ESUCC
Professional Development Committee Meeting
Wednesday, October 8, 2014, 4:30 PM
Country Inn & Suites 5353 N 27th Street Lincoln, NE 68521, 6949 South 110th Street, LaVista, NE 68128

Attendance Taken at 4:31 PM.

Allen ESU 19:	Present
Gegg ESU 05:	Absent
Jeff West (NE):	Present
Dr Kraig Lofquist:	Present
Dr Larianne Polk:	Present
Tedesco ESU 11:	Present
Ted DeTurk (ESU 02):	Present

1. Call to Order

2. Roll Call

3. Agenda Item

3.1. September PDO Overview

3.1.1. ESUCC Mission

3.1.2. ESUPDO Vision

3.1.3. ESUPDO Action Plans

3.2. January PDO

3.2.1. Marsha Kish

3.3. Master Service Agreement Timeline

3.4. NMPDS Grant

3.4.1. Math Grant Evaluation for 2013-2014

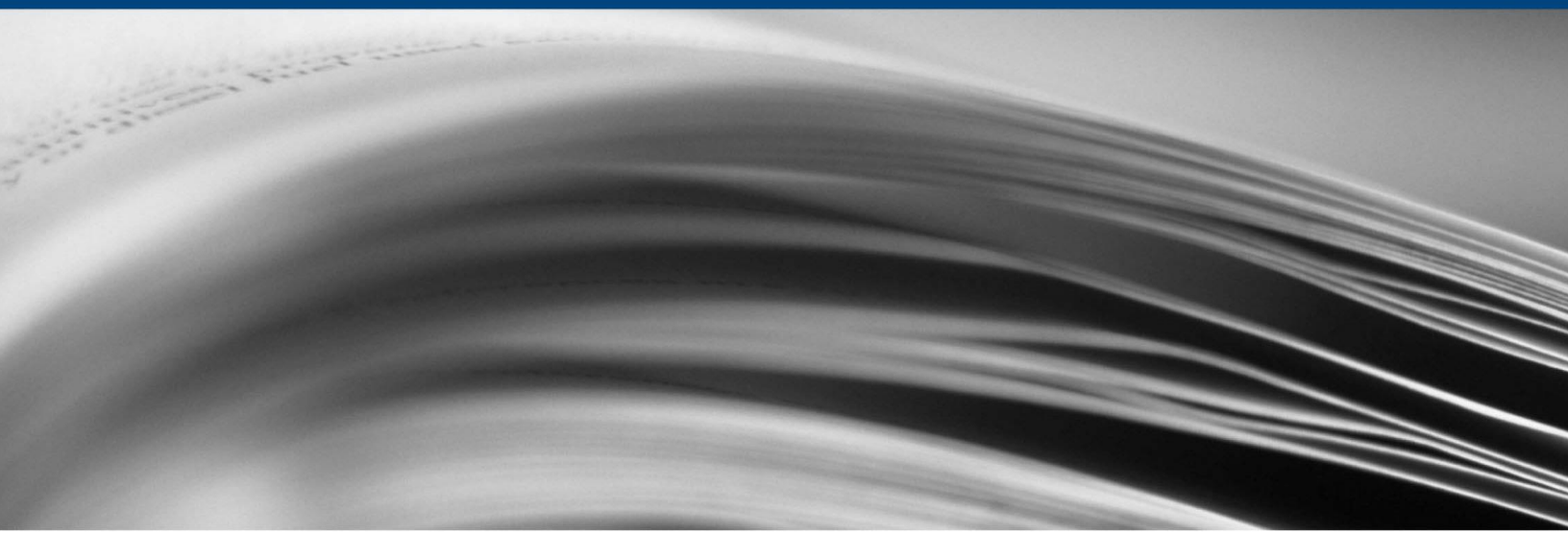
3.4.2. Math Champions

4. Next Meeting Agenda Items

5. Executive Session

6. Adjournment

{{Name: Agenda Item Name}}
{{Discussion: Agenda Item Discussion}}
{{Comments: Agenda Item Comments}}
{{Actions: Agenda Item Actions}}



NEBRASKA STATEWIDE MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM –

NEBRASKA MATHEMATICS PROFESSIONAL DEVELOPMENT SERIES 2013-2014

EVALUATION REPORT

PREPARED FOR:
EDUCATIONAL SERVICE UNIT COORDINATING COUNCIL
6949 SOUTH 110TH STREET
OMAHA, NE 68128

SEPTEMBER 2014

RMC RESEARCH

NEBRASKA STATEWIDE MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM –
NEBRASKA MATHEMATICS PROFESSIONAL DEVELOPMENT SERIES
2013-2014

EVALUATION REPORT

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SEPTEMBER 2014

ACKNOWLEDGMENTS

This report was prepared for the Educational Service Unit Coordinating Council and is funded through the Nebraska Department of Education funds from Title II, Part B of the Math/Science Partnerships (MSP) grant, a component of NCLB Legislation.

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EXECUTIVE SUMMARY

Beginning in June 2014, the Nebraska Mathematics Professional Development Series (NMPDS) operated by Educational Service Unit Coordinating Council (ESU-CC) began a 3-year project period to provide professional development services to teachers in grades 3-12 throughout the state of Nebraska in mathematics content and pedagogical content knowledge. The professional development is delivered to elementary teachers in grades 3-6 through the Elementary Mathematics Academy (EMA) and secondary teachers in grades 7-12 through the Middle School/High School (MS/HS) Institute. This year enrollment was limited to no more than 100 participants in each of the two sections of NMPDS and was offered at three locations for EMA and four locations for MS/HS Institute.

This evaluation report covers the activities during the period of September 2013 through July 2014.

FINDINGS

- **NMPDS participants rated the overall quality of the professional development experiences between above average and excellent.** *Overall clarity of information presented* (4.06) and *instructors reaching stated goals for course* (4.11) contributed to the utility of the sessions. Collectively, NMPDS participants indicated that the preparation of the instructor(s) was nearing "excellent."

- **NMPDS participants rated the utility of the sessions above average.** *Mathematics content* and *mathematics pedagogy/instruction* were rated the highest topical emphasis with results at 3.93 on a 5-point scale. Overall, NMPDS participants strongly agreed that their school or district would be supportive as they implemented what they learned from the sessions.

- **Over 60% of the EMA participants demonstrated a statistically significant gain on the overall content knowledge.** Of the 64 EMA participants who completed both the pretest and posttest, 81% had a significant gain on the Number Concept and Operations subscale and 61% had a significant gain on the Geometry subscale.

- **Over one third of the MS/HS Institute participants demonstrated a statistically significant gain in the overall content knowledge.** Of the 74 participants who completed both pretest and posttest, 51% showed a significant increase on the Patterns, Functions, and Algebra subscale with a small effect size and 33% had a statistically significant increase with no effect size on the Geometry subscale.

- **NMPDS teachers' overall confidence in teaching significantly increased over time.** EMA participants indicated a larger increase in their confidence in comparison to MS/HS Project participants.

- **Teacher ratings of preparedness to teach mathematics increased after participation in NMPDS activities.** Participants indicated they were well prepared at the conclusion of the activities on the

two subscales. Overall, all NMPDS participants rated *teaching mathematics to students who are English Language Learners* as somewhat prepared.

- **NMPDS participants indicated their participation in professional development activities moderately influenced their teaching ability.** Teachers reported that NMPDS had the greatest impact on their ability to apply mathematical practices to classroom instruction.

- **NMPDS participants showed changes in philosophy regarding traditional and progressive teaching and learning statements.** NMPDS participants decreased their level of agreement with all six traditional statements at statistically significant level. The two statements *students generally learn mathematics best in classes with students of similar abilities* and *students master and retain mathematical algorithms more efficiently through repeated practice than through the use of applications and simulations* had the largest decreases. Ratings of agreement by NMPDS participants on the four progressive statements increased at statistically significant levels with small to medium effect size. The statement, *there are different ways to solve most mathematics problems,* increased the most over time with the participants.

RECOMMENDATIONS FOR YEAR 2 OF GRANT

1. **Acquire a mathematics project director to oversee all phases of the grant.**

2. **Establish procedures to allow participants to know their responsibilities for the sessions.**

3. **Illustrate instructional strategies that are effective to teach mathematics to students who are English language learners.**

4. **Expand success indicators to include use of student achievement data in mathematics.**

INTRODUCTION

This section provides background information about the Nebraska Mathematics Professional Development Series (NMPDS) project along with a logic model that provides a visual representation of key project components and outcomes.

BACKGROUND

In January 2002, the No Child Left Behind Act (NCLB) became law. Title II, Part B authorized state Mathematics and Science Partnership (MSP) competitive grant programs to encourage institutions of higher education (IHEs), local school districts, elementary schools, and secondary schools to participate in professional development activities that increase the subject matter knowledge and teaching skills of mathematics and science teachers. The grant program called for professional development activities that were:

- Sustained;
- Intensive;
- Classroom focused; and
- Aligned with state and local standards and with mathematics and science curricula.

The activities undertaken by grantees were expected to show demonstrable and measurable improvement in student academic achievement in mathematics and science. Core partners in these grants were to include mathematics, science, and/or engineering departments from IHEs, including community colleges. Partnerships of IHEs, K-12 districts, and other stakeholders would draw upon the strong disciplinary expertise of the mathematicians, scientists, and engineering faculty from IHEs to design professional development activities that affect improvements in student outcomes by providing K-12 teachers with strong mathematics and/or science content knowledge.

The Nebraska Department of Education (NDE) selected two projects to operate statewide under Title II B, MSP program: the NMPDS and Science: Keep Improving Content Knowledge and Skills (KICKS).

THE NEBRASKA MATHEMATICS PROFESSIONAL DEVELOPMENT SERIES

Beginning in June 2013, NMPDS, operated by Educational Service Unit Coordinating Council, began a 3-year project to provide professional development services to K-12 teachers throughout the state of Nebraska in mathematics content and pedagogical content knowledge. NMPDS offered two distinct branches of professional development to meet the needs of different grade level teachers: EMA for Grades 3-6 and MS/HS Project for Grades 7-12.

NMPDS OBJECTIVES

The project objectives reflect the needs identified by teachers surveyed through the statewide needs assessment administered in October 2009. The NMPDS objectives are as follows:

1. Provide content-focused professional development training in number sense, algebra, geometry/measurement, and data analysis/probability for elementary, middle and high school teachers that integrates technology as a tool into the content area of mathematics and aligns with Nebraska State Mathematics Standards/Common Core through collaborative partnerships.

2. Model and implement research-based instructional strategies using math content examples with the teachers, so they are confident with the implementation of strategies into their classroom.

3. Establish effective professional learning communities (PLCs) with Teacher Leaders of Math (TLM).

4. Utilize myeLearning as an internet-based Learning Management System (LMS) for communication and repository of resources.

5. Build a collaborative statewide network of educators to provide outreach and on-going professional development regarding mathematics knowledge and skills.

