

Primarily Math

Nebraska
MATH

*A partnership to improve
mathematics achievement*



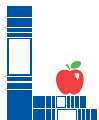
Success stories



University of Nebraska-Lincoln



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Nebraska MATH

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COVER PHOTO: KRISTY KENNEDY AND HER KINDERGARTEN CLASS
AT KLOEFKORN ELEMENTARY IN LINCOLN, NEB.
BY STEPHANIE VENDETTI/UNL CSMCE

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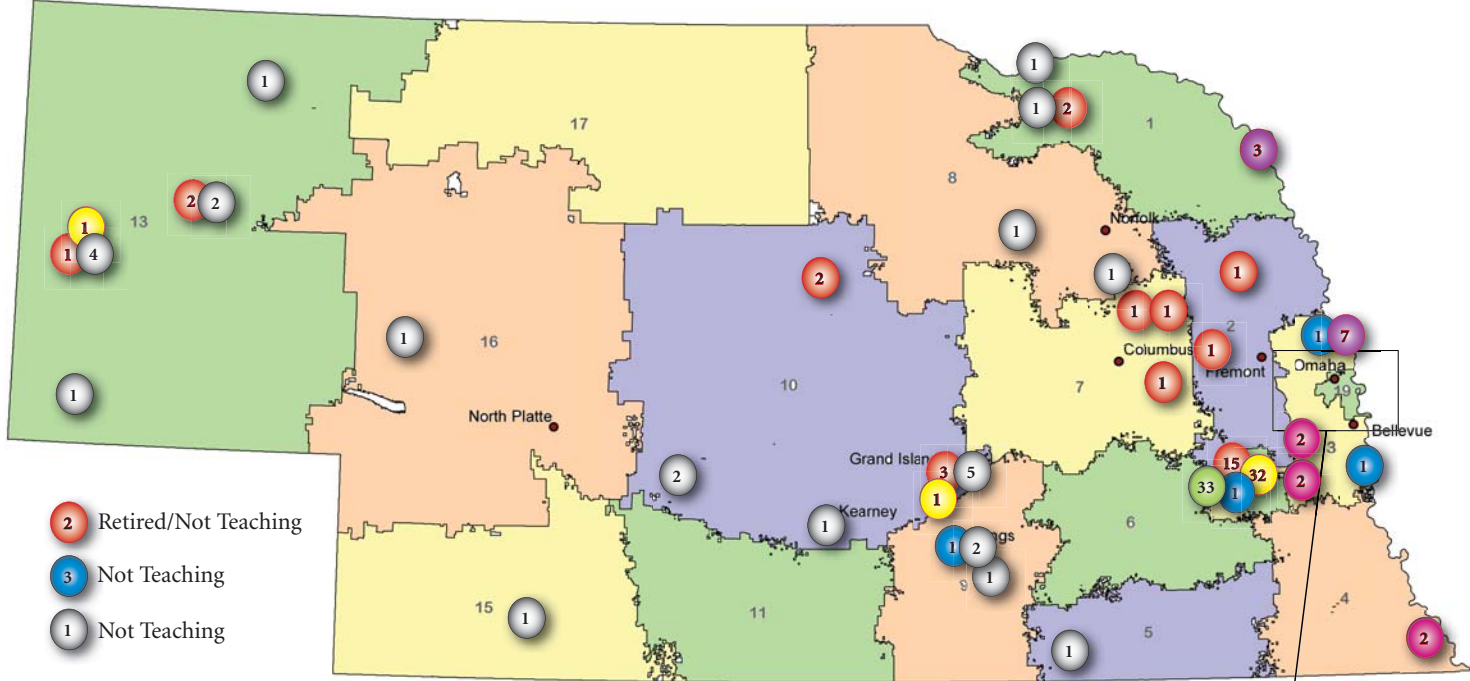
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Thank you to the teachers, principals, parents and students who made this publication possible.

Primarily Math Teachers

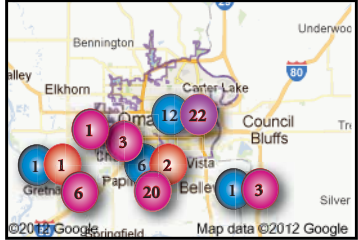
by Nebraska Educational Service Units

2012-2013 Teaching Positions



- Retired/Not Teaching
- Not Teaching
- Not Teaching

- | | | | |
|---|--|---|---|
| 35 Cohort 1 | 33 Cohort 3 Lincoln | 34 Cohort 4 Lincoln | 32 Cohort 4 Omaha |
| 27 Cohort 2 | 27 Cohort 3 West | 39 Cohort 4 ESU 3 | |



Exceeding expectations

This report to Nebraska, “Primarily Math: Success Stories,” tells the story of 227 outstanding elementary teachers who have accepted the challenge to return to graduate school to study mathematics and the teaching of mathematics. Over the past four years, they have used what they have learned to help strengthen mathematics teaching and learning in Nebraska’s K-3 classrooms. It is an inspiring story about dedicated teachers and the young children they teach.

This is also a story of the faculty and graduate students at the University of Nebraska–Lincoln (UNL) who are engaging in research to help us learn more about the potential of programs such as Primarily Math to impact the achievement of young children as they begin their journey from the first day of kindergarten to high school graduation.

Primarily Math is one component of NebraskaMATH, a \$9.2 million Math Science Partnership to UNL from the National Science Foundation (NSF). The goal of Primarily Math is to strengthen

kindergarten to third-grade teachers’ mathematical and pedagogical knowledge for teaching and their professional interactions with other teachers in their schools, while improving attitudes toward the teaching and learning of mathematics.

Teachers earn a K-3 Mathematics Specialist Certificate from UNL upon completion of the 18-hour graduate program. Beyond the six required mathematics and pedagogy courses, there is also a seventh, optional leadership course. Due to the generous support from the NSF, the 227 Primarily Math teachers have participated in the program at no cost to them for tuition and fees.

To date, 122 teachers have completed the program and 105 are scheduled to finish their coursework in the summer of 2013. The original proposal to NSF only anticipated serving 120 teachers but because of substantial demand for the Primarily Math program, NebraskaMATH leadership worked to reallocate resources and extend the opportunity to more teachers. NSF support will make it possible to serve one



Primarily Math

“Watching the students of the Primarily Math teachers collaborate and communicate about math concepts intrigued me. The more time I spent in those rooms, the more I wanted this in the building.”
Principal Amy Rogers, North and South Primary Schools in Blair

“It has been so fun to watch our son’s interest in math grow. He is so excited about what he is learning. We are amazed and proud of how much he has grown in ability this year.” **Parents Andy and Emily Gerch, Beattie Elementary in Lincoln, teacher Lacey Konwinski, Cohort 4**

“Having Primarily Math teachers on staff means that students benefit from having highly skilled math educators, and they are also excellent resources for other teachers. They are seen as having specific expertise and are sought out by their peers.” **Principal Sue Braun, Kloefkorn Elementary in Lincoln**



LINDSAY AUGUSTYN/UNL CSMCE

Cohort 4 teachers (from left) Maris Anderson of Blair Community Schools and Omaha Public Schools teachers Joana Kimmel and Mandy German build polydrons in MATH 801P in June 2012.



LINDSAY AUGUSTYN/UNL CSMCE

Cohort 4 teachers (from left) Angela Thiemann and Lisa Elder of Omaha Public Schools work with Play-Doh during MATH 801P in June 2012, while Master Teacher Tracy Custer of Blair Community Schools offers guidance. Custer participated in Cohort 2 of Primarily Math.

additional cohort of 30 teachers, which will begin the program in Grand Island in Summer 2013.

Blair Community Schools was one district to benefit from this reallocation, as well as from the decision by NebraskaMATH leadership to create geographically-based cohorts. After hosting the first cohort in Lincoln with participants drawn from across the state, Cohort 2 was offered in Omaha in 2010 to serve teachers in the Omaha area, including Blair. Then, Cohort 3 in 2011 was split into two groups – the first in Grand Island for central and western Nebraska teachers and the other for Lincoln Public Schools (LPS) teachers. Afterward, districts such as Blair and Papillion-La Vista School District (PLSD) requested the program be

opened to more teachers. Therefore, three cohorts were created in 2012 – one in Lincoln for LPS teachers; one in the Omaha area serving Omaha Public Schools (OPS), Blair and South Sioux City teachers; and one in Papillion serving ESU 3, including additional Papillion-La Vista teachers, and ESU 4.

Eight teachers from Blair have participated in Primarily Math, seven of them in the North and South Primary Schools with Principal Amy Rogers.

“It started with Tracy Custer in Cohort 2. She came back to me after Primarily Math and said, ‘We’re learning all sorts of new techniques.’ When I was observing her instruction, something was different about it, and I really liked what I saw,” Rogers said. “The Primarily Math teachers have educated me on guided math and Math Talk and the importance of working on depth of knowledge as opposed to breadth of knowledge. Watching their students collaborate and communicate about math concepts intrigued me. The more time I spent in those rooms, the more I wanted this in the building.”

Rogers said the Blair curriculum director observed the changes in instruction and decided to “take it to the next level,” going district-wide with the teachings from Primarily Math.

“What has transpired is that Tracy Custer has become a math leader in the buildings and has brought the level of instruction up, across the board, to every grade level,” Rogers said. “This program has had huge and very positive impacts on not only a few select teachers but also at the building and district levels.”

Along with UNL, the core partners for the NebraskaMATH grant are Grand Island Public Schools (GIPS), LPS, OPS, PLSD, Nebraska Educational Service Units (ESUs), and Northwestern University. Core partners LPS, OPS and PLSD also have contributed funds to enable more teachers to participate in Primarily Math.

“The students in the Papillion-La Vista School District have benefited from their teachers’ participation in Primarily Math,” said PLSD’s Deb Rodenburg, director of assessment and school improvement. “The district’s Primarily Math teachers have not only had an impact in their own classrooms, but also by sharing their learning with other professionals in our district through their involvement in the curriculum development and staff development process.”

UNL Professor Jim Lewis is the lead Principal Investigator of the grant. His co-Principal Investigators are UNL Professors Ruth Heaton, Tom McGowan, Carolyn Edwards, Walt Stroup and Ira Papick, as well as LPS Director of Curriculum Dr. Barb Jacobson. Dr. Jacobson retired in 2012, and her replacement at LPS, Dr. Jadi Miller, has replaced her as a co-PI.

Primarily Math also comprises a large research project, through which the participating teachers’ knowledge in relationship to student attitudes and achievement is studied. UNL faculty members and graduate students associated with Primarily Math conduct research that is informing districts and the mathematics education community regarding the effectiveness of various methods for teaching mathematics in grades K-3 (see page 24).



LINDSAY AUGUSTYN/UNL CSMCE

Alysia Augustus of Cohort 2 talks with two of her students on their assignment as math partners. Augustus teaches math to first- and second-graders at Anderson Grove Elementary in Papillion-La Vista School District, a core partner of the NebraskaMATH grant. Twenty-nine teachers from PLSD have participated in Primarily Math since 2009.

“Primarily Math is an important and successful initiative,” said Lewis, director of the UNL Center for Science, Mathematics & Computer Education. “To significantly strengthen K-12 mathematics education, our schools must strengthen mathematics learning in the primary grades. This requires mathematics preparation that is different from the education received by elementary teachers in the past. Primarily Math is creating K-3 math teachers who can respond to this challenge. We are quite proud of these teachers and excited by what they are accomplishing in their classrooms.”

Beginning on the next page are stories and photos of other Primarily Math teachers like Custer who are making a difference in their schools and districts.

To see more classroom photos besides those seen in this report, please visit the NebraskaMATH website at <http://scimath.unl.edu/nebraskamath>. ○

Community connections

Due to the recognizable success of Primarily Math, NebraskaMATH project leaders began the newsletter, “Primarily Math News,” for K-3 math teachers in 2012. The newsletter reminds participants that they are part of a strong network of teachers and university faculty. It includes articles especially relevant to teachers of grades K-3, and provides a vehicle for communication among Primarily Math alumni and participants. ○

Realizing her full potential

OPS math coach shares ideas, offers support in her new role

Becoming a math coach after Primarily Math has enabled Marni Driessen to “realize my full potential,” the Omaha Public Schools educator said.

