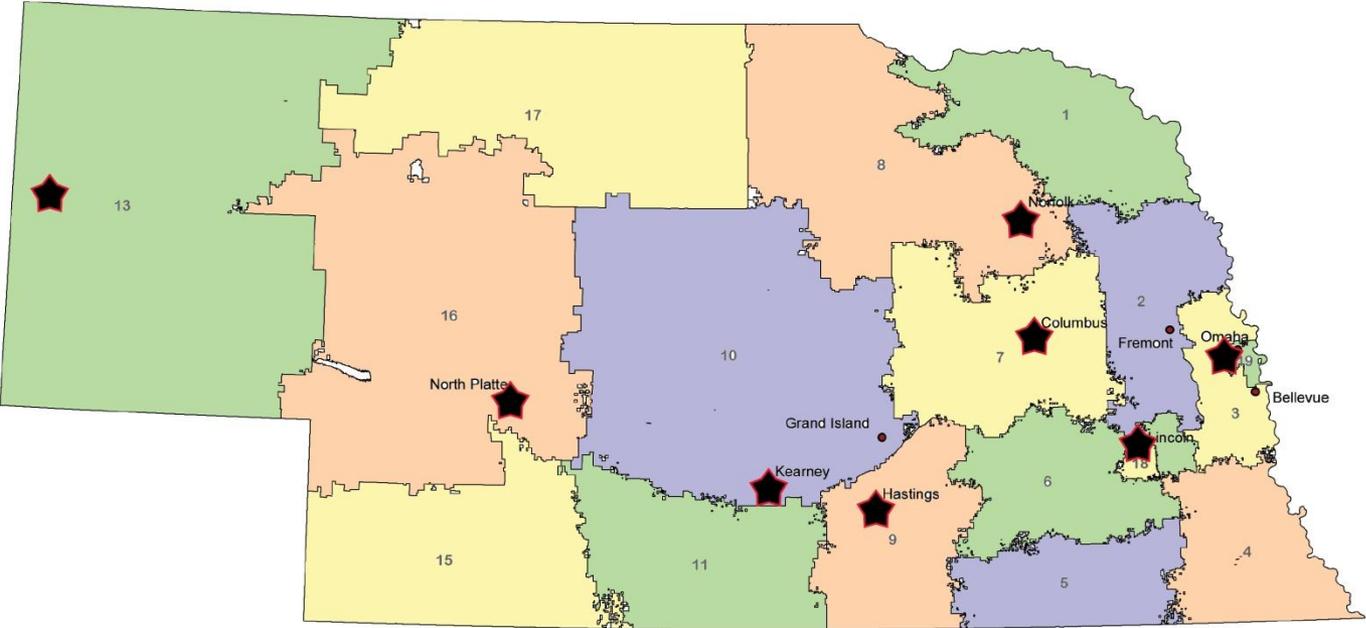
Institutionalization

- Nebraska Math and Science Summer Institutes
 - Graduate education funded with Nebraska dollars (began with Math in the Middle courses, adding NebraskaMATH courses, and creating new courses)
 - Want to offer on-going opportunities for Nebraska teachers' professional development
 - Have greatly expanded beyond M² courses, and constituted approx 1/6 of graduate courses offered by UNL in Summer 2011
 - UNL has agreed to reduce NMSSI tuition by 20%
 - We have pursued external funds (State Farm, Pfizer, Time Warner) to provide fellowships to further reduce tuition costs to teachers



NMSSI Map

NMSSI Course Locations 2008 through 2011



Courses have been held in Columbus, Hastings, Kearney, Lincoln, Omaha, Norfolk, North Platte and Scottsbluff.



Strategies for Institutionalization

- Instruction offered by teams (community of educators) of 2-5 mathematicians, mathematics educators, master teachers, and graduate students
 - Over 60 different graduate students, 32 different faculty from 5 universities, and 50 master teachers have been part of instructional teams
- Some courses are created & taught by master teachers
- Working with Noyce MTFs
- Graduate education beyond master's degrees
- Math coaches
- Course format: Summer 8am-5pm with 3-4 hrs of homework per night for 1 week (1 course) or 2 weeks (pair of courses); AY 1-2 days together on location, then distance ed (Blackboard)



Nature of Graduate Instruction

- High expectations combined with sufficient support
- Belief that effective learning must be active
- Focus on cooperative learning (modeling effective pedagogical skills)
- Focus on building participants' *mathematical habits of mind* and *pedagogical habits of mind* (and in certain courses *educational researcher habits of mind*)



Growing & Sustaining Partnerships

- Shared vision of increasing Nebraska student achievement in mathematics
- Shared belief that the way to address the vision is to engage teachers in high-quality long-term professional development
- Distributed leadership of projects, with “true” partnerships among stakeholders
- Building a community of professionals



Strategies for Sustaining Partnerships

- Nebraska Math and Science Network
 - Online network for professional collaboration
 - Private (not searchable outside the site)
 - Contains site-wide and private groups, blogs, discussions
- Primarily Math Study Groups
- Math Teachers Circles
- Dinner and a Math Problem



Barriers to Partnerships

- Distance
- Time
- Resources (people, funding, materials)
- Past history of relationships among stakeholders
- Bureaucracy



Partnerships Discussion

- How can teachers be better engaged in long-term, high-quality mathematics professional development?
- What do you see as necessary and sufficient conditions to support professional communities of math teachers?
- How can such conditions can be created or worked around?
 - Who are the stakeholders? How to get them connected with a shared vision?
 - Funding?
 - What are the other local barriers?



Nebraska **MATH**

*A partnership to improve
mathematics achievement*



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