6. Recruit teachers for participation in professional who do not meet the NCLB requirements as highly-qualified teachers to participate in professional development. Involve schools not meeting federal and/or state accountability student achievement status for mathematics.

Logic Model

Exhibit 1 presents a logic model that reflects hypotheses about the relationship between NMPDS activities and outcomes. The model illustrates that NMPDS components are expected to have impacts on participating teachers and lead teachers, which in turn leads to impacts on participating schools. The model also indicates that within participating schools, improvements in teacher knowledge are expected to affect practice, which, in turn, affects student achievement outcomes.

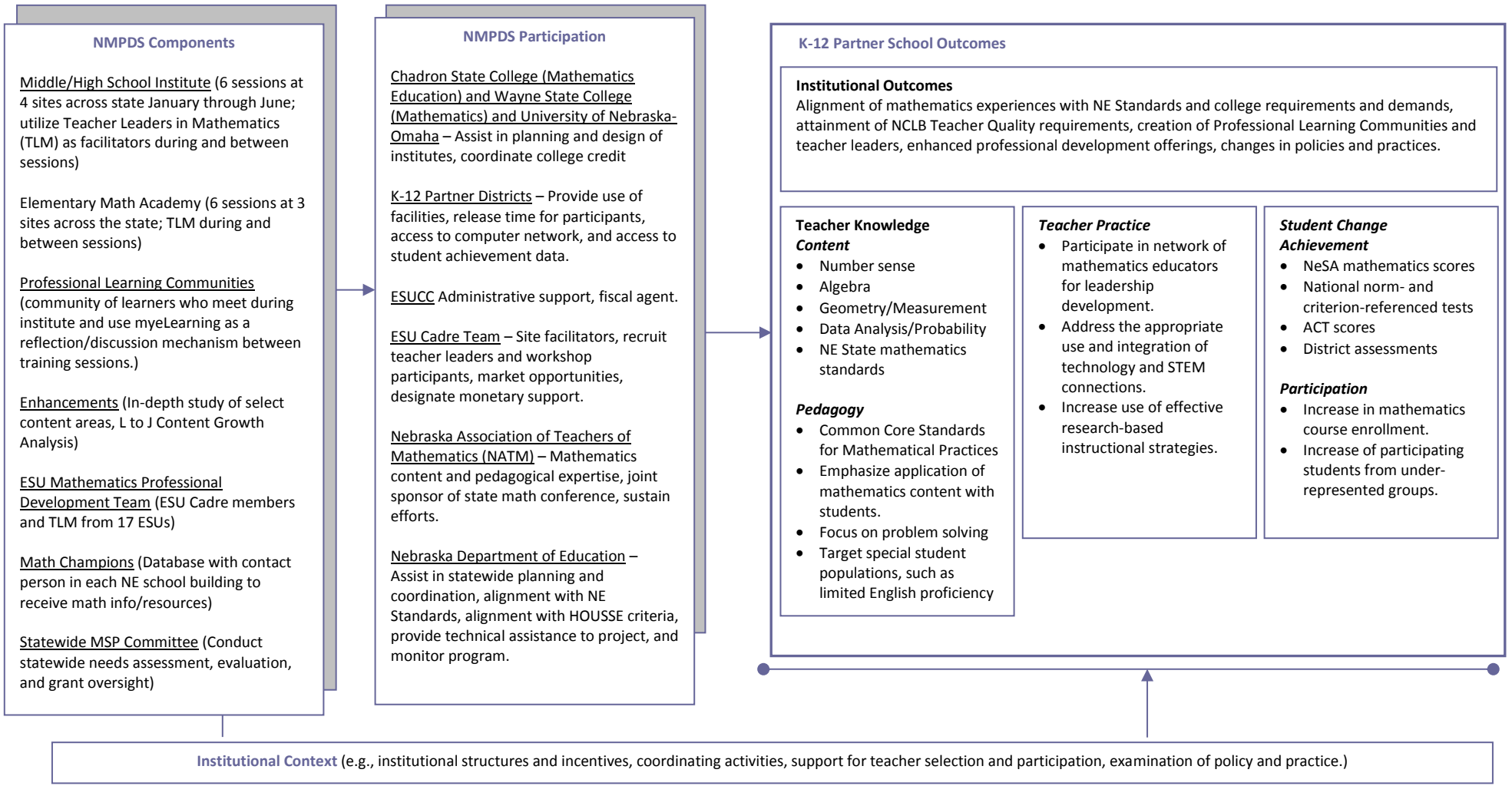
Report Organization

This evaluation report covers the program period of September 2013 through July 2014. The methodology section describes specific questions and methods for this evaluation. Following the methodology are findings which present information about:

- NMPDS professional development activities;
- Development of teacher content knowledge;
- Impact on classroom practice;
- Establishing effective PLCs and building a collaborative statewide network of educators; and
- Facilitators and barriers.

The final section provides conclusions and recommendations.

EXHIBIT 1. NMPDS: MATHEMATICS AND SCIENCE PARTNERSHIP PROJECT LOGIC MODEL (2013-2016)



METHODOLOGY

This section of the report identifies questions used to guide the evaluation, along with data used for analysis and the analysis techniques.

EVALUATION QUESTIONS

Exhibit 2 contains a listing of questions that guided the evaluation process.

EXHIBIT 2. NMPDS EVALUATION QUESTIONS

NMPDS Evaluation Questions
1. To what extent has NMPDS met its articulated goals? *To what extent does NMPDS . . .* a. provide content-focused professional development that integrates technology as a tool? b. model and implement research-based instructional strategies? c. align activities with Nebraska State Mathematics Standards (and Common Core State Standards, as appropriate)? d. establish effective PLCs? e. build a collaborative statewide network of educators to provide ongoing professional growth and support? f. recruit teachers who do not meet the NCLB requirements as highly qualified and further their designation as highly qualified? g. involve schools not meeting federal and/or state accountability student achievement status for mathematics?
2. To what extent does participation in NMPDS activities enhance teachers' mathematics content and pedagogical content knowledge?
3. To what extent does participation in NMPDS activities enhance teachers' levels of confidence, comfort, and preparedness to teach mathematics?
4. What factors impede or facilitate progress toward NMPDS goals?
5. What progress has been made toward sustaining and "scaling up" NMPDS activities and strategies?

For this report, all questions are answered through data analysis. Findings in the report are based on pre- and post-Academy and/or Institute data collected from pretest and posttest content knowledge inventories during the 2014 school year; retrospective pretest and posttest teacher survey[1] and end-of-course evaluations, as well as participant focus groups, project staff interviews, and a limited number of NMPDS professional development observations.

[1] A retrospective pretest/posttest survey is designed to collect pretest data at the same time as the posttest data. For each item in the survey, respondents rate themselves twice: first, as they would prior to their participation in the professional development, and second, as they would at the current point in time.

QUALITATIVE DATA

Professional Development Activity Observations, Focus Groups, and Interviews. Data for this report were collected during onsite visits to:

- Nebraska Association of Teachers of Mathematics (NATM) Annual Conference in Kearney, Nebraska on September 30, 2013.
- EMA Session 1 in Omaha on January 31, 2014.
- MS/HS Institute Session 1 in Omaha, Nebraska on January 30, 2014.
- MS/HS Institute Session 4 in Kearney, Nebraska on April 29, 2014.
- MS/HS Institute Session 4 in Norfolk, Nebraska on April 30, 2014.

Additional onsite visitations were scheduled for EMA Session 3 in Kearney, Nebraska on March 11, 2014 and EMA Session 5 in Norfolk, Nebraska on June 19, 2014. Weather conditions in the area cancelled travel to the sites.

During the onsite visits, RMC Research staff conducted focus groups with randomly selected participants. They also observed and scripted the professional development sessions provided by instructors and key personnel for the project. Then, RMC analyzed the data for trends that could provide insights into progress toward the MSP project goals. Interviews were conducted with the project director, course instructors, and other key personnel at the end of sessions. Qualitative data included in this report are summarized in Exhibit 3.

EXHIBIT 3. SUMMARY OF FOCUS GROUP AND OBSERVATION DATA

Focus Groups	Observations
EMA Omaha • January 31, 2014 (6 participants) • 2 participants new to NMPDS grant program **MS/HS Institute** Omaha • January 30, 2014 (6 participants) • All participated in previous NMPDS grants Kearney • April 29, 2014 (5 participants) • 3 participants new to NMPDS grant program Norfolk • April 30, 2014 (5 participants) • 1 participant new to NMPDS grant program	**EMA** Omaha • January 31, 2014 • 32 participants **MS/HS Institute** Omaha • January 30, 2014 • 35 participants Kearney • April 29, 2014 • 19 participants Norfolk • April 30, 2014 • 22 participants

QUANTITATIVE DATA

Teacher Content Knowledge Assessments. All NMPDS participating teachers were asked to complete a relevant content knowledge assessment. The Mathematics Knowledge for Teaching (MKT)[2] assessments are well-established instruments with several content strands to choose from in order to closely match program requirements. The various instruments have undergone rigorous testing and have produced data that is valid and reliable. The MKT instruments were designed to measure content knowledge and pedagogical content knowledge, necessary components for effective mathematics teaching. The EMA content knowledge assessment was composed of items from two MKT forms, Spring 2006 EQ-NCOP and Winter 2008 Geometry. The items asked questions about number concepts and operations and geometry. The MS/HS Institute content knowledge assessment included items from three MKT forms: Winter MS-2006, Winter GEO-2008, and Winter PDS-2008. These items focused on patterns, functions, and algebra; geometry; and data, probability, and statistics. Since the assessments were hybrids combining items from several forms, the scores could not be transformed into IRT scores like in previous years because whole scales were not used. Therefore, the number of items correct and the percentage correct were used for this year's analysis.

Paper copies of these assessments were administered as a pretest at the first sessions for EMA and MS/HS Institute activities and as a posttest at the conclusion of the school year activities. The number of correct responses was compared over time from pretest to posttest. A total of 64 EMA participants out of 98 participants completed both a pretest and posttest for a response rate of 65%. Of the 89 MS/HS Institute participants, 74 completed both a pretest and posttest for a response rate of 83%.

End-of-Course Evaluations. For this reporting period, end-of-course evaluations for EMA and MS/HS Institute were analyzed. At the final scheduled session, participants were given an end-of-course evaluation asking them to rate their experience pertaining to quality of the workshop, preparation of the instructor(s), level of engagement, ability to ask questions, usefulness and clarity of information, and how well the stated goals were met. These items were rated on a 5-point rating scale where 1 = poor, 2 = below average, 3 = average, 4 = above average, and 5 = excellent.

Also, participants were asked to indicate the degree to which they agreed with a number of statements about support at their school and/or district, new learning, application of strategies, future participation, and intent to implement what they learned. These items were rated on a 5-point scale where 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree.