“Primarily Math has given me confidence in my teaching of mathematics. I no longer question if what I am doing is going to benefit the students,” the Cohort 2 participant added. “Now I know that with careful and purposeful planning, my lessons will positively impact student achievement.”

OPS created two K-3 mathematics coaching positions beginning in January 2012 with subaward funds from NebraskaMATH. Driessen and fellow Cohort 2 participant Jill House were selected to fill these positions. After starting 2012 as a full-time math coach in her building, Driessen shifted to two high-need elementary schools, Mount View and Wakonda, for the 2012-13 academic year.

Jim Harrington, supervisor of mathematics for OPS and member of the NebraskaMATH leadership team, supports the move toward utilizing math coaches. Harrington said, “The Omaha Public Schools believes that coaching teachers is a major component of professional development for classroom teachers. When NebraskaMATH director Jim Lewis approached us with an of-



STEPHANIE VENDETTI/UNL CSMCE

Marni Driessen works with first-grade students at Mount View Elementary in Omaha Public Schools.

fer to fund two elementary math coaches, it fit right in with district initiatives to improve math instruction.”

Driessen said the coaching opportunity appealed to her for a variety of reasons. “I love sharing my ideas with others and offering my support,” she said. “I also realized that I gained a lot of knowledge about the teaching and learning of math through the Primarily Math program and thought I could make a difference by sharing my expertise.”

As a coach, Driessen has many respon-

Marni Driessen

Primarily Math Cohort 2
Omaha Public Schools

sibilities, including mentor, data coach, resource provider, curriculum and instruction specialist, and facilitator of professional development. “Some typical things you may find me doing include helping teachers plan lessons, modeling a teaching move or strategy, analyzing student work, planning professional development sessions, reading research articles, reviewing data, observing lessons, and giving feedback,” Driessen said. “I strive to support all teachers by highlighting and building on their strengths.”

Originally from Jamestown, N.D., Driessen said she has always enjoyed math. Now in her eighth year of teaching, Driessen was greatly influenced by her second-grade teacher, Mrs. Fix.

“I will never forget the sound of her high heels, the way she passed out papers, or the sweet notes she wrote on my work. More than anything, she cared about me and took care of me in many ways for years. From that point on, I wanted to do the same for other children who needed it,” she said.

Driessen has been married to her husband, Ray, for almost 12 years, and they have two sons, Dylan (age 8) and Caden (age 6).

“They are good at math,” Driessen added with a smile. ○



STEPHANIE VENDETTI/UNL CSMCE

OPS math coach Marni Driessen discusses decade numbers with first-graders at Mount View Elementary. Driessen also is a coach at Wakonda Elementary.



LINDSAY AUGUSTYN/UNL CSMCE

Kristy Kennedy helps her kindergartners retrieve manipulatives for the day's mathematics lesson. Kennedy has been teaching in Lincoln for eight years.

Taking on math's 'big' ideas

LPS kindergarten teacher models methods for peers

After completing Primarily Math as part of Cohort 3 LPS, Kristy Kennedy now understands why she did not love math as a high school student.

"I never gained a deep conceptual understanding of the many big mathematical ideas, and I did after Primarily Math," Kennedy said. "I had simply relied on the procedural understanding of applying a formula to specific problems."

Now, Kennedy is teaching and modeling these "big" mathematical ideas to her peers at Lincoln's Kloefkorn Elementary School in an informal coaching role.

"My colleagues know that I have had extensive training in the teaching and learning of mathematics through Primarily Math and frequently seek my guidance and have conversations about various lessons," Kennedy said. "I partner with teachers by observing their lessons, plan lessons with teachers while discussing objectives in-depth, and invite other teachers into my own classroom to observe me teaching math lessons."

Kennedy also assists teachers in developing their personal Math Talk Action Plan, part of the *Math Expressions* curriculum. Academically-productive classroom discussions about mathematics, otherwise known as Math Talk, have many benefits. Math Talk



STEPHANIE VENDETTI/UNL CSMCE

Principal Sue Braun (from left), Cohort 1's Megan Fleischman, Cohort 3's Kristy Kennedy, course instructor Kyla Hall, and Cohort 3's Laura Deans work at Kloefkorn Elementary, which opened in 2012.

Kristy Kennedy

Primarily Math Cohort 3 LPS
Lincoln Public Schools

assists in developing student understanding of mathematical ideas and creates a collaborative classroom culture where students contribute to the success of others.

"Kristy has played an integral role as a leader within her team, building and the district," said LPS district math coach Susie Katt. "Kristy's desire to learn and grow as an educator, along with her grace and kindness, makes her a leader whose work truly makes a difference in the lives of our young children."

Kennedy began her eighth year of teaching

in 2012 at this brand-new school. She chose to follow her principal, Sue Braun, and assistant principal, Kristi Schirmer, from Rousseau Elementary to Kloefkorn due to their "amazing leadership."

Braun said it was a "conscious decision" to ask Primarily Math teachers to come to Kloefkorn due to their additional training.

"Kristy has the exceptional ability to take students to a deeper level of understanding mathematically. She provides kindergartners with such a solid base on which to grow their math knowledge," Braun said.

Originally from Schuyler, Neb., Kennedy and her husband, Ricky, have two sons, Carson (age 3) and Colton (age 1). Kennedy has always loved helping children learn. After experiencing this program and its strong support system, her confidence in her own mathematical skills has grown to a greater confidence in her teaching of mathematics.

"I firmly believe in the power of a professional learning community to partner with one another in assisting all teachers and students to develop into mathematical thinkers," Kennedy said. "A strong partnership must have trust, perseverance, and commitment in order to have a powerful impact on student learning." ○

Making a greater impact

Augustus serves as ‘math intensive’ teacher for grades 1-2

Having an impact on just 20 students each year wasn’t enough for Alysia Augustus.

After completing Primarily Math in 2011, Augustus approached her principal, Dr. Anne Harley, at Anderson Grove Elementary in the Papillion-La Vista School District with the idea of being a “math intensive” teacher. After receiving approval from the district and support from the other first- and second-grade teachers, Augustus became the sole math teacher for both the first and second grades.

“Four teachers have first- and second-graders for the subjects they are teaching: two teachers teach reading and writing, one teacher teaches science and social studies, and I teach math,” Augustus said. “This format has allowed me to focus solely on math. I am able to have more time to plan meaningful lessons and more time to reflect on lessons. It has also allowed me to know my students better as mathematicians.”

Augustus also is one of Nebraska’s finalists for the 2012 cycle of the Presidential Award for Excellence in Math and Science Teaching.

The NebraskaMATH partnership with the Papillion-La Vista School District remains strong, as two Cohort 1 teachers (Danielle Inserra and Jane McGill) and one Cohort 2 teacher (Elizabeth Scheppers) continue to serve as full-time mathematics coaches. The other Cohort 2 PLSD teachers,

including Augustus, are all designated building math coaches, while remaining in the classroom full time.

Last year, Augustus was provided with 16 days to work as a building math coach.

“My role as a math coach has allowed me to share the instructional strategies I learned in Primarily Math with the teachers within our building,” she said. “As a coach, I planned, observed, and debriefed lessons with my colleagues. We set goals and discussed meaningful strategies to implement. I also had the opportunity to video-tape and gather data on all our teachers’ questioning strategies and classroom discussions. As a staff, we looked at the data and discussed ways to improve our teaching. Teachers then viewed their video so they could observe themselves teaching.”

Augustus and fellow Cohort 2 participant Kelli Roehrig worked closely in 2012 with UNL’s Dr. Ruth Heaton in a studio project for PLSD and NebraskaMATH. Through this process, she and first-grade teacher Roehrig allowed others to observe them planning, teaching, and reflecting during five different sessions conducted by Heaton (see page 29).

“After taking part in studio math, I now look at planning lessons differently,” Augustus said. “I have learned the importance of the decisions we make and the impact our questions have on our students’ understanding. Many

Alysia Augustus

Primarily Math Cohort 2
Papillion-La Vista School District

“I am able to have more time to plan meaningful lessons and more time to reflect on lessons. It has also allowed me to know my students better as mathematicians.”

times, as educators, we get so wrapped up in time and content we rush through the content that impacts our lessons the most.”

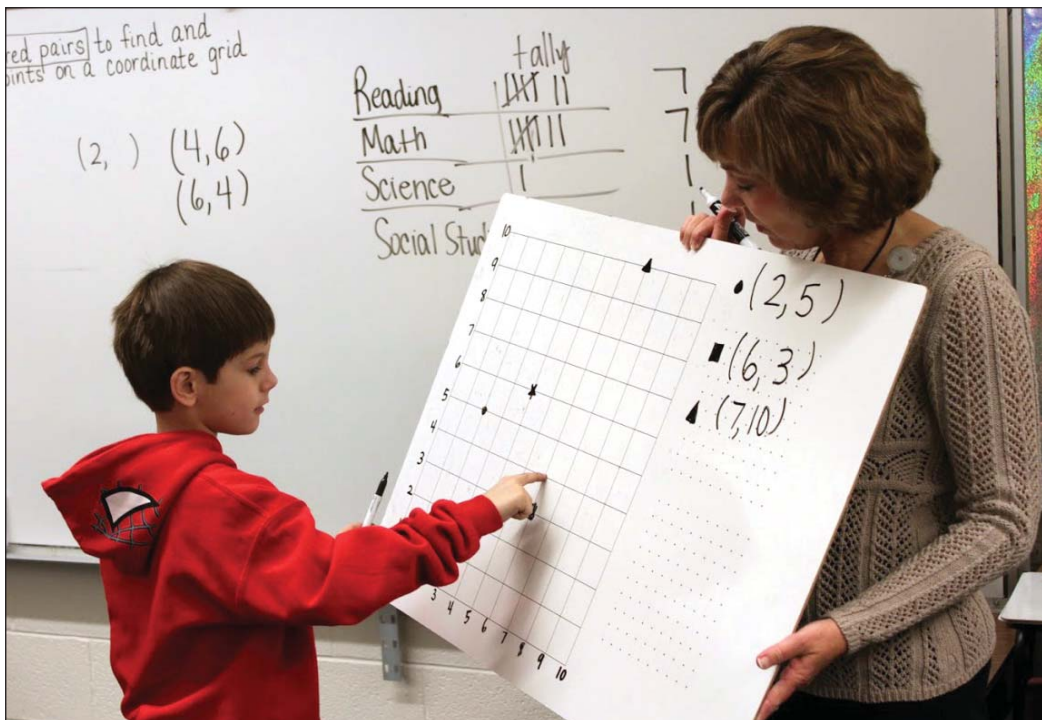
Originally from Louisville, Neb., Augustus is married and enjoys fulfilling her childhood dreams of becoming a teacher. She believes all students can be successful in math if they feel comfortable and take risks.

“Students learn a lot from their own mistakes and they need a setting that allows them to make mistakes so they can work through the learning process,” she said. “I try to make my classroom a safe place for students to share their thoughts by controlling my facial expressions and resisting the urge to tell students when they are right and wrong. Instead, I want the students to examine one another’s work and decide when they agree and disagree. Teachers can support and provide strategies, but we are not the superheroes who have to fly in and save the day if they are struggling with concepts.” ○



LINDSAY AUGUSTYN/UNL CSMCE

Alysia Augustus, a first- and second-grade teacher at Anderson Grove Elementary in Papillion, approached her principal with the idea of being a “math intensive” teacher. After receiving approval from the district and support from the other first- and second-grade teachers, Augustus is now the sole math teacher for both grades.