In addition to these items, participants were asked to respond to open-ended questions regarding:

- What they liked best about the institute;
- What recommended changes they would make to improve the institute;
- The impact the institute would have on their classroom, school, and/or district;
- What supports they would need to implement these new approaches; and
- How they would describe the session to their colleagues.

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

Teacher Surveys. NMPDS participating teachers were asked to complete a retrospective pretest/posttest-teacher survey at the conclusion of the EMA and MS/HS Institute sessions. The same instrument was used for both EMA and MS/HS Institute. For EMA, 75 out of 98 participants (77%) across all locations completed the teacher survey at the end of their last session in either June or July 2014. Of the 89 participants in the MS/HS Institute, 77 participants (87%) completed the teacher survey at the end of their last session in June 2014. EMA and MS/HS Institute teacher surveys were analyzed together to examine the impact of the NMPDS program as a whole, and they also were analyzed separately to see if EMA and MS/HS Institute participants reported different changes.

The teacher survey included questions about participant's educational background, teaching certification, and teaching experience. Teachers were asked to rate on a 5-point scale, where 1 = no emphasis, 3 = moderate emphasis, and 5 = complete emphasis, the degree specific topics were emphasized during the professional development activities in which they participated. The survey contained questions assessing teacher opinions regarding effective mathematics instruction and learning that were rated on a 5-point scale where 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. Questions regarding teacher preparedness to utilize several instructional strategies and to instruct students with diverse needs were rated on a 5-point scale where 1 = not well prepared, 2 = somewhat prepared, 3 = moderately prepared, 4 = well prepared, and 5 = very well prepared. Teachers also were asked to rate their confidence in their mathematical knowledge using a 5-point response scale, where 1 = not confident, 2 = somewhat confident, 3 = moderately confident, 4 = very confident, and 5 = extremely confident.

The teacher survey items have been analyzed in previous years for construct validity; thus, the internal reliability of the scaled items was confirmed using Cronbach's alpha.[3] Scales and subscales with acceptable reliability were retained for the analysis. Exhibit 4 presents the reliability results for scaled items with internal reliability greater than .70. The survey section about opinions regarding effective mathematics instruction and learning was analyzed at the item level.

EXHIBIT 4. TEACHER SURVEY SUBSCALE RELIABILITY ANALYSIS

Construct Being Measured	Number of Items	Cronbach's Alpha
Overall Preparedness	**15**	**.916**
Preparedness to Teach Mathematics	10	.872
Preparedness to Meet Needs of All Students	5	.814
Confidence in Teaching	**4**	**.839**
Impact of NMPDS on Teaching Ability	**7**	**.934**

[3] Cronbach's alpha (α) is a measure of the reliability or internal consistency of a composite measure or scale that is based on multiple survey items. Values range from 0 to 1.

Exhibit 5 summarizes the number of completed assessments and completion rates for each assessment administered to EMA and MS/HS Institute participants.

EXHIBIT 5. NUMBER OF COMPLETED ASSESSMENTS

Assessment	Number of Completed Assessments	Completion Rate
EMA (*n* = 98)[4]		
Teacher Survey	75	77%
Pretest Content Knowledge Assessment	98	100%
Posttest Content Knowledge Assessment	75	77%
Pretest/Posttest Matched Pairs	*64*	*65%*
End of Course Evaluation	72	73%
MS/HS Institute (*n* = 89)		
Teacher Survey	77	87%
Pretest Content Knowledge Assessment	86	97%
Posttest Content Knowledge Assessment	77	87%
Pretest/Posttest Matched Pairs	*74*	*83%*
End of Course Evaluation	70	79%

ANALYSIS

Retrospective pretest/posttest teacher survey data were analyzed using paired-samples *t* tests[5] to determine if any statistically significant changes occurred in teacher opinions or attitudes over time. Content knowledge data were analyzed using the U.S. Department of Education MSP supplied *t* test program to examine changes over time in teacher knowledge. Using Cohen's *d,*[6] effect sizes[7] were reported for any statistically significant differences revealed for the subscales and individual items analyzed using parametric statistics.

Survey and end-of-course evaluation forms were analyzed using descriptive statistics when appropriate. Statistical results presented in this report should be interpreted with some caution. While steps were made to reduce the probability of committing a Type 1 error (finding significant differences when there are no differences) by combining scale items when appropriate, this type of error increases with each analysis. Since there were numerous statistical analyses conducted for this report using *t* tests, programmatic decisions should be made only after triangulating findings.

Qualitative results were analyzed using data summaries and matrices, and analysis was undertaken using techniques and principles recommended by Miles, Huberman, and Saldana (2013)[8] with data from focus group interviews, project staff interviews, and observations provided to complement the analysis where appropriate.

[4] *N* is the total number in a sample. *n* is the number in a subsample.
[5] A *t* test is a statistical procedure that commonly used to examine differences in mean values over time or across two groups.
[6] Cohen's *d* is a measure of effect size, designed to measure the magnitude of treatment effect. Traditionally these effect sizes are measured as "small, *d* = .2," "medium, *d* = .5," and "large, *d* = .8."
[7] Effect size (ES) is a name given to a family of indices that measure the magnitude of a treatment effect, represented by differences in outcomes across groups. Unlike significance tests, these indices are independent of sample size.
[8] Miles, Huberman, and Saldana (2013). *Qualitative data analysis: An expanded sourcebook (3rd ed).* Thousand Oaks, CA: Sage.

FINDINGS

This section presents a summary of findings based on evaluation data collected from September 2013 through July 2014. NMPDS professional development activities are presented first including findings from end-of-course evaluations and teacher surveys indicating topical emphasis of NMPDS professional development activities. Next, findings related to the analysis of change in NMPDS teachers' mathematics content knowledge over time in addition to an analysis of teacher survey data to identify teacher perceptions regarding confidence in mathematics knowledge are presented. An analysis of how mathematics learned through NMPDS activities was transferred into participants' classrooms is included using findings from teacher surveys and participant focus groups. Next, the extent to which NMPDS activities fostered interaction among mathematics teachers, which contributed to effective PLCs and a collaborative statewide network of educators is presented along with participant ratings of professional interactions. The findings section concludes with a discussion of factors that facilitated and impeded progress.

NMPDS PROFESSIONAL DEVELOPMENT ACTIVITIES

NMPDS PROFESSIONAL DEVELOPMENT ACTIVITIES

Between January 2014 and July 2014, Nebraska teachers participated in a variety of professional development experiences in mathematics as part of the NMPDS activities. Both EMA and MS/HS Institute offered six sessions spaced throughout the time period at three sites for EMA and four sites for MS/HS Institute around the state. Participants were assigned to attend the site closest to their school district which assisted in keeping the number of participants relatively equal at each of the sites.

Unlike previous grant periods where all applications were accepted, no more than 100 participants for either EMA or MS/HS Institute were accepted to participate during the year from the 300 applicants. Each participant needed to adhere to established criteria of schools not meeting federal and/or state accountability student achievement status for mathematics, which included adequate yearly progress (AYP), free and reduced lunch (FRL), and low performing results on the NeSA mathematics test. Principals also needed to give written permission for those participants selected to attend the sessions, to which substitute expenses would be reimbursed by the grant.

Each participant had seven hours of professional development for each of the six scheduled sessions for a total of 42 hours. Participants implemented one or more of the activities into their classroom during the four sessions held during the school year which involved one hour of preparation, one hour of implementation and one hour to write a reflection of the activity's impact on their students, adding an additional 12 hours. Additional STEM sessions were offered in July 22-24 in Kearney at ESU 10 for all participants for another 18 hours. Attendance at the NATM conference, September 29, 2014, added an additional 8 hours for the total of 80 hours offered during the 2013-2014 NMPDS professional development. The sites, dates, and number of participants for all NMPDS activities are identified in Exhibit 6.

EXHIBIT 6. MATHEMATICS NMPDS PROFESSIONAL DEVELOPMENT ACTIVITIES

NMPDS Activity	Location	Institute Dates	Number of Participants
EMA	Kearney at ESU 10	January 14, 2014 February 12, 2014 March 11, 2014 April 9, 2014 June 12-13, 2014	50
EMA	Norfolk at Lifelong Learning Center	January 22, 2014 February 7, 2014 March 4, 2014 April 14, 2014 June 19-20, 2014	17
EMA	Omaha at ESU 3	January 31, 2014 February 24, 2014 March 14, 2014 April 25, 2014 July 10-11, 2014	31
MS/HS Institute	North Platte at ESU 16	January 27, 2014 February24, 2014 March 24, 2014 April 28, 2014 June 11-12, 2014	15
MS/HS Institute	Kearney at ESU 10	January 28, 2014 February 25, 2014 March 25, 2014 April 29, 2014 June 9-10, 2014	19
MS/HS Institute	Norfolk at Lifelong Learning Center	January 29, 2014 February 26,2014 March 26, 2014 April 30, 2014 June 23-24, 2014	22
MS/HS Institute	Omaha at ESU 3	January 30, 2014 February 27, 2014 March 27, 2014 May 1, 2014 June 25-26, 2014	33

The theme for the 2013-2014 sessions was *Math Standards and Practices for 21st Century Teaching and Learning* with concentration in the focus areas of: Nebraska State Mathematics Standards and Standards for Mathematical Practices; content areas of algebra, geometry, data analysis, and probability; strategies to integrate science, technology, engineering, and mathematics (STEM) into the classroom; and development of mathematical concepts through problem solving, representation, reasoning, communication, and connections.

Attendance at the various locations varied throughout the year. Sometimes weather was a factor, but participants could participate in the missed session through a previously recorded session. Only 60% and 61% of EMA and MS/HS Institute participants, respectively, attended all of the scheduled sessions during the academic year for NMPDS. The sessions scheduled for July 22-24 yielded only 10% of the

combined EMA and MS/HS Institute participants in attendance, with more representation from the participants from the MS/HS Institute.

There were between 19 and 35 participants at the observed professional development sessions, with predominately more females in attendance. Each site set up the classroom with tables and chairs to accommodate four to five participants per table. Everyone could view the large group presentations and work with either a shoulder partner or across the table as a small, interactive group. Two instructors consistently facilitated all of the EMA sessions while various instructors facilitated the MS/HS Institute sessions. One ESU-CC person attended all of the NMPDS sessions and one ESU site person attended the sessions to address logistical concerns.

Each set of instructors at the various locations worked well together as a coherent and cohesive team who brought complimentary skills into the learning environment in order to provide learning opportunities for all participants. Instructors utilized a structured teaching approach that included presenting information, assigning tasks, and providing feedback. They also employed guided discovery and questioning strategies to facilitate and model implementation of activities into classrooms with students. Participants engaged regularly in a combination of whole class and small group collaborative learning opportunities that emphasized content-specific and developmentally appropriate classroom activities designed to enhance various curriculums and to illustrate a variety of different strategies and approaches to solve problems. Content was intertwined in the sessions to reinforce the interdisciplinary aspect of mathematics and the Nebraska standards for mathematics. Mathematical instruction was reinforced through the consistent use of the Standards for Mathematical Practices.

Participants in focus groups across NMPDS activities summarized their professional development sessions with the following statements:

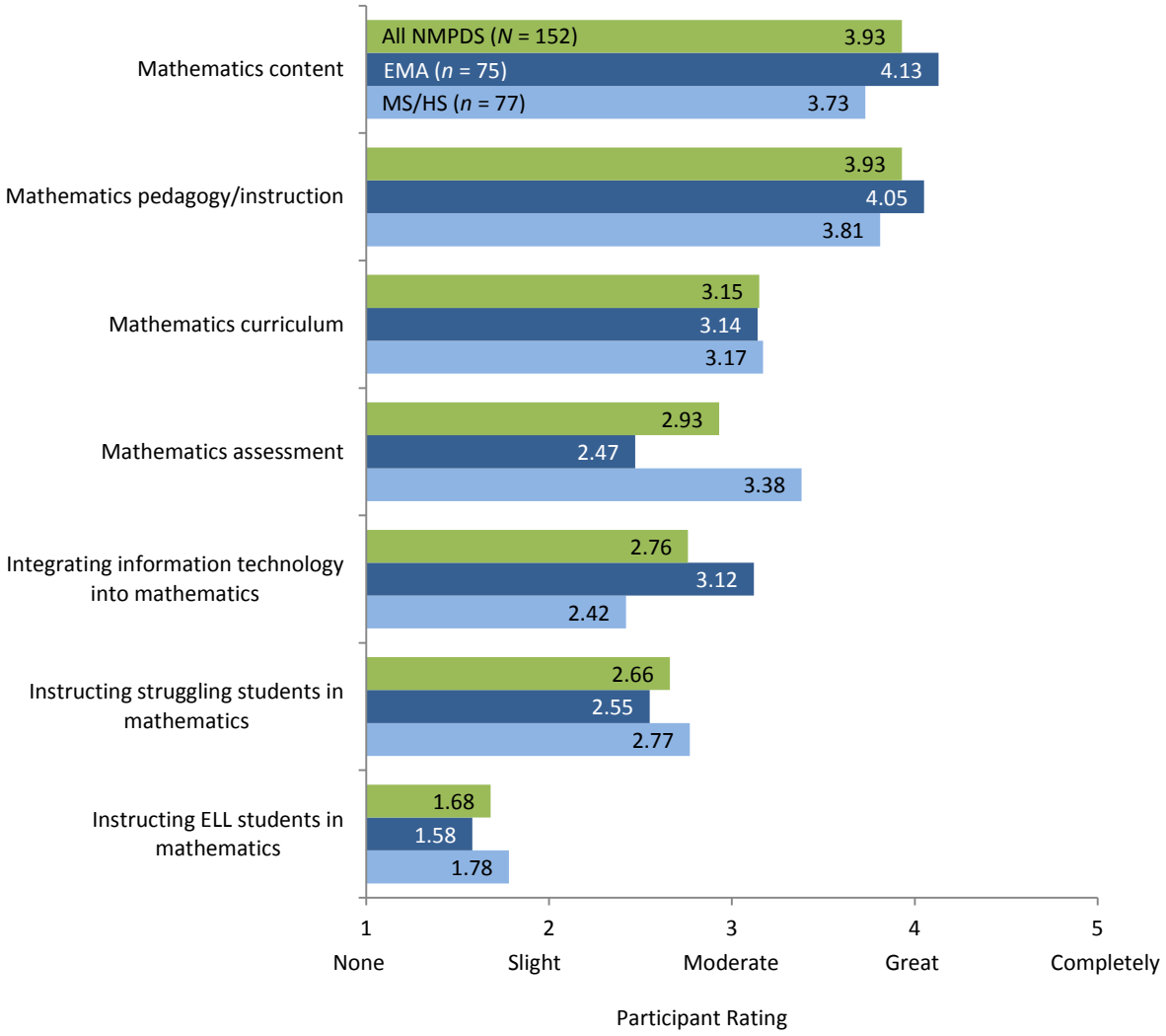
> *There are lots of other professional developments going on in districts, but these sessions give us the chance to talk to peers, try activities in classrooms, and talk about how the activity went with the students. This is one of the strongest pieces of the professional development.*
>
> *The project only discusses mathematics where other professional development sessions talk about general topics. Here, it is math teachers talking about math topics and what is happening in our classrooms.*
>
> *The project helps you to think outside of the box. I like trying things in the workshop and then trying them in class with my students.*
>
> *An administrator at school is keeping track of MAP scores and realized that 75% of my students improved, including the lower level students. He asked what could be attributed to their improvement, and I believe it is NMPDS and the activities we do with students.*

Topical Emphasis of Professional Development Activities

The teacher survey collected participant ratings for the degree to which NMPDS professional development activities emphasized mathematical topics. Exhibit 7 displays the ratings and shows that NMPDS activities overall placed between moderate and great emphasis on *mathematics content*, *mathematics pedagogy/instruction*, and *mathematics curriculum*. Both EMA and MS/HS Institute

participants rated the emphasis on *instructing struggling students in mathematics* between slight emphasis and moderate emphasis. The area with slight to no emphasis for both EMA and MS/HS Institute participants involved *instructing ELL students in mathematics*. EMA and MS/HS Institute participants rated differently the extent to which NMPDS activities emphasized *integrating information technology into mathematics* and *mathematics assessments*.

EXHIBIT 7. PARTICIPANT RATINGS OF TOPICAL EMPHASIS OF PROFESSIONAL DEVELOPMENT ACTIVITIES

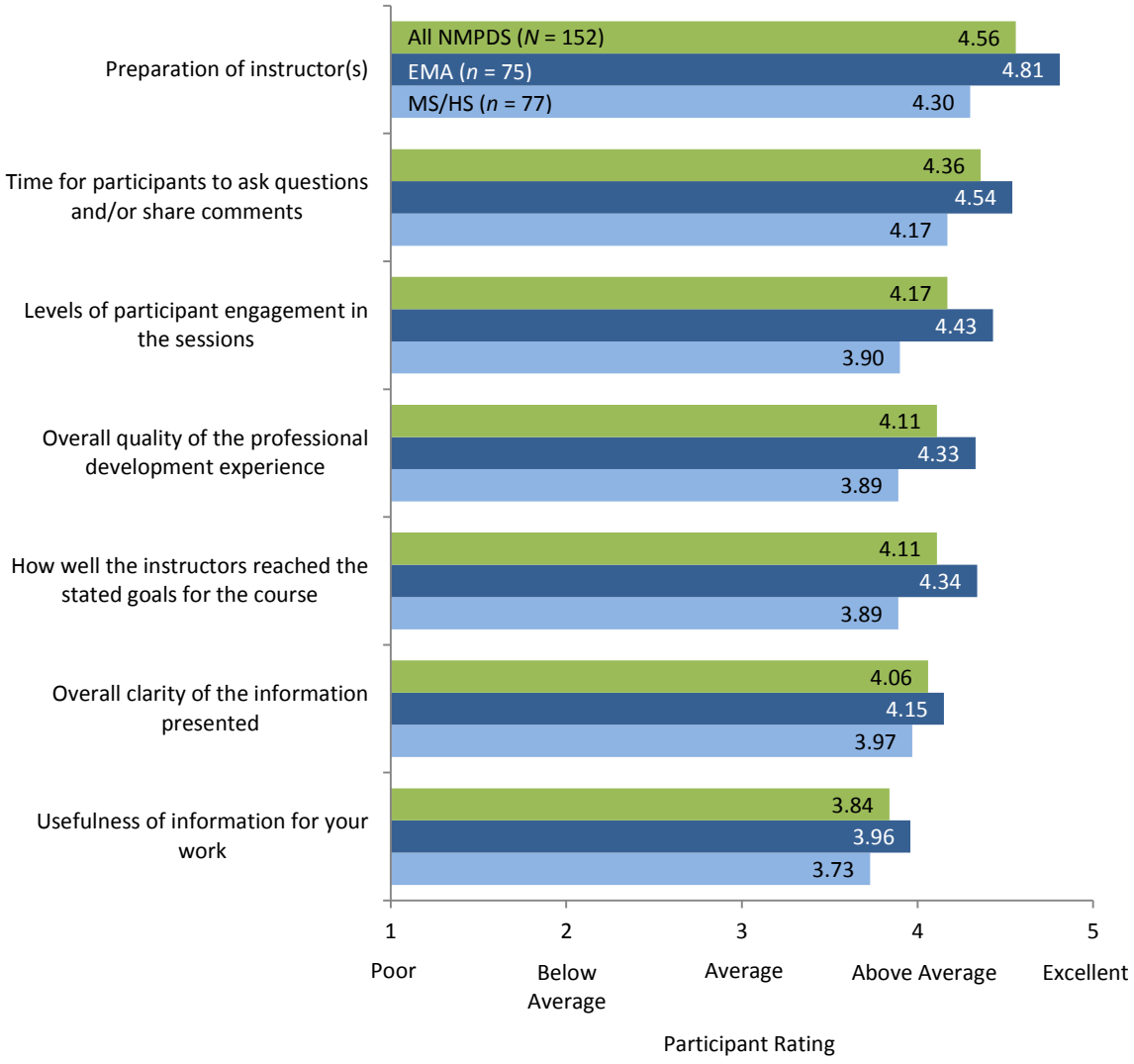


RATINGS OF SESSION CONTENT, INSTRUCTION, AND UTILITY

All NMPDS participants were asked to complete an end-of-course evaluation at the conclusion of their EMA or MS/HS Institute activities. In total, 142 participants across the three locations of EMA and the four locations of MS/HS Institute completed the evaluation. Teachers rated the quality of course content and instruction using a 5-point scale with a rating of 1 indicating poor and a rating of 5 indicating excellent. Exhibit 8 presents the mean ratings and shows NMPDS participants rated majority of the items between above average and excellent in quality. All participants indicated that the *preparation of the instructors(s)* was nearing excellent. EMA and MS/HS Institute participants rated the *engagement*