PHOTOS BY PRINCIPAL TINA MASON/KNICKREHM ELEMENTARY

Grand Island Public Schools elementary mathematics coach Cindy Beaman, who participated in Primarily Math Cohort 1, assists Dana Henry's second-graders with a math lesson. For five years Beaman has been a coach, but she was a classroom teacher for the 25 years prior. "I became a coach because I was ready for a new challenge in my career. I knew I would miss having my own classroom, but I get to work with students from all backgrounds and grade levels," Beaman said.



Working

For Grand Island teachers Dana Henry and Amber Woitaszewski, working as a team has led to more conversations about mathematics in their school. During the 2012-2013 school year, Henry and Woitaszewski have been working together to encourage other teachers at Knickrehm Elementary to think about their instructional processes in mathematics.

"Amber and I first broke down the Common Core State Standards to understand what each of them said. We then worked as a team to create a set of kid-friendly standards, to help us to encourage students to have a deeper understanding of the mathematics taught in their classrooms," Henry said. "We also gave a presentation on Math Talk or 'Talk Moves' to the staff. We showed videos of each of the different talk moves, and had conversations about each of them, and then found similarities and differences between them. We encouraged each one of our colleagues to work harder at incorporating at least one new talk move each quarter."

Woitaszewski said through leading sessions at professional development days and staff meetings, she was able to pass on the instructional strategies and various ways to meet specific needs of students that she learned during Primarily Math.

"Primarily Math has given me new instructional strategies and a deeper understanding of content knowledge," said Woitaszewski, who has been teaching kindergarten at Knickrehm for four years. "This program has given me the

as a team pays off

opportunity to experience why it is important to give students a strong foundation and multiple strategies to work with and solve math problems.”

Henry said when she first signed up for Primarily Math, she encouraged three other teachers from Knickrehm to join with her. Besides Woitaszewski, Vanessa Bartels and Jackie Fitzgerald also completed the program with Henry in 2012.

“During the first semester of 2011, the four of us started by sharing all of the different strategies that we learned during the summer. Many of the other teachers really started to latch onto our new ideas. They also started asking us for help with certain concepts that they were struggling with in their classrooms, and more importantly, we all just started having more conversations about mathematics,” said Henry, who is currently in her fourth year of teaching second grade at Knickrehm. “During the second semester, we shared the ideas of talking through mathematics, efficacy and more of our ‘new’ strategies.”

Grand Island elementary teachers also have the benefit of receiving help from district elementary math coach Cindy Beaman, a Cohort 1 participant. Beaman has taught for GIPS for 30 years, the last five as a coach.

“I became a coach because I was ready for a new challenge in my career. I knew I would



Woitaszewski

miss having my own classroom, but I get to work with students from all backgrounds and grade levels. The best part of my job is collaborating with other teachers and leaders. I have connected with many people I would never have gotten the chance to work with had I not become a math coach,” Beaman said.

The delivery service models that instructional coaches provide in GIPS include the following: classroom observation with feedback, problem-solving with teachers/principals, analyzing students’ work, modeling a lesson, co-teaching a lesson, and providing professional development.

“I have found that many of the strategies that I have learned through the Primarily Math program have really helped to make teaching easier,” Henry said. “There are so many different strategies out there, and it is very hard to know which one is truly the ‘best’ one. But when it came to Primarily Math, the teachers told us their ideas to use on the first day of instruction, giving us a ton of ‘a ha’ moments. From the first class, I gained so many strategies that help me to see the faces of students understanding the content. That is exciting, and is exactly what I wanted out of a graduate level program.”

Primarily Math also teaches how to explore math, not just how to memorize rules, Woitaszewski added.

“Math was once a subject that I disliked in school and is now a subject I love to teach, thanks to Primarily Math,” Woitaszewski said. ○

Cindy Beaman

Primarily Math Cohort 1
Grand Island Public Schools

Dana Henry

Primarily Math Cohort 3 West
Grand Island Public Schools

Amber Woitaszewski

Primarily Math Cohort 3 West
Grand Island Public Schools



PRINCIPAL TINA MASON/KNICKREHM ELEMENTARY

Knickrehm teacher Dana Henry helps one of her second-grade students during a mathematics lesson.

Stretching her skills in math

PAEMST finalist functions as math liaison for building

The year 2012 was a memorable one for Amy Davidson.

The Cohort 3 LPS participant completed Primarily Math in the summer, and, like Cohort 2 participant Alysia Augustus, is one of Nebraska's finalists for the 2012 cycle of the Presidential Award for Excellence in Math and Science Teaching.

The third-grade teacher is also currently the math liaison for her building, Fredstrom Elementary, and is on the Math Advisory Committee.

"We plan the monthly update sessions and provide instruction for a group of teachers," Davidson said.

In addition, Davidson has taken advantage of the Nebraska Math & Science Summer Institutes courses for elementary teachers that build on the coursework of Primarily Math.

"The courses were so relevant to what we are teaching every day," she said. "Primarily Math and other NMSSI courses are so worth it!"

As a result of the program, Davidson

said she can count on the support system of other LPS teachers if she needs anything.

"Sharing frustrations and successes with other teachers who think math is important has been invaluable," Davidson said. "So many teachers feel that reading should be at the forefront, so it was comforting to know that there are other teachers that believe math should be a focus as well."

While she always has loved math, Davidson said the two years of Primarily Math stretched her mathematically, and she gained a solid foundation for teaching conceptually.

"Children remember concepts best when math is taught conceptually. They do best when they discover patterns and rules on their own or with strategic guidance. Rote memorization may help with short term understanding, but it does more harm than good in the long run," she said.

Davidson has taught at Fredstrom for 14 years, and is married with one daughter (age 8). She has known she always wanted to be a teacher. "It was, and still is, my calling," she said. ○



STEPHANIE VENDETTI/UNL CSMCE

Amy Davidson talks with one of her third-grade students about telling time and using numbers.

Amy Davidson

Primarily Math Cohort 3 LPS
Lincoln Public Schools

"I loved when we started learning division. And Mrs. Davidson is awesome at teaching her smart math class. So far this year division has been my favorite unit."

Lauren

"What I like about this year in math was Mrs. Davidson had lots of math games and fun math books. I liked that." **Tyler**

"This year I liked and learned the distributive property also division and multiplication. p.s. Mrs. Davidson is the best math teacher ever. She rocks!" **Kayla**

Rethinking and reaffirming

With 32 years' experience, Merica enjoys new ways to teach math, reach students

Out of her comfort zone. Out of the box. This is how Frances Merica describes her Primarily Math experience – and she wouldn't have it any other way.

"You will become a better teacher after NebraskaMATH, and your students will also benefit in their learning and understanding of mathematics. The program teaches you to understand mathematics in a new way and to appreciate the importance of teaching mathematics to students. It is a lot of hard work but the return is well worth it!" the Omaha Public Schools teacher of 32 years said.

Merica, a participant in the Cohort 4 group of OPS teachers, currently teaches full-day kindergarten at Beals Elementary School. She and her grade-level partner are working on making their instruction more differentiated to meet students' needs and learning styles. "We are incorporating more small-group instruction into our teaching as well as increasing the amount of student involvement in our lessons," Merica explained.

Merica also attends monthly voluntary extended learning sessions offered by Connie Colton, a Math in the Middle graduate, Noyce Master Teaching Fellow and Primarily Math instructor, who teaches at McMillan



STEPHANIE VENDETTI/UNL CSMCE

Cohort 4 participant and OPS kindergarten teacher Frances Merica incorporates small-group instruction into her teaching at Beals Elementary.

Frances Merica

Primarily Math Cohort 4 Omaha
Omaha Public Schools

Magnet Middle School in Omaha.

The support systems that exist in OPS and in NebraskaMATH help Merica and her colleagues make it through the intense 18-hour program.

"When the work in the program seems overwhelming, there is always someone to go to for help and support. The people involved in the program are very supportive and are available to help you accomplish things that sometimes feel unattainable," she said. "The

cohort helps you develop lasting friendships with fellow educators."

Born and raised in Omaha, Merica always loved math as a student, from elementary school through college. She found growing up that she loved working with younger children and "seeing their eyes light up when they learned and

accomplished new things." Today, she and her husband, Chuck, have one daughter, Lacey, who graduated from UNL with a degree in biology.

Merica already has adjusted her teaching to accommodate what she's learned thus far in Primarily Math.

"Being involved in Primarily Math has made me rethink some of my teaching methods as well as reaffirm some of them. I often find myself questioning the planning of my math lessons as well as lessons in other subjects," Merica said. "It has made me look at whether the students are being challenged to not only find the answers, but also to be able to explain their thinking and reasoning." ○

Connecting school to home

Kindergarten teacher strives to give parents math tools

Building a strong connection with parents has been fundamental for kindergarten teacher Allie Guiney, a Cohort 4 participant. Guiney's philosophy for teaching math in kindergarten revolves around not only creating a strong yet flexible number sense, but also giving parents the tools to develop this number sense at home.

She plans on using this teaching philosophy with Patriot Elementary's incoming students as well, through a grant the Papillion-La-Vista School District teacher was recently awarded from Region II.

"The grant will allow me to hold a math day in April 2013, where I will invite parents of incoming kindergartners to come to Patriot and share some ideas and resources on how to create an early number sense before their child starts school," Guiney said. "My hope is to have a 'make and take' with some activities and to help parents gain some ideas and strategies to help develop strong questioning and math communication. This includes using visual images, math vocabulary, math games and literature to use."

Parents of Guiney's students are amazed at how much their children have learned about math. One parent said of her son, "He counts everything! Sometimes he turns it into a song. I even hear him teaching his



STEPHANIE VENDETTI/UNL CSMCE

Cohort 4 participant Allie Guiney works with one of her kindergarten students at Patriot Elementary.

3-year-old little sister math problems. He loves to learn, and it is obvious he is being taught very well." Another parent said when she asked her son what he thought about math, "He said, 'Math is awesome!' He is learning about patterns, adding and skip counting, which is helping him learn to tell time, and he's so excited about it!" The daughter of another parent proudly proclaimed to her mother, "I have learned that six is less than eight."

Allie Guiney

Primarily Math Cohort 4 ESU 3
Papillion-La Vista School District

Originally from Omaha, Guiney knew from an early age she wanted to be a teacher. "From my earliest memories, I played teacher and school. I knew I wanted to teach early childhood and was fascinated by young children's development. As I got into my undergrad schooling at UNL, I knew without a doubt, teaching was for me."

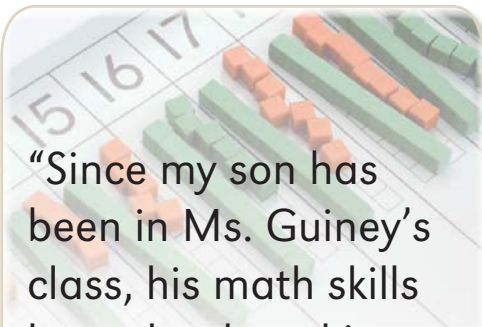
Now in her sixth year of teaching, Guiney will complete Primarily Math in the summer of 2013, as well as get married in July. She was encouraged to join Primarily Math by her principal, Mary Scarborough, and her math coach at the time, Danielle Inserra, a participant in Cohort 1. Fellow Patriot teacher Erin Case also joined Cohort 4.

Guiney said the program has made her become more strategic, reflective and knowledgeable in her teaching of mathematics.

"My students have blown me away with their math journaling, discussions, sharing their work on the ELMO/smart board, and teamwork during math workshop. They celebrate one another's successes and push one another's thinking. This experience has helped me see that even kindergarten students can be effective math communicators." ○



STEPHANIE VENDETTI/UNL CSMCE



“Since my son has been in Ms. Guiney’s class, his math skills have developed in more ways than I expected. He counts everything! Sometimes he turns it into a song. I even hear him teaching his 3-year-old little sister math problems. He loves to learn, and it is obvious that he is being taught very well.”