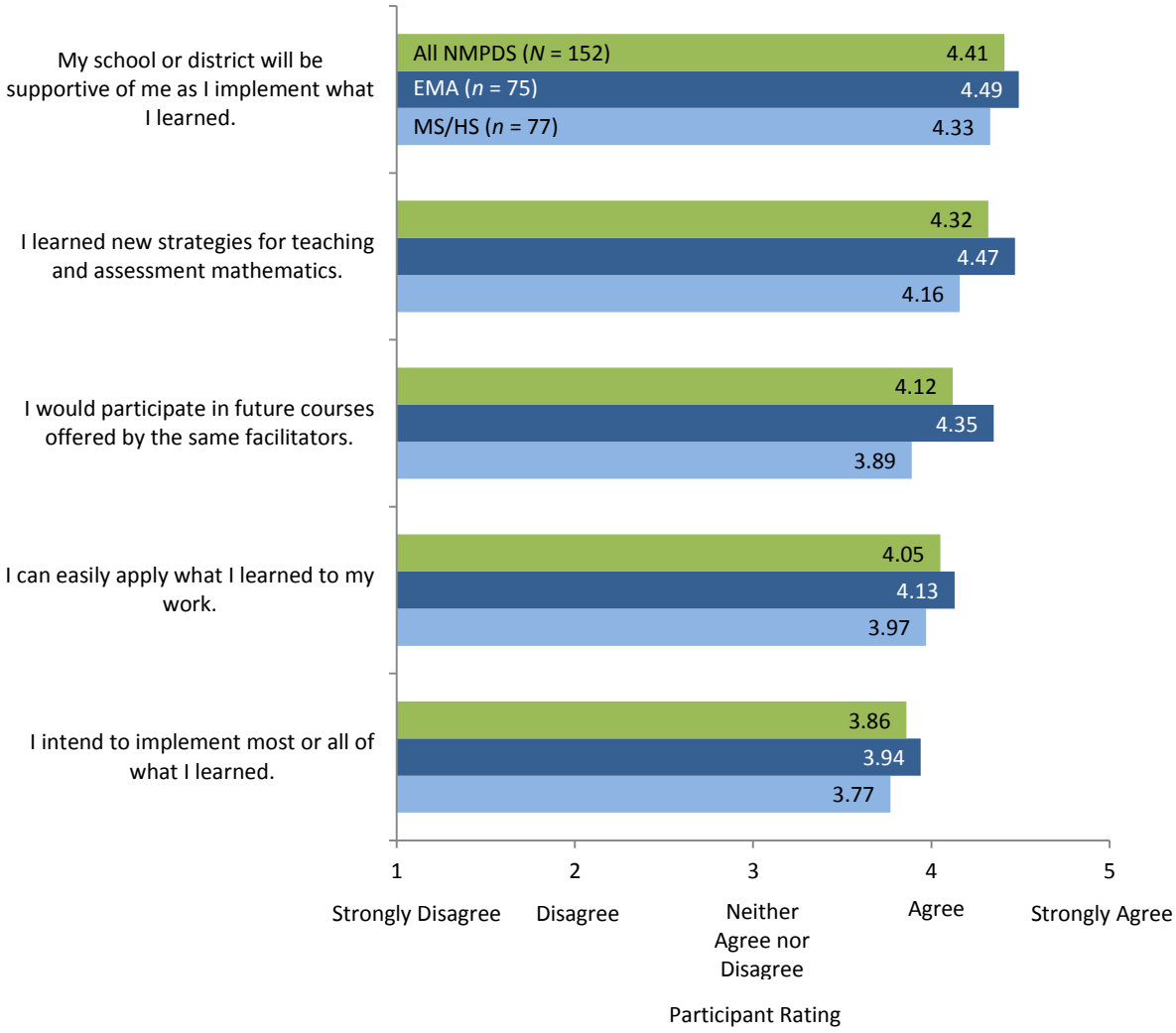
level of participation, *overall quality of professional development experience*, and *instructors reaching stated goals* differently with EMA participants rating their experiences higher.

EXHIBIT 8. END-OF-COURSE EVALUATION RATINGS OF NMPDS SESSION CONTENT AND INSTRUCTION



Aspects of session utility were rated on a 5-point scale with 1 indicating strong disagreement and 5 indicating strong agreement to statements. Exhibit 9 shows that NMPDS participants were in agreement with most statements about session utility. EMA and MS/HS Institute participants agreed that their *school or district will be supportive as they implement what they learned* and *they learned new strategies for teaching and assessing mathematics*.

EXHIBIT 9. END-OF-COURSE EVALUATION RATINGS OF NMPDS SESSION UTILITY



NMPDS PARTICIPANT COMMENTS

WHAT PARTICIPANTS LIKED BEST

Participants across all professional development activities were asked what they liked best about sessions on end-of-course evaluations through open-ended questions as well as in focus groups with randomly selected participants. EMA participants overwhelming stated the hands-on activities were beneficial to them to understand mathematical concepts at various levels. Through the support of the knowledgeable instructors in an atmosphere of collaboration, participants believed their own mathematics content and pedagogy increased from their active involvement in the professional development sessions. MS/HS Institute participants stated collaborative networking was the strength of their sessions. Networking with teachers from other districts provided many opportunities for thought-provoking discussions to improve their instruction. The resources from the sessions helped MS/HS Institute participants envision the application of mathematical practices into their classrooms.
As a result of the sessions, NMPDS participants commented they were becoming more flexible in their approaches to problem solving which was impacting their students' learning. They consciously were

thinking about their instruction using mathematical practices and academic vocabulary in teaching mathematical concepts to students. Many stated that the hands-on activities engaged their students in learning concepts at a deeper level than their school or district curriculum required.

What Should Be Changed

Participants from EMA and MS/HS Institute offered different suggestions to improve the professional development sessions. EMA participants stated the activities needed to be specifically aligned to the Nebraska mathematics standards with a grade level assignment to help in implementation into their school and district curriculum. EMA participants stated they could benefit from detailed, written instructions for the sessions' activities to assist them later to effectively implement the activities into their classrooms. MS/HS Institute participants requested more technology topics be inserted into the sessions along with quick activities that can be implemented immediately into the classrooms to engage learners. Both set of participants requested that materials be available through a central website for a longer period of time.

Both EMA and MS/HS Institute participants suggested logistical changes for the project. The sessions should be offered throughout the school year rather than the second semester in order to implement activities with the students for greater impact. There were suggestions for a site in western Nebraska or videotaping classes to involve others who are not able to travel to the NMPDS sites. Overview of the sessions and reminder emails for the upcoming sessions were also mentioned as logistical items that would benefit the project in the coming years.

How to Describe the Institute

When asked how they would describe NMPDS to others, it was evident from the comments that most participants enjoyed the experience and benefited from attending NMPDS professional development sessions. Some of the descriptive words used by the participants included: *engaging, thought provoking, challenging, rigorous, useful, enhancing, informative, relevant, worthwhile,* and *collaborative.* Many referenced the fun experience they encountered in the sessions with other teachers and the knowledgeable instructors. Some described that they were rethinking their instructional techniques to be more student driven.

Development of Teacher Content Knowledge

Elementary Mathematics Academy

Exhibit 10 displays the performance of EMA participants on the content knowledge assessment as a whole as well as the two subscales. Of the 64 EMA participants who completed both the pretest and posttest content knowledge assessment, 41 participants demonstrated a statistically significant gain in overall content knowledge; 52 teachers (81%) had a significant gain on the Number Concept and Operations subscale; and 39 teachers (61%) had a significant gain on the Geometry subscale. As a whole group, EMA participants demonstrated statistically significant increases in scores from pretest to posttest on the overall assessment and on each of the two subscales, with moderate to large effect sizes.

Exhibit 10. EMA Participant Content Knowledge (*N* = 64)

	Number of Teachers With Significant		Pretest		Posttest				
Scale/Subscale	Gains	Possible Range	Mean	*SD*	Mean	*SD*	Mean Difference	*t*	Cohen's *d*
EMA Content Knowledge Assessment	**41**	**0 - 27**	**14.13**	**4.88**	**16.56**	**4.73**	**2.43**	**6.38*** **	**0.51**
Number Concepts and Operations	52	0 - 20	9.55	3.18	13.30	3.62	3.75	12.51***	1.10
Geometry	39	0 - 7	2.80	1.66	3.53	1.60	0.73	3.47***	0.45

Note. Bold text indicates overall scale. ***$p < .001$.[1]

MS/HS Institute

Exhibit 11 presents the performance of MS/HS Institute participants on their content knowledge assessment. Of the 74 participants who completed both the pretest and posttest content knowledge assessment, 28 participants (38%) demonstrated a statistically significant gain on the overall content knowledge assessment; 38 participants (51%) showed a significant increase on the Patterns, Functions and Algebra subscale, and 25 participants (33%) had a statistically significant increase on the Geometry subscale. No individual teacher had a statistically significant increase on the Data, Probability, and Statistics subscale. As a group, participants showed a statistically significant increase in scores from pretest to posttest on the whole assessment and also on one of the Patterns, Functions, and Algebra subscale; however the effect sizes were small. The average group increases on the Geometry and Data, Probability, and Statistics subscales were not statistically significant.

[1] The *p*-value is an indicator that represents the likelihood that observed results occurred by chance. In education research, values of $p < .05$ (i.e., values indicating that observed results had a less than 5% chance of occurring by chance) are typically used to identify results that are statistically significant. Lower *p*-values indicate a smaller likelihood that observed results occurred by chance and are therefore associated with statistically significant findings.

EXHIBIT 11. PARTICIPANT CONTENT KNOWLEDGE FOR MS/HS INSTITUTE (*N* = 74)

Scale/Subscale	Number of Teachers With Significant Gains	Possible Range	Pretest Mean	Pretest *SD*	Posttest Mean	Posttest *SD*	Mean Difference	*t*	Cohen's *d*
Middle/High School Content Knowledge Assessment	**28**	**0 - 28**	**16.19**	**3.56**	**17.24**	**3.91**	**1.05**	**-3.70*** **	**0.28**
Patterns, Functions, and Algebra	38	0 - 15	9.47	2.11	10.20	2.31	0.73	-3.29**	0.33
Geometry	24	0 - 5	2.77	1.10	2.96	1.03	0.19	-1.47	---
Data, Probability & Statistics	0	0 - 8	3.95	1.47	4.08	1.51	0.13	-0.80	---

Note. Bold text indicates overall scale. ***$p < .001$. ** $p < .01$.

TEACHER CONFIDENCE

A portion of the teacher survey asked participating teachers to rate how confident they perceived themselves to be with regards to teaching mathematics. Four items formed the Confidence in Teaching scale. Exhibit 12 displays participants' mean ratings. After NMPDS activities, participants indicated they were very confident in their overall confidence in their mathematical knowledge, a statistically significant increase from their ratings prior to participation. In looking at the two groups separately, EMA and MS/HS Institute participants exhibited similar statistically significant increases, with EMA participants indicating a larger increase in their confidence in comparison to MS/HS Institute participants. Effect sizes ranged between moderate and very large.

EXHIBIT 12. CHANGE OVER TIME IN PARTICIPANT CONFIDENCE - SCALES

Confidence in Teaching	*N*	Prior to Participation Mean	Prior to Participation *SD*	At the Conclusion Mean	At the Conclusion *SD*	Mean Difference	Cohen's *d*
All NMPDS Participants	152	3.45	0.71	3.99	0.58	0.54***	0.83
EMA Participants (*n* = 75)		3.22	0.71	3.92	0.57	0.70***	1.09
MS/HS Institute Participants (*n* = 77)		3.68	0.63	4.06	0.59	0.38***	0.62

Note. Responses were rated on a 5-point scale where 1 = Not at All Confident, 2 = Somewhat Confident, 3 = Moderately Confident, 4 = Very Confident, and 5 = Extremely Confident. ***$p < .001$.