**Parent Angelique Roseman,
Patriot Elementary**

Leadership roles take shape

Konwinski, other LPS teachers work with district

Whether it is in their building or their district, several LPS teachers have taken on leadership roles because of Primarily Math. Beattie Elementary's Lacey Konwinski, a Cohort 4 participant, has stepped up in both settings.

"I have helped the district with the first-grade implementation of the new math curriculum," Konwinski said. "I led monthly meetings last year, and this year I helped with the second semester update sessions."

Konwinski and her Cohort 4 colleague West Lincoln Elementary teacher Megan Slothouber piloted the new math program *Math Expressions* during the spring semester of 2011. Slothouber also serves as the district-wide first-grade math implementation leader and has created multiple professional development sessions for teachers. This year, Slothouber and Konwinski collaborated to plan the second semester math professional development for the first-grade teachers.

"Lacey's willingness to learn and openness to trying new instructional strategies in her classroom makes her a professional role model for others. We are very fortunate to have her as a part of the district leadership team as she brings many gifts as a top-notch educator," said Susie Katt, LPS K-3 district



LINDSAY AUGUSTYN/UNL CSMCE

Lacey Konwinski works with her first-graders on a math problem.

Lacey Konwinski

Primarily Math Cohort 4 Lincoln
Lincoln Public Schools

math coach and Primarily Math instructor.

Three other Primarily Math teachers also teach at Beattie with Konwinski: Darcy Vercellino from Cohort 3 LPS and Tracy Clements and Jennifer Woelber from Cohort 4 Lincoln. Clements, Konwinski, Vercellino, and Woelber lead "Math Moments" at staff

meetings in which they share what they have learned through Primarily Math.

In the first Math Moment they talked about productive struggle, asked the staff to solve the "crossing the river problem," and showed a video clip of two of Konwinski's first-graders solving the problem.

Konwinski said Primarily Math has not only helped her understand math better, but also has introduced new ways to help struggling students.

"I believe students should encounter some productive struggle within their learning, and I also believe that students need a chance to explore and

construct meaning for themselves as much as possible with me as a guide to get them to the desired point," Konwinski said.

Originally from Columbus, Neb., Lacey and her husband, Greg, have been married for four years. She said she cherishes the friendships she has made in Primarily Math and always looks forward to working together at course workshops and viewing the beneficial resources.

"The best part of Primarily Math, however, is seeing the differences it has made in my students' math knowledge," she said. ○

Learning value of listening

Boone seizes opportunities for colleague collaboration

In just his third year of teaching, Andrew Boone already is making a difference. Between his Primarily Math coursework in Cohort 4 and the mission of Gretna Public Schools, this first-grade teacher has gained a new understanding of math – and has been able to put it into practice.

“Presently, I have had the opportunity to serve on a math improvement team at Thomas Elementary that is working on educating our staff about current trends in math teaching and the resources that are out there for us to use,” Boone said. “We have also been working to identify areas in which we see a need for improvement with math instruction. We have had the opportunity to collaborate with our colleagues and learn where they see a need for math resources in the classroom.”

Driven by the mission and philosophy of Gretna’s school system (“the unconditional and undeniable acceptance of all students”), Boone has found his favorite part of Primarily Math to be the collaboration it affords, whether that be with the other teachers in his cohort or with his colleagues at Thomas.

Three of his fellow teachers at Thomas are also in Cohort 4 of Primarily Math: Brittany Fulton (second grade), Carter Pratt



LINDSAY AUGUSTYN/UNL CSMCE

Gretna Public Schools first-grade teacher Andrew Boone leads the class in a discussion about counting money.

Andrew Boone

Primarily Math Cohort 4 ESU 3
Gretna Public Schools

(third grade) and Scott Simpson (first grade).

“Andrew Boone thinks deeply about the mathematics that he teaches,” said Primarily Math instructor and Nebraska Wesleyan mathematics professor Kristie Pfabe. “His fascination with mathematics and the zest with which he embraces challenges are important attributes in an outstanding mathematics teacher.”

“I have become more knowledgeable of children’s developmental levels and what we can do as professionals to help each child grow as a mathematician,” Boone said.

Growing up in Hull, Iowa, Boone enjoyed the challenges math presented, whether through participating in the local sixth-grade math bee or doing challenge math games in junior high. He was greatly influenced by his parents; his father was a pastor and his mother an educator.

“Although I switched my major about three times in college, I was ultimately led back to being a teacher because of the way I saw my mom and dad have the opportunity to interact with others and the compassion they showed toward them,” said Boone, who lives in Gretna with his wife, Kim, a medical laboratory scientist.

Boone said the most important thing he has learned from Primarily Math is the value of listening.

“With time, I have learned the value of listening to children, regardless of whether they are right or wrong, to more deeply understand their misconceptions and how deep their knowledge of the topic is,” he said. “This has helped me better identify where children are at developmentally and what I can do to guide the individual.” ○

‘There is no fear of failing’

LPS second-grade teacher works with building math coach to better her skills

Jessica Tewalt is reaping the benefits of teaching in a school with a math coach – not to mention a math coach who participated in Primarily Math.

Tewalt, a Cohort 4 participant teaching at Cavett Elementary in Lincoln, has worked with Cohort 1 participant Tara Zuspan, the school’s math coach, since she started there three years ago.

“Tara helped me plan and try new math ideas in my classroom. She pushed the boundaries of what was expected and helped me gain important math teaching knowledge,” Tewalt said. “In college, they teach you how to make a lesson plan. Tara taught me how to teach math.”

Tewalt said she appreciates the teamwork and sharing of ideas that having a building math coach provides.

“Some people might think that working with a coach means you have a weakness. I know that I am just pushing myself to be a better teacher,” she said.

The camaraderie between the Primarily Math teachers also encourages Tewalt as she works on completing the program in 2013.

“We are working together and helping one another grow as learners,” Tewalt



STEPHANIE VENDETTI/UNL CSMCE

Two of Jessica Tewalt’s students show the class how they strategized to reach 50 cents with small coins.

said. “There is no fear of failing because you always have someone willing to help you. I can’t imagine what my teaching would be like without this program. A whole new door has been opened.”

Originally from Pine Island, Minn., a small town 20 minutes north of Rochester, Tewalt was recruited to work for LPS at a job fair in Minneapolis. Both of her grandmothers were teachers, leading Tewalt to decide to pursue teaching as a career from an early age.

“After taking a leave of absence raising her seven children, my Grandma Pearl was asked to come back to teaching. She decided to continue her education and went back to get her bachelor’s degree in education. When she received it, she was 56 years old and at the University of Wisconsin-Superior,” Tewalt said. “She was my biggest inspira-

Jessica Tewalt

Primarily Math Cohort 4 Lincoln
Lincoln Public Schools

“My students don’t sit during math. They walk to the front of the room proud. Students give each other high-fives after figuring out a problem.”

tion. When I was little she would sit me on her lap and talk about how much she loved her second-graders, which is why I pursued teaching second grade.”

Not only has Tewalt been amazed by what her students have done after teaching them new ways of thinking about math, parents of Tewalt’s students have been impressed as well. One parent said, “Since we incorporated books about math and math games at home, my child has developed a better attitude toward doing math skills worksheets at home and school.”

Tewalt added, “My students don’t sit during math. They walk to the front of the room proud. Students give each other high-fives after figuring out a problem. They cheer for a student with limited English who gets up in front of the class. It is fascinating to see, and I feel so proud of all they have accomplished.” ○



LINDSAY AUGUSTYN/UNL CSMCE

Jessica Tewalt, a second-grade teacher at Cavett Elementary in Lincoln, often collaborates with her building math coach, Cohort 1 participant Tara Zuspan.

Coaches' impact visible

As teachers complete Primarily Math, there is substantial evidence they are becoming intellectual leaders in their schools and districts and sharing what they have learned with their peers.

Primarily Math participants are assuming larger leadership roles in their districts. In LPS, OPS and PLS, Primarily Math participants have been at the front of piloting and implementing new elementary mathematics curricula district-wide. Primarily Math participants are also helping provide building-, district- and ESU-wide professional development for elementary mathematics teachers, in addition to serving as the “go-to” people for mathematics teaching and learning in their buildings.

After the successful adoption of the *Math Expressions* curriculum in 2011-2012 for grades K-2, leaders in the LPS district wanted to extend some of *Math Expressions* key pedagogical ideas to third grade. LPS district math coach and Primarily Math instructor Delise Andrews enlisted five Primarily Math teachers to create curriculum materials in the summer of 2012 that enabled third-grade teachers to build on the experiences students had in grades K-2 with Math Talk and other features of *Math Expressions* (see pages 9 and 18). OPS also has adopted *Math Expressions* in 2012 in grades K-6.

Each partner district also has at least

Furthering their graduate education

To date, 55 of the 122 teachers who participated in one of the first three cohorts of Primarily Math teachers have taken TEAC 836B: Leadership and Mathematics Instruction. Others have continued to take math classes such as Math 803P: Algebraic Thinking in the Elementary Classroom or Math 804P: Problem Solving and Critical Thinking for Elementary Teachers through the Nebraska Math & Science Summer Institutes (see course catalog at <http://scimath.unl.edu/NMSSI>). Thirty-nine Primarily Math teachers have continued their education to pursue a master's degree from UNL's Department of Teaching, Learning and Teacher Education, eight of whom already have graduated. ○

two teachers who now have been working as K-3 elementary math coaches. Coaches help teachers plan and teach mathematics lessons

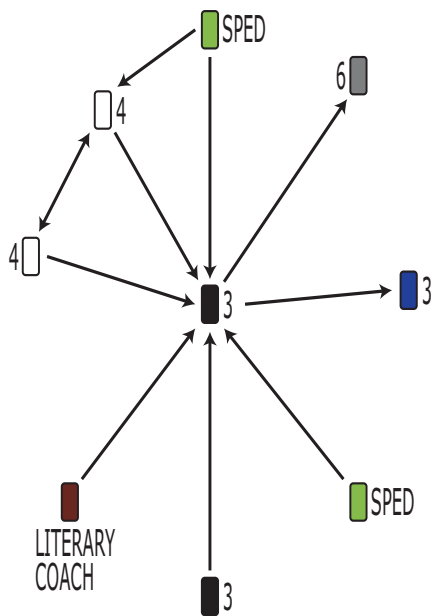
to students, help teachers use data to inform mathematics teaching and learning, and, on a larger scale, offer professional development for teachers across their district.

To learn more about teacher leadership, the Primarily Math research program has been expanded to involve math coaches. All coaches affiliated with Primarily Math, as well as a building and/or district administrator for each math coach, have been interviewed, the analyses of which are ongoing. One or two coaches from each of the four core partner districts will be selected to collect further data from during Spring 2013, to better understand the work of coaches. As evidenced also by the Teacher Network Survey done by researchers at Northwestern University (see diagrams on pages 23 and 29), data collected on staff interactions showed the individuals involved in Primarily Math, and especially those with coach positions, emerged as more central actors in their school's math advice networks.

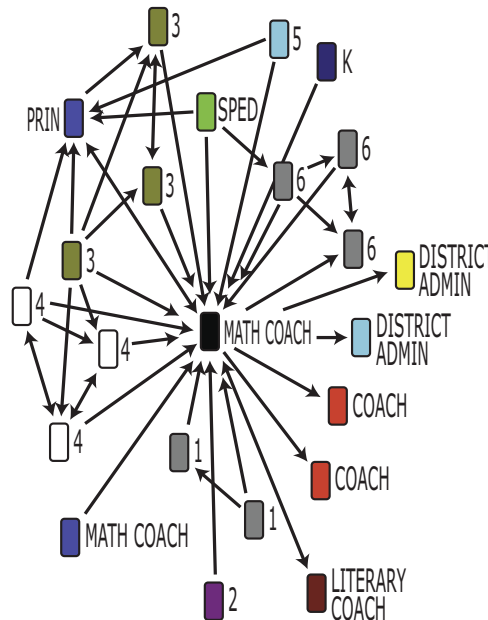
Primarily Math teachers are also continuing to take graduate courses and some are employed as adjunct faculty teaching courses for K-3 teachers. For example, Cohort 1 participants Susie Katt, Tara Zupan (both LPS) and Cindy Beaman (GIPS) now teach the optional leadership course taken by Primarily Math teachers. Other Primarily Math graduates are serving on the instructional teams for Cohort 4. ○

Teacher Network Survey: A Building with a Math Coach

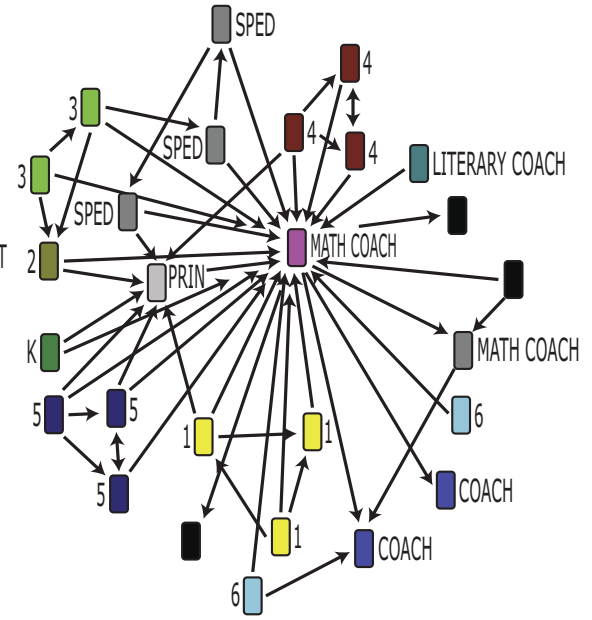
These diagrams from researchers at Northwestern University show a building where a Primarily Math third-grade teacher in 2009-2010 became a coach in her same building for 2010-2011 and then continued as a coach for 2011-2012. Each line represents an instance where one person turns to another for advice about teaching mathematics, with the arrow pointing to the person giving the advice. The coach emerges as a more central actor in the school's math advice network, indicating that after finishing Primarily Math and being designated a math coach, far more people turn to the coach for advice about teaching mathematics.



2009-2010



2010-2011



2011-2012

"She really wasn't our facilitator [last year], she was my co-worker, a third-grade teacher. I knew she had a wealth of knowledge, I just wasn't in [her classroom] when she was teaching math. But now that she's moved into this math facilitator position, that's different. She's been trained in it. She's gone to school for it, and she's a great coach. She knows a lot about math, and I trust her wealth of knowledge. She's the go-to person."

Quote from a special education teacher in the building with this math coach to Northwestern University researchers



Support teachers through donations

Through the NebraskaMATH grant, Nebraska math teachers have had the opportunity to take graduate courses at no cost to them. Many more teachers want similar opportunities for graduate education but the cost can be a significant barrier to teachers. To this end, the Center for Science, Mathematics & Computer Education (CSMCE) asks for support from private donations to help teachers cover the costs of tuition and fees for courses through its Nebraska Math & Science Summer Institutes program. It is important to provide Nebraska math teachers with continued opportunities for professional growth. In turn, great teachers will inspire their students to learn — and love — mathematics. To donate to the CSMCE via the University Foundation, visit:

<http://scimath.unl.edu/giving> ○

Encouraging results

Primarily Math presents the faculty and graduate students at UNL with an important opportunity to learn more about mathematics teaching and learning in the primary grades. Knowledge gained from the Primarily Math research initiative also will inform partner districts about the benefits of the Primarily Math program and their own efforts to strengthen mathematics achievement in their primary grade classrooms. The work of the Primarily Math research team is expected to lead to many published research articles as well as several Ph.D. dissertations (see page 30).

Three key questions guide the Primarily Math research program:

1. How do Primarily Math teachers translate the mathematical attitudes, knowledge, and habits of mind emphasized in their graduate coursework into changes in teaching practice?
2. How do Primarily Math teachers become school leaders in ways that impact the culture of their school?
3. Does the professional development received by Primarily Math teachers translate into measurable improvement in students'

beliefs and achievement in mathematics?

To provide data needed for the Primarily Math research study and the evaluation of the grant provided by RMC Research, teachers have invited researchers into their classrooms for observations and have generously given of their time to complete several surveys and to complete assessments that use the Mathematical Knowledge for Teaching instrument. Students' mathematical understanding also has been assessed using the Test of Early Mathematical Ability, 3rd Edition (TEMA-3), a nationally validated assessment for children from age 2 to 8.

The following is a report on the research program and its preliminary findings.

Test of Early Mathematical Ability (TEMA-3). To learn more about the impact of the program and other district initiatives on student learning, students' mathematical understanding is being assessed through the TEMA-3, which measures K-3 students' mathematical abilities. Starting in the fall of 2009, and continuing through the spring of 2013, the TEMA-3 is being administered to 12 to 15 students per class in a representative sample of classrooms of Primarily

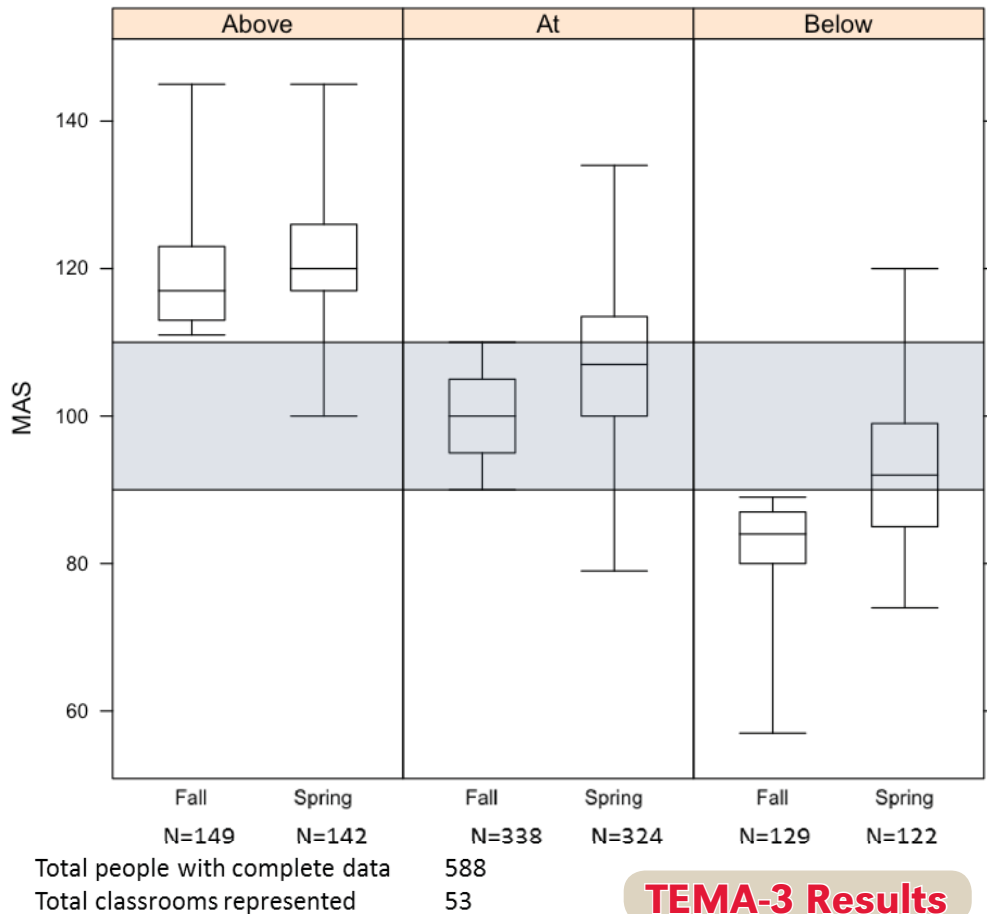
Math participants and in the classrooms of a comparison group of K-3 teachers in three partner districts (LPS, OPS and PLSD). After randomly selecting students from each classroom in the fall, those same students are tested in the spring of that school year. Each participating classroom also gives students a Child Competence Beliefs Survey both in the fall and spring.

The TEMA-3 calculates a standardized score called the Math Ability Score, which calculates a child’s overall mathematical ability based on both age and raw score. Thus, students making expected growth in mathematical knowledge over time would have the same TEMA-3 score each time they were tested. The TEMA-3 has a mean of 100 and a standard deviation of 15. Scores from 90 to 110 are considered average.

The TEMA-3 results graph appearing on this page shows the distribution of K-3 child TEMA-3 scores from one partner district and is representative of findings in all districts. Children are separated by their fall score (above, at, or below average). Across all districts and all groups of teachers (Primarily Math and comparison groups), statistically significant gains in student scores from fall to spring each year resulted.

These gains point to accomplishments of partner district initiatives in addition to the benefits derived from the Primarily Math program. The largest gains were for students who scored in the “below-average” range in the fall; therefore, the data are encouraging.

Researchers did experience ceiling effects with the TEMA-3, as approximately 50 percent of third-graders scored so high in the fall that they could not show statistically



TEMA-3 Results

significant improvement in the spring. Thus, for 2012-2013, the decision was made to stop testing third-graders.

Child Belief Survey: Mathematics and Reading Competency-Beliefs. This survey asked the following questions, once for math and once for reading:

1. How good in math/reading are you?
2. How good in math/reading are you

compared to your classmates?

3. How well do you do in math/reading compared to all your other school subjects?

4. How well do you expect to do in math/reading this year?

5. How good would you be at learning something new in math/reading?

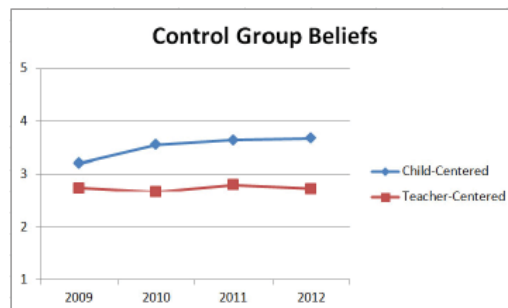
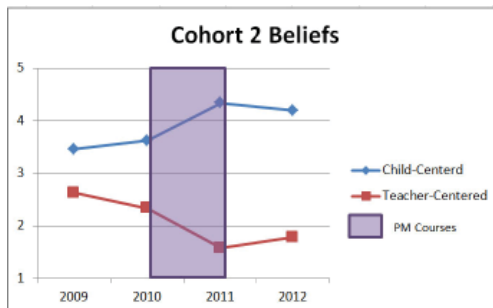
A key reason to focus on students’ competence beliefs is because these beliefs

are typically strongly correlated with mathematics achievement. A productive learning disposition is composed of healthy beliefs that fortify creativity and persistence during problem solving, as well as the habitual inclination to view mathematics as useful and fun. If it can be better understood how children’s beliefs are formed about mathematics, then it may be possible to influence those beliefs for the better.

Primarily Math interviewed 115 K-3 students. Students were asked to share why they believed themselves to be “good” or “bad” at math. Kindergarten students believe they are good at math because they like math, placing a premium on effort (“I like math! I just try really hard in my brain to figure out the right answer!” – Matt). First-, second- and third-grade students also recognize the value of effort and practice, but rely heavily on performance feedback. Older students pay the most attention to feedback regarding the proportion of right to wrong answers and the speed at which work is completed (“I’m good because I practice a lot and I pass my tests really fast.” – Heidi, second grade). However, all K-3 students who believe themselves to be bad at math (about 15 percent of the interviewed sample) rely only on the proportion of wrong answers on past activities when they rate their mathematical competence.

A number of students did not consistently evaluate their mathematical competencies as solely good or bad; self-evaluations varied as a function of reference points, with students reporting they were sometimes good and sometimes bad at math. For example, Tom, a first-grade student states, “It’s

Survey of Teaching Practices Results



not that math is my worst subject, it’s that I don’t like it much. I’m good at math but I don’t like to sit down a lot. So math isn’t my favorite subject – but it could be!” Jorge, a third-grader, said, “Well, I’m not the best at math. I’m not bad or really good, but I’m OK. I think I’m OK because my multiplication test I’ve passed, but division I haven’t, but I’m close.”