The Appendix contains a table (Exhibit A9) showing all NMPDS participants', EMA participants', and MS/HS Institute participants' ratings for each item utilized to assess teacher confidence. The findings reveal that participant ratings increased over time at statistically significant levels for each item.

Impact on Classroom Practice

Teacher Preparedness

A section of the teacher survey asked participants to rate their level of preparedness to teach and meet the needs of all students as shown in Exhibit 13. Fifteen items formed the Overall Preparedness scale and condensed into two subscales: Preparedness to Teach Mathematics (10 items) and Preparedness to Meet the Needs of All Students (5 items). Participants indicated they were moderately prepared prior to NMPDS activities and were closer to well prepared at the conclusion of activities for each scale or subscale. These increases in preparedness were statistically significant with moderate to large effect sizes. EMA participants had slightly larger increases in preparedness compared to MS/HS Institute participants.

Exhibit 13. Change Over Time in Participants' Preparedness to Teach Scales

		Prior to Participation		At the Conclusion		Mean	Cohen's
Measure	*N*	Mean	*SD*	Mean	*SD*	Difference	*d*
Overall Preparedness							
All NMPDS Participants	152	3.23	0.58	3.78	0.52	0.55***	1.00
EMA Participants (*n* = 75)		3.21	0.63	3.82	0.55	0.61***	1.03
MS/HS Institute Participants (*n* = 77)		3.26	0.52	3.75	0.50	0.49***	0.96
Preparedness to Teach Mathematics							
All NMPDS Participants	152	3.32	0.59	3.85	0.53	0.53***	0.95
EMA Participants (*n* = 75)		3.28	0.64	3.86	0.56	0.58***	0.96
MS/HS Institute Participants (*n* = 77)		3.35	0.54	3.84	0.51	0.49***	0.93
Preparedness to Meet Needs of All Students							
All NMPDS Participants	152	3.16	0.66	3.53	0.66	0.37***	0.56
EMA Participants (*n* = 75)		3.14	0.70	3.56	0.70	0.42***	0.60
MS/HS Institute Participants (*n* = 77)		3.18	0.61	3.50	0.61	0.32***	0.52

Note. Responses were rated on a 5-point scale where 1 = Not at All Prepared, 2 = Somewhat Prepared, 3 = Moderately Prepared, 4 = Well Prepared, and 5 = Very Well Prepared. Bolded text indicates scale. ***$p < .001$.

The Appendix contains a table (Exhibit A10) presenting changes in ratings over time for each of the 15 preparedness items. In general, participants showed statistically significant increases in ratings over time for each item with effect sizes ranging from small to large.

Impact of NMPDS on Teaching Ability

The teacher survey asked teachers to rate the extent to which their participation in NMPDS influenced their teaching ability. The questions focused on the teacher's ability to craft and respond to questions; to adjust their mathematical classes to all students; to gauge the varying levels of comprehension; and to apply mathematical practices to classroom instruction. A total of 7 items formed the Impact of NMPDS on Teaching Ability scale. As Exhibit 14 shows, participants indicated their participation in NMPDS moderately influenced their teaching ability. EMA teachers more often than MS/HS teachers said the program moderately impacted their teaching ability. As a whole group, teachers reported that

NMPDS had the greatest impact on their ability to apply mathematical practices to classroom instruction. Item results are included in the Appendix in Exhibit A11.

EXHIBIT 14. IMPACT OF NMPDS ON TEACHING ABILITY

Impact of NMPDS on Teaching Ability	*N*	*M*	*SD*
All NMPDS Participants	152	3.69	0.79
EMA Participants (*n* = 75)		3.87	0.76
MS/HS Institute Participants (*n* = 77)		3.51	0.78

Note. Responses were rated on a 5-point scale where 1 = Not Well, 2 = Somewhat, 3 = Moderately, 4 = Well, and 5 = Very Well.

TEACHER OPINIONS REGARDING MATHEMATICS INSTRUCTION

Exhibit 15 presents participant ratings of agreement with several statements related to mathematics teaching and learning. Six of the statements reflect traditional ideas of teaching and learning while four of the statements reflect progressive ideas of teaching and learning. NMPDS participants decreased in their level of agreement with each of the six traditional teaching statements, all at statistically significant levels. The largest decreases in agreement were found for the following statements: *students generally learn mathematics best in classes with students of similar abilities* and *students master and retain mathematical algorithms more efficiently through repeated practice than through the use of applications and simulations*. Ratings of agreement by NMPDS participants on each of the four progressive teaching statements increased at statistically significant levels. Effect sizes were small to medium. At the conclusion of NMPDS activities, participants had strongest agreement with the statements: *there are different ways to solve most mathematical problems* and *it is important for student learning to make connections between mathematics and other subject areas*.

EXHIBIT 15. CHANGE OVER TIME IN PARTICIPANTS' PHILOSOPHY ON TEACHING AND LEARNING MATHEMATICS

		Prior to Participation		At the Conclusion			
Item	*N*	Mean	*SD*	Mean	*SD*	Mean Difference	Cohen's *d*
Traditional Statements							
Students generally learn mathematics best in classes with students of similar abilities.							
All NMPDS Participants	152	2.87	1.01	2.64	1.05	-0.41***	-0.39
EMA Participants (*n* = 75)		2.75	1.12	2.57	1.17	-0.18	-0.16
MS/HS Institute Participants (*n* = 77)		2.99	0.88	2.70	0.92	-0.29***	-0.32
Students master and retain mathematical algorithms more efficiently through repeated practice than through the use of applications and simulations.							
All NMPDS Participants	151	2.83	1.02	2.42	1.07	-0.41***	-0.39
EMA Participants (*n* = 74)		2.86	0.98	2.41	1.11	-0.45***	-0.43
MS/HS Institute Participants (*n* = 77)		2.81	1.06	2.44	1.05	-0.37***	-0.35
Learning mathematics mainly involves memorizing.							
All NMPDS Participants	152	2.42	0.97	2.07	0.88	-0.35***	-0.38
EMA Participants (*n* = 75)		2.61	1.04	2.19	1.01	-0.42***	-0.41
MS/HS Institute Participants (*n* = 77)		2.23	0.87	1.96	0.72	-0.27***	-0.34

Item	*N*	Prior to Participation Mean	Prior to Participation *SD*	At the Conclusion Mean	At the Conclusion *SD*	Mean Difference	Cohen's *d*
It is important for students to learn basic mathematics skills before solving problems.							
All NMPDS Participants	152	3.56	0.93	3.24	1.09	-0.32***	-0.32
EMA Participants (*n* = 75)		3.43	0.96	3.12	1.15	-0.31***	-0.29
MS/HS Institute Participants (*n* = 77)		3.69	0.88	3.36	1.03	-0.33***	-0.34
Few new discoveries in mathematics are being made.							
All NMPDS Participants	152	2.55	0.83	2.31	0.94	-0.24***	-0.27
EMA Participants (*n* = 75)		2.56	0.81	2.28	1.07	-0.28~	-0.30
MS/HS Institute Participants (*n* = 77)		2.53	0.85	2.34	0.81	-0.20	-0.21
Mathematics should be learned as sets of algorithms or rules that cover all possibilities.							
All NMPDS Participants	152	2.97	0.91	2.75	1.04	-0.22***	-0.23
EMA Participants (*n* = 75)		2.99	0.88	2.96	1.19	-0.03	-0.03
MS/HS Institute Participants (*n* = 77)		2.96	0.94	2.55	0.84	-0.41***	-0.46
Progressive Statements							
Solving mathematics problems often involves making conjectures, testing, and modifying findings.							
All NMPDS Participants	151	3.96	0.58	4.36	0.57	0.40***	0.70
EMA Participants (*n* = 74)		3.96	0.61	4.42	0.58	0.46***	0.77
MS/HS Institute Participants (*n* = 77)		3.96	0.55	4.30	0.56	0.34***	0.61
There are different ways to solve most mathematics problems.							
All NMPDS Participants	152	4.26	0.69	4.63	0.62	0.37***	0.56
EMA Participants (*n* = 75)		4.20	0.74	4.65	0.69	0.45***	0.63
MS/HS Institute Participants (*n* = 77)		4.32	0.64	4.61	0.54	0.29***	0.49
It is important for student learning to make connections between mathematics and other subject areas.							
All NMPDS Participants	152	4.23	0.61	4.58	0.62	0.35***	0.57
EMA Participants (*n* = 75)		4.29	0.65	4.65	0.67	0.36***	0.55
MS/HS Institute Participants (*n* = 77)		4.17	0.57	4.51	0.55	0.34***	0.61
All students can learn challenging content in mathematics.							
All NMPDS Participants	151	3.78	0.89	4.12	0.81	0.34***	0.40
EMA Participants (*n* = 75)		3.68	0.96	4.12	0.85	0.44***	0.49
MS/HS Institute Participants (*n* = 76)		3.88	0.82	4.12	0.77	0.24***	0.30

Note. Responses were rated on a 5-point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, and 5 = Strongly Agree. ~$p < .10$; ***$p < .001$.

PERCEPTIONS OF PROGRESS

Based on responses from focus groups and end–of–course evaluations, NMPDS activities modeled problem-solving activities that emphasized various strategies and approaches that employed the Standards for Mathematical Practices. Participants acknowledged they increased their mathematics content knowledge as a result of the activities and discussions in the sessions. NMPDS influenced participants to develop purposeful questions to increase student engagement with the activities. Teachers, while aware the need to increase NeSA mathematics scores, acknowledge positive learning experiences can increase understanding of mathematics as well as student achievement.

> *I hope my students will have a better understanding of how to use math in the real world and have better problem solving skills.*

I am learning to work on my questioning techniques to help students see their mistakes rather than me just showing them where the mistake is.

I am seeing how math can be applied in different ways. I have a broader experience to help decide what is best for students in my classroom.
The sessions revitalize me when I return to the classroom. I am willing to try new things with the students.

Establishing Effective Professional Learning Communities and Building a Collaborative Statewide Network of Educators

Perceptions of Progress

Professional learning communities were not formally employed during the year because of the late start for the professional development sessions and the limited number of participants at each of the professional development sites. Many of the teachers participating in NMPDS were already considered teacher leaders for their school and district and were willing to work in groups without a formal structure of Teacher Leaders of Mathematics (TLM). Project leaders intentionally placed teachers into groups of same grade levels or different school groups in order to expand their communities of practice during the sessions and to place more responsibility on the smaller groups. According to project leaders, some teachers shared information they learned at the sessions with their schools and ESUs, continuing the community of learning at another level.

Instructors decided not to use *myeLearning* for communication or repository of resources. The support and trainers for the system was not available and the system did not always result in active participation by the teachers. Instructors employed wikis, Google docs, Dropbox, and emails to establish links for the participants. Networking between teachers and instructors continued in an informal manner on an as-needed basis.