Across time, student responses have remained fairly steady. Kindergartners are the most positive in their competence beliefs, with steady decreases seen each year thereafter. One psychology doctoral candidate has focused her dissertation research on the child competence beliefs and TEMA-3 results (see page 30).

Survey of Teaching Practices. Within the Survey of Teaching Practices used by Primarily Math, one set of items measures teachers’ beliefs about teaching and learning. Sample items include the following, with teachers asked for a response ranging from “Strongly agree” to “Strongly disagree”:

- Children should not solve simple word problems until they have mastered some

number facts.

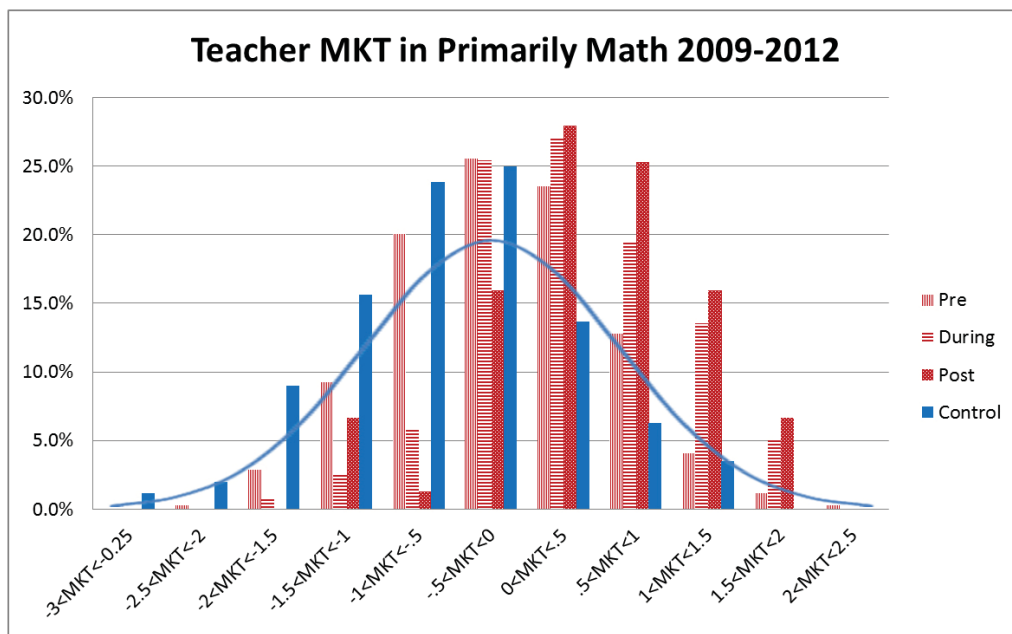
- Most young children can figure out a way to solve many mathematics problems without any adult help.
- Teachers should teach exact procedures for solving word problems.
- Teachers should encourage children to find their own solutions to math problems even if they are inefficient.

Results have shown that K-3 teacher data fit a two-factor model with the items divided into more “child-centered” versus more “teacher-centered” beliefs. The data show that Primarily Math seems to have a significant impact on teachers’ reported practices, increasing their “child-centered” beliefs and decreasing their “teacher-centered” beliefs. The results from this survey are overwhelmingly positive in all respects. The positive changes to Primarily Math teachers (graphs of Cohort 2 and the non-participant control group are shown above, as examples) are contrasted with the statistically flat responses to most items over time by the control group, indicating Primarily Math is a key contributor to the

positive changes. The shaded period corresponds to the period of intense professional development for the teachers in Cohort 2. In the comparison group of Papillion teachers, some increases parallel Primarily Math teachers' increases and can be attributed to the intense focus on mathematics instruction the district has provided in the past two years, including the studio classroom studies.

Fennema-Sherman Mathematics Attitude Scales for Teachers (FSMAS-T). The results from the FSMAS-T test also showed positive results: decreases in Primarily Math teachers' levels of anxiety and increases in their confidence and motivation with respect to teaching and learning mathematics. Given the recent literature about anxiety, and how "contagious" teachers' anxiety is, especially for young girls, it is encouraging that Primarily Math seems to decrease teachers' levels of mathematical anxiety. The comparison group teachers start off statistically equivalent to Primarily Math teachers in all categories except motivation, in which Primarily Math teachers start significantly higher. This makes sense, since the Primarily Math teachers have voluntarily applied to participate in a program about mathematics, and the comparison group teachers have not.

Mathematical Knowledge for Teaching (MKT). The MKT assessment measures K-6 teachers' knowledge of mathematics as it relates to teaching elementary math within three subscales: Numbers and Operations; Patterns, Function, and Algebra; and Geometry. The items include questions about teaching knowledge, such as choosing the best examples or representations to illustrate specific mathematical ideas, and items that



The blue line represents the expected distribution of scores for K-6 teachers on the Mathematical Knowledge for Teaching, which asks teachers to choose the best representations of specific mathematical ideas or to interpret examples of student thinking. While the control group and the pre-Primarily Math scores roughly follow this distribution (slightly lower), the during and post-Primarily Math scores exceed the national averages significantly.

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. Thus, 68 percent of all K-6 teachers in the U.S. would score between -1.0 and 1.0 and 50 percent would have a negative score.

While the national sample for the MKT is K-6 teachers, the MKT creators have data showing K-3 teachers are expected to have lower scores than the overall scores for the K-6 population. Since Primarily Math par-

ticipants are K-3 teachers, it is reasonable to expect them to score below the mean prior to beginning Primarily Math. This is what happened for teachers prior to Primarily Math, as the average of all scores was -0.16 and approximately 60 percent of the scores were negative. However, after Primarily Math, the K-3 teachers' mean score is 0.45, representing a gain of more than half of a standard deviation. While nationally only 16 percent of all K-6 teachers score above 1.0 (1 standard deviation above the mean), after Primarily Math, 23 percent of the K-3 teachers in the

first three cohorts scored in that range.

The examples at right show the types of items used to measure teachers' MKT. These problems require much more than common mathematical knowledge. In the first example, a teacher needs to recognize alternate algorithms students may use and judge their correctness. In the second, the teacher needs to recognize common student errors.

Clearly, the Primarily Math program is having a large effect on teachers' mathematical knowledge for teaching. The analysis of student data, as evidenced through TEMA-3, is ongoing to detect whether these large improvements in teacher knowledge are translating to comparable improvements in student success in mathematics.

Teacher Network Surveys. In partnership with researchers at Northwestern University, a Teacher Network Survey was designed and conducted for the purposes of understanding how Primarily Math is developing as a learning community for its participants. The survey includes several questions that ask instructional staff in elementary schools for their opinions about the culture of their school and their instructional practices in mathematics. Additionally, the survey includes social network measures to collect data on staff interactions, which allow for an examination of the patterns of relationships that are built as staff members seek advice and information about their instruction.

The survey was administered to all instructional staff and administrators in all elementary buildings in three core partner districts (LPS, PLSD and GIPS) and selected elementary buildings in OPS in Spring 2010 and 2011, and will be repeated in 2013. In

Sample Items Measuring Teachers' MKT

These problems from the Mathematical Knowledge for Teaching require much more than common mathematical knowledge. In Example #1, a teacher needs to recognize alternate algorithms students may use and judge their correctness. In Example #2, the teacher needs to recognize common student errors.

Example #1: Imagine that you are working with your class on multiplying large numbers. Among your students' papers, you notice that some have displayed their work in the following ways:

Student A	Student B	Student C
$\begin{array}{r} 35 \\ \times 25 \\ \hline 125 \\ +75 \\ \hline 875 \end{array}$	$\begin{array}{r} 35 \\ \times 25 \\ \hline 175 \\ +700 \\ \hline 875 \end{array}$	$\begin{array}{r} 35 \\ \times 25 \\ \hline 25 \\ 150 \\ \hline 100 \\ +600 \\ \hline 875 \end{array}$

Which of these students would you judge to be using a method that could be used to multiply any two whole numbers?

Example #2: Mrs. Jackson is getting ready for the state assessment, and is planning mini-lessons for students focused on particular difficulties that they are having with adding columns of numbers. To target her instruction more effectively, she wants to work with groups of students who are making the same kind of error, so she looks at a recent quiz to see what they tend to do. She sees the following three student mistakes:

I) $\begin{array}{r} 1 \\ 38 \\ 49 \\ +65 \\ \hline 142 \end{array}$	II) $\begin{array}{r} 1 \\ 45 \\ 37 \\ +29 \\ \hline 101 \end{array}$	III) $\begin{array}{r} 1 \\ 32 \\ 14 \\ +19 \\ \hline 64 \end{array}$
--	---	---

Which have the same kind of error?

Answers: Example #1 - All three are valid methods. Example #2 - I and II.

Hill, H.C., Schilling, S.G., & Ball, D.L. (2004) Developing measures of teachers' mathematics knowledge for teaching. Elementary School Journal 105, 11-30.

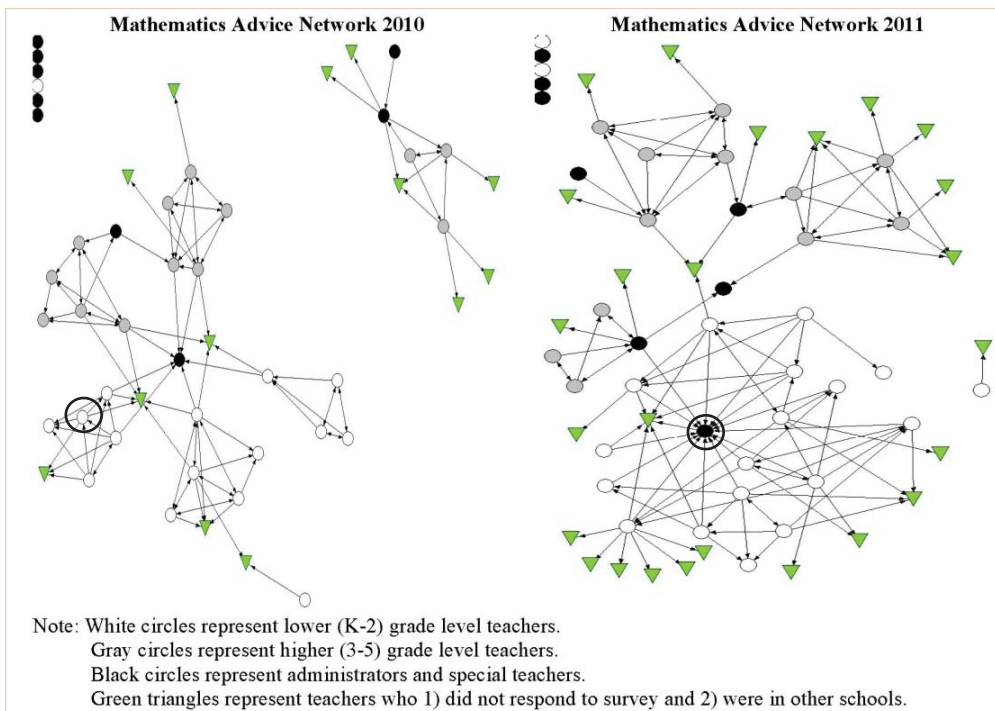
response to requests from district leaders in LPS and PLSD, the survey was also given in Spring 2012 in the LPS buildings with math coaches and all 14 PLSD elementary school buildings, to better study the impact Primarily Math and math coaches are having on their buildings. Initial findings show that there can be very large changes in a school's network when there is an emphasis on improving mathematics teaching and learning, and when there are Primarily Math participants (either in teaching or coaching roles) to whom their colleagues turn for advice.

Although the research team is hesitant to identify definitive longitudinal trends

in school culture and instructional practices with just two years of data, the data do reveal noteworthy shifts in the mathematics advice and information networks at several schools in partner districts. In particular, those schools with Primarily Math participants, showed, for the most part, increases in density of interactions about mathematics. Moreover, the individuals involved in Primarily Math, and especially those with coach positions, emerged as more central actors in their school's math networks, indicating that the formal position and specialized training facilitate staff interactions related to mathematics (see examples on pages 23 and 29).

Teacher Network Surveys

A building with a Cohort 1 participant who became a half time coach in fall 2010
(Diagrams from researchers at Northwestern University)



Observations. While Cohorts 1 and 2 teachers' formal participation in Primarily Math ended after completing study groups in the spring of 2012, five Cohort 1 teachers' classrooms were selected to be observed in-depth in 2012-2013 as part of an expansion to the Primarily Math research agenda. Classes were observed and students and teachers were interviewed in order to develop paired case studies of students and teachers together.

A second expansion of Primarily Math's research project is the addition of studying a special type of case – the studio classroom experience. Studio classrooms first began in 2011-2012, and the results in Papillion-La Vista were so positive that PLSD chose to continue the project in 2012-2013 in classrooms of non-Primarily Math teachers, in order to expand the impact of the studios. Each studio classroom involves one studio teacher, other district/building colleagues,

building and/or district administrators, district coaches, and facilitators from UNL. Five times during the school year, a studio cycle takes place. During a studio cycle PLSD teachers/coaches/administrators plan a mathematics lesson together with a university facilitator, co-PI Ruth Heaton. Then, the studio teacher teaches the lesson to her students while the rest of those involved in the planning observe. The facilitator prompts the studio teacher to periodically explain her instructional decision making, guides the studio teacher's teaching moves, or calls for limited interaction from the observers. Afterward, the participants debrief about the lesson, interactions and student learning. All participants work on some aspect of their own practice between meetings. This type of professional development, centered in the art of teaching and located in the classroom, is showing promise to positively impact participants' mathematics teaching practices. One math education doctoral candidate has focused her dissertation research, in part, on the studio classroom experiences during 2011-2012 (see page 30).

Through Primarily Math's investment in elementary teachers and its ongoing research projects, UNL and NebraskaMATH's core partner districts work to continue to develop an active and mature K-16 partnership that can be sustained in the future, and one that links mathematics teachers and school administrators from across Nebraska with university mathematicians and mathematics educators to improve state mathematics education. The names of all of the participating teachers and instructors for Primarily Math can be found starting on page 31. ○



Dissertations

Four UNL doctoral students' dissertations are based upon their involvement with Primarily Math's research project

Mary Alice Carlson

Teaching, Learning and Teacher Education

Learned and Learning: Developing Responsive Teachers for the Primary Mathematics Classrooms

This study examines four teachers' learning from a professional development program that (a) emphasizes the importance of instruction that is responsive to children's mathematical ideas, and (b) maintains the complexities of practice. Specifically, this study seeks to understand how teachers learn to be intentional, playful, observant and reflective and how these four characteristics are exhibited in teaching practice. The following questions guide this investigation: (1) How do teachers use their learning from professional development during classroom practice? (2) What forms do ideas related to being intentional, playful, observant and reflective take on when they are examined in practice?

Kelly Georgius

Teaching, Learning and Teacher Education

Planning and Enacting Mathematical Tasks of High Cognitive Demand in the Primary Classroom

This study examines how teachers select and enact mathematical tasks in a first- and second-grade classroom around the concepts of addition and subtraction. This study also investigates the relationship between what teachers plan to have happen during mathematics class, and what actually happens when enacting lessons with students. I focus on the cognitive demand of tasks, both planned and enacted, as well as how teachers and students talk about mathematics during class.

Traci Kutaka

Psychology

Young Children's Math Self-Competence Beliefs and Observed Ability: Changes and Associations over One Year

This mixed methods study asks three questions. First, what do K-3 students think of themselves as mathematical learners? Do they think they are good at math, or not? Second, are their beliefs stable from fall to spring, and how are the beliefs of older students different from younger ones? Finally, to what extent are math-competence beliefs associated with actual mathematical competence across K-3? This study attempts to answer these questions with data from Primarily Math, using quantitative and qualitative approaches to blend data, theory, and

substantive interpretation that can fortify a discussion on what the contents of these early beliefs reveal about how children form identities as learners and producers of mathematics.

Yinjing Shen

Child, Youth, and Family Studies

Elementary School Teachers' Interpretation and Promotion of Creativity in the Learning of Mathematics:

A Grounded Theory Study

This study explores (1) how K-3 teachers from a public school system understand mathematical creativity in their students, and (2) how their understanding interacts with their context to influence their pedagogy. The study is centered on three questions to be investigated through interviews with teachers:

- 1) How do teachers define and talk about mathematical creativity?
- 2) How do teachers try to foster creativity?
- 3) What supports or obstacles do teachers encounter when trying to foster mathematical creativity? My exploration of teachers' understanding of mathematical creativity leads me to ask teachers: Is creativity part of students' personality? Or is it a series of cognitive traits? Is it learned? Is it available to all students or some of them? Are there different types of creativity? Is creativity a series of specialized skills different from the others? How do teachers describe the role of basic skills and creativity and their relationship in solving mathematical problems? ○

Primarily Math Cohort 1

Shannon Allard,
Alliance Public Schools,
Emerson Elementary
Kelli Anderson,
Lincoln Public Schools,
Campbell Elementary
Jeane Anderson,
Scottsbluff Public Schools,
Roosevelt Elementary
Diann Barnes, Grand
Island Public Schools,
Engleman Elementary
Cindy Beaman, Grand
Island Public Schools
Jodi Chapek, East
Butler Public Schools,
East Butler Elementary



2012-13 Teaching Positions

Stacy Chapek, Lincoln Public Schools, Adams Elementary
Jo Conrad, Howells-Dodge Unified District/Elementary
Jessica Dickes, Gretna Public Schools, Thomas Elementary
Kelly Dockweiler, Loup County Public School
Rita Ehly, Lincoln Public Schools, Everett Elementary
Amy Fiedler, Bloomfield Community School
Megan Fleischman, Lincoln Public Schools, Kloefkorn Elementary
Lynn Fuller, Lincoln Public Schools, Elliott Elementary
Tabitha Gilsdorf, Bloomfield Community School
Bev Grueber, North Bend Central Public School
Janis Hiatt, retired, formerly Lincoln Public Schools
Danielle Inserra, Papillion-La Vista School District, Walnut Creek
Elementary and La Vista West Elementary
Brittany Jenkins, West Point Public Schools, Beemer Elementary
Kellie Joy, Lincoln Public Schools, Clinton Elementary
Susie Katt, Lincoln Public Schools District Office

Annie Kennedy, Lincoln Public Schools, Sheridan Elementary
Keri Lewandowski, Lincoln Public Schools, Kooser Elementary
Lisa Mason-D’Croze, Lincoln Public Schools, Elliott Elementary
Jane McGill, Papillion-La Vista School District, Carriage Hill
Elementary and G Stanley Hall Elementary
Cynthia Mracek, Alliance Public Schools, Grandview Elementary
Molly Orton, Lincoln Public Schools, Adams Elementary
Jana Rowe, formerly Gretna Public Schools
Sy Settell, Lincoln Public Schools, Elliott Elementary
Cindy Settje, Leigh Community School
Kathy Simpson, Lincoln Public Schools, Belmont Elementary
Kina Stefka, Loup County Public School
Deb Watchorn, Lincoln Public Schools, Belmont Elementary
Linda Woitaszewski, Grand Island Public Schools, Shoemaker
Elementary
Tara Zuspan, Lincoln Public Schools, Cavett Elementary

Primarily Math Cohort 2

Alysia Augustus, Papillion-La Vista School District, Anderson Grove Elementary
Wendy Badders, Omaha Public Schools, Bancroft Elementary
Kathleen Bilek, Omaha Public Schools, Bancroft Elementary
Heather Bryan, Omaha Public Schools, Ashland Park-Robbins Elementary
Nadene Chavet, formerly Santee Community Schools
Tracy Custer, Blair Community Schools, North Primary School
Marni Driessen, Omaha Public Schools, Mount View and Wakonda Elementaries
Mary Duffy, formerly Omaha Public Schools
Jeani Guenther, Papillion-La Vista Public Schools, Walnut Creek Elementary
Megan Harding, Papillion-La Vista Public Schools, G Stanley Hall Elementary
Meeghan Hartfield, Omaha Public Schools, Central Park Academy
Jill House, Omaha Public Schools, Howard Kennedy Elementary and King Elementary
Cynthia Hudson, Bellevue Public Schools, Fort Crook Elementary
Alycia Hughes, Hastings Public Schools, Morton Elementary
Melissa Jankowski, Omaha Public Schools, Central Park Academy
Sherri Johnson, Plattsmouth Community Schools, Plattsmouth Elementary
Leah Kastrup, Omaha Public Schools, Fontenelle Elementary
Kerri Kratina, Omaha Public Schools, Saddlebrook Elementary
Tina Noll, formerly Papillion-La Vista School District, Parkview Heights Elementary



2012-13 Teaching Positions

Christine Olsen, Omaha Public Schools, Central Park Academy
Rebecca Rech, Lincoln Public Schools, Holmes Elementary
Kelli Roehrig, Papillion-La Vista School District, Golden Hills Elementary
Elizabeth Scheppers, Papillion-La Vista School District, Parkview Heights and Tara Heights Elementary
Carrie Schnell, Gretna Public Schools, Palisades Elementary
Laura Topf, formerly Omaha Public Schools, teaching out of state
Jimmi Watts, Omaha Public Schools, Belle Ryan Elementary
Meredith Whiley, Omaha Public Schools, Liberty Elementary

Primarily Math Cohort 3 LPS

All teachers
in Lincoln
Public Schools

Mary Abebe,
Saratoga Elementary

Jill Allen, Hartley
Elementary

Sara Andersson,
Kooser Elementary

Amy Barton,
Lakeview Elementary

Amanda Christensen,
Fredstrom
Elementary

Tina Cruickshank,
Arnold Elementary

Amy Davidson,
Fredstrom
Elementary

Laura Deans, Kloefkorn Elementary

Chris Dinneen, Maxey Elementary

Allyn Fujan, Brownell Elementary

Kristi Green, Campbell Elementary

Whitney Hobbs, Clinton Elementary

Carol Hovey, Campbell Elementary

Jamie Hoyle, Lakeview Elementary

Sarah Ideus, Adams Elementary

Carol Jozsa, Morley Elementary

Kristy Kennedy, Kloefkorn Elementary

Heather Kramer, Roper Elementary

Cassie Krueger, Adams Elementary

Shelly Muggy, Everett Elementary



2012-13 Teaching Positions

Stephanie Nantkes, Arnold Elementary

Angela Penner, Sheridan Elementary

Erin Pfister, Belmont Elementary

Tiffany Reynolds, Kooser Elementary

Tessie Ringlein-Beaver, Everett Elementary

Jamie Ritchey, Belmont Elementary

Michelle Stephens, Prescott Elementary

Becky Unterseher, Arnold Elementary

Darcy Vercellino, Beattie Elementary

Deirdre Walton, Adams Elementary

Krista Wells, Kooser Elementary

Kimberly Zetterman, Adams Elementary

Dawn Ziegelmann, Clinton Elementary

Primarily Math Cohort 3 West

Jessie Anderson, Hay Springs Public School

Vanessa Bartels, Grand Island Public Schools, Knickrehm Elementary

Tawnya Bass, Alliance Public Schools, Grandview Elementary

Mary Carriker, South Central NE Unified System 5, Sandy Creek Elementary

Cynthia Crick, Cozad City Schools, Cozad Elementary

Jane Dewey, McCook Public Schools, McCook Elementary

Michelle Dubbert, Deshler Public Schools, Deshler Elementary

Michelle Dutcher, Kearney Public Schools, Sunrise Middle School

Merri Ann Elliott, Cozad City Schools, Cozad Elementary *2012-13 Teaching Positions*