"Math Champions" was also not a focus for this year for NMPDS. Project leaders would like to further develop this concept in the coming years of the grant. Each school district would designate one person as the "Math Champion" who would receive information directly from the Mathematics Coordinator for the state of Nebraska. This form of communication would help share current information as revisions are being made to the Nebraska state mathematics standards.

Facilitators and Barriers

Perceptions of Facilitators and Barriers to NMPDS Implementation

Facilitators

NMPDS is a well-developed project that provides teachers with professional development during the academic school year to impact their content and pedagogical content knowledge in order to improve mathematics learning for all students. The project capitalizes on collaboration and shared expertise with a cadre of ESU staff to assist with recruitment and site facilitation. There is a strong partnership with the NDE's director of mathematics who facilitated presentations at NMPDS sessions.

Many participants return year-after-year because of their perceived belief that the mathematics professional development does impact the achievement of their students. The teachers are trying more inquiry-based learning approaches and incorporating more problem solving activities into their classroom lessons. The strategies being modeled allow teachers to diversify for their classroom needs and increase connections for different learning styles.

BARRIERS

NMPDS lacked a mathematics project director during this first year of the grant. Additional responsibilities for the detail operations of the grant were delegated to personnel from ESU-CC and NDE. When leadership personnel were not aware of the operational requirements of the grant or the mathematics content and pedagogical knowledge, there were challenges in communication.

The project also had changes in leadership at the instructor level for the MS/HS Institute. The NDE mathematics director employed relationships with presenters throughout the United States to fill voids for the sessions. Also, the professional development sessions started later in the school year and continued into the summer, which participants did not understand they needed to attend.

Many teachers attended sessions to obtain activities that can be used immediately in their classrooms to introduce topics at a surface level in a short amount of time, often referenced as “activities for activity sake.” During two of the sessions, MS/HS Institute participants completed problems from the Shell Centre that required more attention to mathematics content and student misconceptions through the examination of student work and rubric scoring. Although some stated they valued the problems and learned about their students, other participants did not see the benefit of such activities for themselves or their students.

Teachers committed to attend the professional development sessions for NMPDS. Even though a principal’s signature was required on the acceptance form, the principals preferred master teachers to be in their classrooms. Since many of the participants were from struggling schools, obtaining the principal support was valuable, especially if their support was needed to address attendance issues

At the participant level, the biggest challenge was focused on time to make changes in their classrooms based on what they were learning in the sessions. Many stated there were so many great ideas and strategies that they had difficulty deciding which ones to place into their current curriculum for maximum effect. For some, their pacing guides do not allow for insertion of additional activities, especially if they are not aligned to the state mathematics standards. School technology is not always aligned to what is utilized during the NMPDS sessions.

CONCLUSIONS AND RECOMMENDATIONS

This section summarizes key finding from data collected during the period from January 2014 through July 2014, and then presents recommendations for the NMPDS project.

FINDINGS

- **NMPDS participants rated the overall quality of the professional development experiences between above average and excellent.** This can be attributed to their ratings for *overall clarity of information presented* (4.06) and *instructors reaching stated goals for course* (4.11). The level of participant engagement differed between EMA and MS/HS Institute for levels of participant engagement in the sessions with ratings of 4.33 and 3.89, respectively. Collectively, NMPDS participants indicated that the preparation of the instructor(s) was approaching "excellent." EMA participants overwhelming stated the hands-on activities were beneficial to understanding mathematical concepts. MS/HS Institute participants stated the collaborative networking was the strength of their sessions that helped to improve their instruction through the thoughtful discussions.

- **NMPDS participants rated the utility of the sessions above average.** *Mathematics content* and *mathematics pedagogy/instruction* were rated the highest topical emphasis with results at 3.93 on a 5-point scale. EMA and MS/HS Institute participants rated the extent to which NMPDS activities emphasized integrating technology and mathematics assessments differently, with EMA rating technology higher (3.12 on the 5-point scale) and MS/HS Institute rating mathematics assessment higher (3.38 on the 5-pont scale). Overall, NMPDS participants strongly agreed that their school or district would be supportive as they implemented what they learned from the sessions.

- **Over 60% of the EMA participants demonstrated a statistically significant gain the overall content knowledge.** Of the 64 EMA participants who completed both the pretest and posttest, 81% had a significant gain on the Number Concept and Operations subscale and 61% had a significant gain on the Geometry subscale. On each of these two subscales, there was moderate to large effect sizes.

- **Over one third of the MS/HS Institute participants demonstrated a statistically significant gain on the overall content knowledge.** Of the 74 participants who completed both the pretest and posttest, 51% showed a significant increase on the Patterns, Functions, and Algebra subscale with the subscale having a small effect size. On the Geometry subscale, 33% had a statistically significant increase but no effect size. No individual teacher had a statistically significant increase on the Data, Probability, and Statistics subscale.

- **NMPDS teachers' overall confidence in teaching significantly increased over time.** EMA participants indicated a larger increase in their confidence in comparison to MS/HS Institute participants. Effect sizes ranged between moderate and very large.

- **Teacher ratings of preparedness to teach mathematics increased after participation in NMPDS activities.** Participants indicated they were moderately prepared prior to NMPDS activities in the two subscales and were closer to well prepared at the conclusion of the activities. These increases were statistically significant with moderate to large effect size. Overall, all NMPDS participants rated *teaching mathematics to students who are English Language Learners* as somewhat prepared in the retrospective teacher survey.

- **NMPDS participants indicated their participation in professional development activities moderately influenced their teaching ability.** EMA teachers more often than MS/HS Institute teachers said the program moderately impacted their teaching ability. As a whole group, teachers reported that NMPDS had the greatest impact on their ability to apply mathematical practices to classroom instruction.

- **NMPDS participants showed changes in philosophy regarding traditional and progressive teaching and learning statements.** NMPDS participants decreased their level of agreement with all six traditional statements at statistically significant levels. The largest decreases were found in the two statements *students generally learn mathematics best in classes with students of similar abilities* and *students master and retain mathematical algorithms more efficiently through repeated practice than through the use of applications and simulations.* Ratings of agreement by NMPDS participants on each of the four progressive teaching statements increased at statistically significant levels with effect sizes of small to medium. The statement, *solving mathematics problems often involves making conjectures, testing, and modifying findings,* increased the most over time for the participants. Effect sizes for progressive statements were generally greater.

RECOMMENDATIONS FOR YEAR 2 OF GRANT

1. **Acquire a mathematics project director to oversee all phases of the grant.** This was an unusual year for the grant, operating without the benefit of a full-time project director. Everyone performed extra duties from acquiring facilitators to fulfilling participant requests. The project requires full attention to meet the requirements for the MSP at the state level. Without someone in this position, accountability becomes more reactive to the situations. A project director would coordinate with ESU-CC to fulfill logistical, participant, and facilitator needs.

2. **Establish procedures to allow participants to know their responsibilities for the sessions.** Attendance needs to be prioritized to eliminate the mindset that NMPDS participants can pick-and-choose activities to attend. Reminders of upcoming sessions can help participants and their principals be responsible in their attendance as well as participants completing necessary activities for discussion in upcoming sessions. Facilitators should give overview of the sessions throughout the year and align activities to Nebraska Standards for Mathematics.

3. **Illustrate instructional strategies that are effective to teach mathematics to students who are English language learners.** Ratings of preparedness at the conclusion of NMPDS activities revealed that EMA and MS/HS Institute participants were least prepared to teach mathematics to students who are English language learners. Emphasis on instructional strategies that strengthen mathematics instruction for all students will benefit NMPDS and participants in many ways.

4. **Expand success indicators to include use of student achievement data in mathematics.** With NeSA-M results available at a variety of different levels over a number of years, the success of NMPDS should consider expanding to show the influence teacher learning from the NMPDS project is having on student achievement. The evaluation of the project shows that the professional development has affected teacher content knowledge. It would be an appropriate time for student achievement to be linked to NMPDS.

APPENDIX

This section presents teacher characteristics including an examination of participant education, teaching certification, and teaching experience. Item level findings of the teacher survey items are then presented.

NMPDS Teacher Survey Demographic Data

Teacher Characteristics

The teacher survey asked participants about their participation in past NMPDS offerings. As Exhibit A1 shows, the majority of the 75 EMA participants who completed a teacher survey indicated that this was their first time in NMPDS. Less than half of the 77 MS/HS teachers who completed a teacher survey were new to NMPDS, with nearly one fourth indicating that they have participated in NMPDS for 5 to 6 years, not including this year's offerings.

Exhibit A1. NMPDS Past Participation

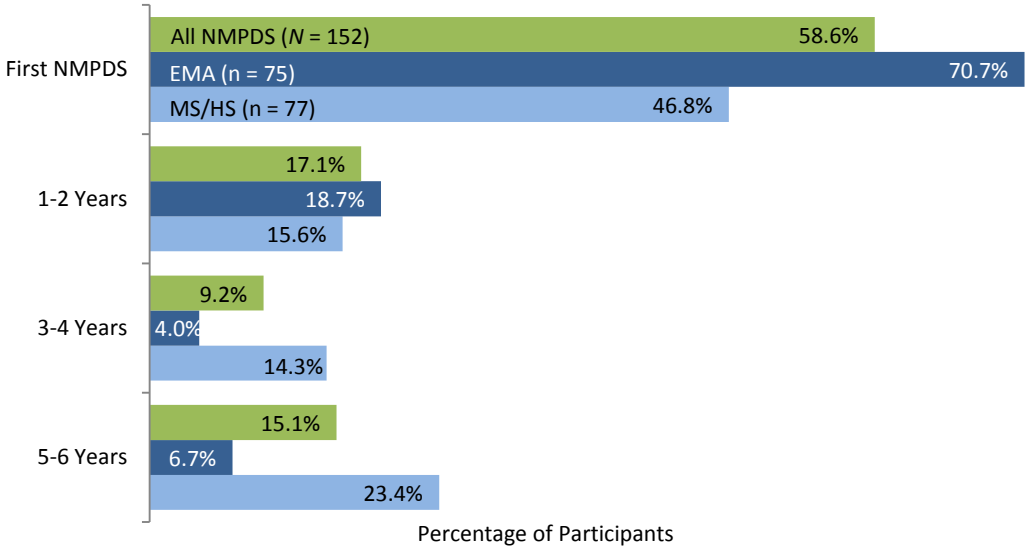


Exhibit A2 presents demographic data for the 152 NMPDS participants who completed teacher surveys. The majority of participants who completed a teacher survey were female and white.

Exhibit A2. NMPDS Participant Demographics

	All NMPDS (*N* = 152)		EMA (*n* = 75)		MS/HS Institute (*n* = 77)	
	n	Percentage	*n*	Percentage	*n*	Percentage
Gender						
Male	21	13.8	7	9.3	14	18.2
Female	131	86.2	68	90.7	63	81.8
Missing Response	0	0.0	0	0.0	0	0.0
Ethnicity						
White	149	98.0	74	98.7	75	97.4
Hispanic	1	0.7	0	0.0	1	1.3
African American	1	0.7	1	1.3	0	0.0
Other	1	0.7	0	0.0	1	1.3

Information about participants' level of education and certification is displayed in Exhibit A3. Over half of NMPDS participants (60%) reported earning advanced degrees. The majority of EMA participants (55%) minored in mathematics and two thirds of MS/HS Project participants majored in mathematics. Almost all EMA participants held an elementary teaching certification and a little less than half held a middle level teaching certificate. Half of the MS/HS participants were certified at the middle level and 87% held secondary level certificates.