Jackie Fitzgerald, Grand Island Public Schools, Knickrehm Elementary

Whitney Flower, Grand Island Public Schools, Lincoln Elementary

Stephanie Hamilton, Elkhorn Valley School

Dana Henry, Grand Island Public Schools, Knickrehm Elementary

Penny Hilzer, Scottsbluff Public Schools, Lincoln Heights Elementary

Nanette Kissler, Scottsbluff Public Schools, Lincoln Heights Elementary

Vicki Klein, Scottsbluff Public Schools, Lake Minatare School

Bobbi Middleton, Madison Public Schools, Madison Middle School

Melanie Moore, formerly Northwest Public Schools



Monica Munter, Hastings Public Schools, Longfellow Elementary

Linda Paesl, Nebraska Unified School District 1, Verdigre Public School

Patty Powers, Arthur County Schools, Arthur Elementary

Nora Robinson, Kimball Public Schools, West Elementary

Trudy Schnell, Scottsbluff Public Schools, Lake Minatare School

Tammy Sorensen, Santee Community Schools, Santee Elementary

Penny Wickham, Alliance Public Schools, Grandview Elementary

Suzanne Wissing, Hastings Public Schools, Watson Elementary

Amber Woitaszewski, Grand Island Public Schools, Knickrehm Elementary

Primarily Math Cohort 4 ESU 3

Andrew Boone, Gretna Public Schools, Thomas Elementary
Michelle Brown, Bellevue Public Schools, Fort Crook Elementary

Erin Case, Papillion-La Vista School District, Patriot Elementary

Danielle Cassell, Douglas County West Community Schools, Douglas County West Community Elementary

Liz Cook, Gretna Public Schools, Palisades Elementary

Melissa Croom, Millard Public Schools, Norris Elementary

Laura Darling, Papillion-La Vista School District, Portal Elementary

Mindi Fowler, South Sarpy District 46, Westmont Elementary

Brittany Fulton, Gretna Public Schools, Thomas Elementary

Allie Guiney, Papillion-La Vista School District, Patriot Elementary

Nichole Hallquist, Papillion-La Vista School District, Trumble Park Elementary

Christine Hanke, Papillion-La Vista School District, La Vista West Elementary

Melissa Hawley, Falls City Public Schools, North Elementary

Gretchen Kalkowski, Louisville Public Schools, Louisville Elementary

Diane King, Papillion-La Vista School District, Carriage Hill Elementary

Bethany Klone, Bellevue Public Schools, Two Springs Elementary

Brittni Konrad, Papillion-La Vista School District, G Stanley Hall Elementary

Danielle Koory, Papillion-La Vista School District, Walnut Creek Elementary

Kelly Krings, Papillion-La Vista School District, Portal Elementary

Chris Miller, Papillion-La Vista School District, Rumsey Station Elementary

Brooke Morehead, Papillion-La Vista School District, Parkview Heights Elementary

Krista Morrison, Millard Public Schools, Reagan Elementary

Kimberly Norblade, Papillion-La Vista School District, Tara Heights Elementary

Kimberly Oliver, Falls City Public Schools, North Elementary

Marilyn Opitz, Millard Public Schools, Norris Elementary

Linda Poole, Papillion-La Vista School District, Portal Elementary



2012-13 Teaching Positions

Carter Pratt, Gretna Public Schools, Thomas Elementary

Britni Putnam, Papillion-La Vista School District, Walnut Creek Elementary

Julia Simon, Papillion-La Vista School District, G Stanley Hall Elementary

Scott Simpson, Gretna Public Schools, Thomas Elementary

Betsy Smith, Papillion-La Vista School District, Rumsey Station Elementary

Sarah Smith, Papillion-La Vista School District, G Stanley Hall Elementary

MaryBridget Stork, South Sarpy District 46, Westmont Elementary

Christine Synowiecki, Papillion-La Vista School District, La Vista West Elementary

Jamie Toelle, Louisville Public Schools, Louisville Elementary

Jon Trede, Gretna Public Schools, Whitetail Creek Elementary

Abby Wagoner, Papillion-La Vista School District, Parkview Heights Elementary

Maureen Walding, Papillion-La Vista School District, La Vista West Elementary

Rhonda Wiebers, Bellevue Public Schools, Fort Crook Elementary

Primarily Math Cohort 4 Lincoln

Tiffany Anderson, Lincoln Public Schools,
Kooser Elementary

Angela Blanco, Scottsbluff Public Schools,
Lincoln Heights Elementary

Teresa Calafiore, Lincoln Public Schools,
Kooser Elementary

Tracy Clements, Lincoln Public Schools,
Beattie Elementary

Theresa Conradt, Lincoln Public Schools,
Elliott Elementary

Amy Emanuel, Lincoln Public Schools,
Roper Elementary

Rachel Frank, Lincoln Public Schools,
Prescott Elementary

Sarah Haynes, Grand Island Public Schools,
Jefferson Elementary

Sarah Hogle, Lincoln Public Schools,
Belmont Elementary

Andrea Holtgrewe, Lincoln Public Schools,
Clinton Elementary

Jennifer Jenkins, Lincoln Public Schools,
Pershing Elementary

Michele Jones, Lincoln Public Schools, Roper Elementary

Sherri Key, Lincoln Public Schools, Rousseau Elementary

Lacey Konwinski, Lincoln Public Schools, Beattie Elementary

Lisa Metcalf, Lincoln Public Schools, West Lincoln Elementary

Megan Miller, Lincoln Public Schools, Adams Elementary

Nancy Mosier, Lincoln Public Schools, Lakeview Elementary

Alison Nickolaus, Lincoln Public Schools, Prescott Elementary

Tricia Phillips, Lincoln Public Schools, West Lincoln Elementary

Jessi Potter, Lincoln Public Schools, Kooser Elementary

Elizabeth Pruett, Lincoln Public Schools, Lakeview Elementary

Kristine Ray, Lincoln Public Schools, West Lincoln Elementary



2012-13 Teaching Positions

Sara Rief, Lincoln Public Schools, Campbell Elementary

Chantelle Schroeder, Lincoln Public Schools, Meadow Lane Elementary

Megan Slothouber, Lincoln Public Schools, West Lincoln Elementary

Katie Songster, Lincoln Public Schools, Randolph Elementary

Holly Southwick, Lincoln Public Schools, Maxey Elementary

Jessica Tewalt, Lincoln Public Schools, Cavett Elementary

Beth Topp, Lincoln Public Schools, Kooser Elementary

Karen Vontz, Lincoln Public Schools, Clinton Elementary

Barb Wallingford, Lincoln Public Schools, Eastridge Elementary

Ashley Wergin, Lincoln Public Schools, Sheridan Elementary

Jennifer Woelber, Lincoln Public Schools, Beattie Elementary

Andrea Woita, Lincoln Public Schools, Meadow Lane Elementary

Primarily Math Cohort 4 Omaha

Maris Anderson, Blair Community Schools, South Primary School

Rebecca Barber, South Sioux City Community Schools, Covington Elementary

Hollie Booth, Blair Community Schools, North Primary School

Angela Brodine, Omaha Public Schools, Spring Lake Magnet Elementary

Jill Copeland, Omaha Public Schools, Oak Valley Elementary

Meghan Daigh, Omaha Public Schools, Kennedy Elementary

Ann Dirks, Omaha Public Schools, Western Hills University Partnership Magnet Center

Jessica Ehlers, Omaha Public Schools, Oak Valley Elementary

Lisa Elder, Omaha Public Schools, Bancroft Elementary

Erica Flynn, Omaha Public Schools, Bancroft Elementary

Christina Free, Omaha Public Schools, Jefferson Elementary

Mandy German, Omaha Public Schools, Highland Elementary

Mike Heller, Omaha Public Schools, Standing Bear Elementary

Heather Herman, Blair Community Schools, North Primary School

Jenna Hoelsing, Blair Community Schools, North Primary School

Lisa Holland, Omaha Public Schools, Columbian Elementary

Jim Hubbard, South Sioux City Community Schools, Covington Elementary

Tracie Johnson, Blair Community Schools, North Primary School

Joana Kimmel, Omaha Public Schools, Bancroft Elementary



2012-13 Teaching Positions

Chelsea Kwapnioski, Blair Community Schools, Arbor Park Intermediate School (pictured with PMC4 ESU 3)

Kelle Lawrence, Omaha Public Schools, Sunny Slope Elementary

Frances Merica, Omaha Public Schools, Beals Elementary

Michelle Meyer, Omaha Public Schools, Belle Ryan Elementary

Carey Mogensen, South Sioux City Community Schools, Covington Elementary

Karen Overland, Omaha Public Schools, Spring Lake Magnet Elementary

Suzanne Pike, Omaha Public Schools, Jefferson Elementary

Mary Schubert, Blair Community Schools, West Primary School

Jennifer Streeter, Omaha Public Schools, Boyd Elementary

Angela Thiemann, Omaha Public Schools, Bancroft Elementary

Shirley Tipler, Omaha Public Schools, Sherman Elementary

Kristin Wiese, Omaha Public Schools, Picotte Elementary

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Deb Wragge

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Julia St. Goar, Mathematics
Molly Williams, TLTE

* - current institution

K-3 Math Specialist Certificate

Six mathematics and pedagogy courses comprise Primarily Math's 18-hour graduate program, with a seventh optional leadership course

SUMMER 1

MATH 800P: Number and Operation for K-3 Math Specialists – This course strengthens teachers' conceptual knowledge of number and operation in the K-3 mathematics curriculum and connects the intuitive mathematical understandings that children bring to school with an understanding of place value in the K-3 curriculum. The significance of base 10 in our place value system, along with its role in arithmetic operations and their properties, is a major emphasis of the course.

MATH 801P: Geometry, Measurement and Algebraic Thinking for K-3 Math Specialists – This course promotes a deep understanding of geometry, measurement and algebraic thinking and its role in the K-3 mathematics curriculum. Emphasis is placed on mathematical argument related to geometric relationships, measurement, spatial reasoning, patterns, relations and functions.

FALL

TEAC 808A: Teaching Math K-3: Planning Lessons for Diverse Classrooms – This course increases practicing teachers' understanding of and their ability to apply current research in mathematics education to the teaching and learning of K-3 mathematics. The course focuses on understanding the learning trajectories of children's mathematical ideas in the K-3 mathematics curriculum.

SPRING

TEAC 808J: Helping Young Children Become Mathematical Thinkers – This course focuses on the continued design and implementation of math lessons aimed at helping children become mathematical thinkers. The course emphasizes meeting the needs of diverse learners, including the intentional selection and use of particular teaching strategies coupled with systematic reflection on learning outcomes.

SUMMER 2

MATH 802P: Number, Geometry and Algebraic Thinking II for K-3 Math Specialists – This course builds on the mathematics studied in MATH 800P and 801P and extends teachers' mathematical knowledge by considering how concepts studied in the K-3 curriculum lay a foundation for abstract thinking in grades 4 and beyond. The first week focuses on a study of fractions, and the second week emphasizes geometry topics.

TEAC 907: Communities of Practice and Mathematics – This course is designed to help teachers become increasingly more intentional, planful, observant, and reflective as teachers of elementary mathematics. Teachers situate their individual lesson planning within the mathematical ideas of the elementary curriculum, giving particular attention to creating coherence and connections to the learning trajectories of children.

FALL 2 (optional)

TEAC 836B: Leadership and Mathematics Instruction, Professional Development in Education – This course is driven by the goal of preparing teachers for new or existing leadership roles that involve leading peers in using effective strategies for teaching and learning mathematics. The course offers strategies and tools for the practical, day-to-day work of leading others in planning, implementing and assessing current mathematical instructional practices.



CENTER FOR SCIENCE,
MATHEMATICS
& COMPUTER EDUCATION

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