EXHIBIT A3. NMPDS PARTICIPANT EDUCATION

	All NMPDS (*N* = 152)		EMA (*n* = 75)		MS/HS Institute (*n* = 77)	
	n	Percentage	*n*	Percentage	*n*	Percentage
Highest Degree Completed						
BA or BS	59	38.8	35	46.7	24	31.2
MA, MS, or MEd	91	59.9	39	52.0	52	67.5
PhD or EdD	1	0.7	0	0.0	1	1.3
Other (e.g., graduate work beyond BA or BS)	1	0.7	1	1.3	0	0.0
Undergraduate Mathematics Emphasis[a]						
Major in Mathematics	55	36.2	3	4.0	52	67.5
Major in Mathematics - Intensive Field (e.g., statistics, physics, etc.)	2	1.3	0	0.0	27	35.1
Major in Another Field	41	27.0	24	32.0	2	2.6
Minor in Mathematics	68	44.7	41	54.7	11	14.3
Minor in Mathematics - Intensive Field (e.g., statistics, physics, etc.)	25	16.4	14	18.7	17	22.1
Minor in Another Field	1	0.7	0	100.0	1	1.3
Level of Teaching Certification[a]						
Elementary	86	56.6	72	96.0	14	18.2
Middle	76	50.0	33	44.0	43	55.8
Secondary	74	48.7	7	9.3	67	87.0

[a] Percentages do not sum to 100 because respondents could select more than one response.

PARTICIPANT TEACHING EXPERIENCE

Exhibit A4 summarizes the teaching experiences of NMPDS participants. Nearly half of the EMA and MS/HS participants have been teaching for 15 or more years, with just over 40% of each group reporting having taught mathematics for the same amount of time. Nearly three fourths of EMA participants reported teaching only 1 class while half of the MS/HS participants taught three or four classes.

EXHIBIT A4. NMPDS PARTICIPANT EXPERIENCE

	All NMPDS (*N* = 152)		EMA (*n* = 75)		MS/HS Institute (*n* = 77)	
	n	Percentage	*n*	Percentage	*n*	Percentage
Years Full-Time, Teaching in a K-12 School						
3 or less	21	13.8	11	14.7	10	13.0
4 to 6 Years	17	11.2	10	13.3	7	9.1
7 to 9 Years	22	14.5	8	10.7	14	18.2
10 to 14 Years	18	11.8	10	13.3	8	10.4
15 or More Years	71	46.7	36	48.0	35	45.5
N/A or Missing Response	3	2.0	0	0.0	3	3.9

	All NMPDS (*N* = 152)		EMA (*n* = 75)		MS/HS Institute (*n* = 77)	
	n	Percentage	*n*	Percentage	*n*	Percentage
Years Full-Time, K-12 Teaching Mathematics						
3 or less	25	16.4	13	17.3	12	15.6
4 to 6 Years	17	11.2	11	14.7	6	7.8
7 to 9 Years	22	14.5	8	10.7	14	18.2
10 to 14 Years	21	13.8	12	16.0	9	11.7
15 or More Years	63	41.4	31	41.3	32	41.6
N/A or Missing Response	4	2.6	0	0.0	4	5.2
Number of Different Mathematics Classes Currently Teaching						
1 class	59	38.8	56	74.7	3	3.9
2 classes	23	15.1	12	16.0	11	14.3
3 classes	21	13.8	1	1.3	20	26.0
4 classes	26	17.1	2	2.7	24	31.2
5 classes	10	6.6	2	2.7	8	10.4
6 classes	4	2.6	0	0.0	4	5.2
7 or more classes	9	5.9	2	2.7	7	9.1

Exhibit A5 shows that the most commonly reported teacher description for EMA participants was a regular content classroom educator at the elementary level. About one third of the MS/HS participants were regular content classrooms educators at the middle-level and two thirds were a regular content classroom educator in the secondary grades.

EXHIBIT A5. NMPDS PARTICIPANT TEACHER DESCRIPTION

	Elementary Education		Middle-level Education		Secondary Education	
	n	Percentage	*n*	Percentage	*n*	Percentage
All NMPDS (*N* = 152)						
Regular content classroom educator	51	33.6	40	26.3	49	32.2
Special education educator	1	6.6	2	13.2	0	0.0
Non-teaching instructional coach	0	0.0	1	6.6	0	0.0
None of the above	5	3.3	0	0.0	3	19.7
EMA (*n* = 75)						
Regular content classroom educator	51	68.0	17	22.7	---	---
Special education educator	1	1.3	1	1.3	---	---
None of the above	5	6.7	0	0.0	---	---
MS/HS (*n* = 77)						
Regular content classroom educator	---	---	23	29.9	49	63.6
Special education educator	---	---	1	1.3	0	0.0
Non-teaching instructional coach	---	---	1	1.3	0	0.0
None of the above	---	---	0	0.0	3	3.9

The teacher survey asked participants to identify which courses they taught during the 2013-2014 school year. Findings displayed in Exhibit A6 show that over half of the EMA participants taught 4th or 5th grade and one third taught a science class. Of the MS/HS participants, 55% taught Algebra I, followed by 47% teaching Geometry, and a 36% teaching Algebra II. Participants were able to attend either EMA or MS/HS Institute regardless of their current teaching assignment.

EXHIBIT A6. NMPDS PARTICIPANT EXPERIENCE - COURSES TAUGHT DURING THE PAST SCHOOL YEAR

	All NMPDS (*N* = 152)		EMA (*n* = 75)		MS/HS Institute (*n* = 77)	
	n	Percentage	*n*	Percentage	*n*	Percentage
K or 1 grade	6	3.9	5	6.7	1	1.3
2 or 3 grade	23	15.1	21	28.0	2	2.6
4 or 5 grade	47	30.9	42	56.0	5	6.5
6th grade	27	17.8	20	26.7	7	9.1
7th grade	27	17.8	3	4.0	24	31.2
8th grade	19	12.5	1	1.3	18	23.3
Pre-Algebra	23	15.1	1	1.3	22	28.6
Algebra I	43	28.3	1	1.3	42	54.5
Algebra II	28	18.4	0	0.0	28	36.4
Geometry	36	23.7	0	0.0	36	46.8
Statistics	7	4.6	0	0.0	7	9.1
Calculus	19	12.5	0	0.0	19	24.7
Integrated Math 1	5	3.3	0	0.0	5	6.5
Integrated Math 2	3	2.0	0	0.0	3	3.9
Integrated Math 3	5	3.3	0	0.0	5	6.5
Science Class	28	18.4	26	34.7	2	2.6
Technology Class	15	9.9	7	9.3	8	10.4
Other	45	29.6	6	8.0	39	50.6

Note. Percentages do not sum to 100 because respondents could select more than one response.

Participants were also asked to report the number of students they taught mathematics to during the 2013-2014 school year. As shown in Exhibit A7, EMA participants reported teaching an average of 25 elementary students and an average of 64 middle school students. MS/HS Project participants reported teaching an average of 28 elementary students, 56 middle school students and 70 high school students.

EXHIBIT A7. NUMBER OF STUDENTS TAUGHT BY NMPDS PARTICIPANTS

Number of Students Taught by Participants	All NMPDS (*N* = 152)			EMA (*n* = 75)			MS/HS Institute (*n* = 77)		
	Range	Mean	*SD*	Range	Mean	*SD*	Range	Mean	*SD*
Elementary Students	6 – 75	25.0	14.7	6 – 75	24.8	14.5	6 – 44	27.8	19.3
Middle School Students	3 – 150	58.1	45.0	3 – 140	64.1	46.3	3 – 150	55.6	44.7
High School Students	4 – 172	68.7	45.3	---	---	---	4 - 172	69.7	45.3

As conveyed in Exhibit A8, over half of the EMA participants taught in an elementary only school and 25% taught in a K-12 multilevel school. MS/HS participants most commonly taught in a high school or a K-12 multilevel school. Three fourths of EMA participants and over half of the MS/HS participants taught at schools where 40% or more students in the district or school qualify for free or reduced cost meals. Nearly half of the NMPDS participants also taught in a district or school that did not meet AYP or School Accountability requirements in a content area.

EXHIBIT A8. NMPDS PARTICIPANT SCHOOL CONFIGURATION

	All NMPDS (*N* = 152)		EMA (*n* = 75)		MS/HS Institute (*n* = 77)	
	n	Percentage	*n*	Percentage	*n*	Percentage
School Configuration						
Elementary Only	40	26.3	40	53.3	0	0.0
Middle School	26	17.1	10	13.3	16	20.8
High School	22	14.5	0	0.0	22	28.6
K-12 Multilevel School	40	26.3	20	26.7	20	26.0
7-12 Multilevel School	16	10.5	1	1.3	15	19.5
Other	8	5.3	4	5.3	4	5.2
High Need Designation[a]						
District/school did not meet AYP or School Accountability requirements in a content area.	71	46.7	32	42.7	39	50.6
40% or more students in district or school qualify for free or reduced cost meals.	102	67.1	57	76.0	45	58.4
Teachers in the district or school were assigned to a mathematics or science course but were not appropriately endorsed for the assignment and/or were not NCLB qualified.	14	9.2	4	5.3	10	13.0
Special Education teachers who are responsible for teaching mathematics or science content to special education students.	26	17.1	10	13.3	16	20.8

Note. [a] Percentages do not sum to 100 because respondents could select more than on response.

Lastly, the teacher survey asked participants if they had participated in the science portion of the MSP grant, Keep Improving Content Knowledge and Skills (Science KICKS). Of the 152 respondents, eight previously participated in KICKS, with seven teachers from EMA and one teacher from MS/HS.

TEACHER SURVEY ITEM ANALYSIS

The following section contains the item level analysis of teacher survey items that were presented as scales in the Findings section of the evaluation report. Findings for each item are displayed for all NMPDS participants and disaggregated by EMA and MS/HS Project participants.

TEACHER CONFIDENCE

Exhibit A9 presents the change over time in ratings for items assessing Confidence in Mathematical Knowledge. NMPDS participants demonstrated statistically significant increased ratings over time for all items with effect sizes ranging between small and very large. Overall, NMPDS participants had the largest increase in ratings of confidence for their knowledge about current educational issues related to mathematics. EMA participants generally had larger increases over time than their MS/HS counterparts. The largest increase in ratings for EMA participants was found in their ratings of confidence *in their mathematics knowledge beyond and below what they teach*.

EXHIBIT A9. CHANGE OVER TIME IN PARTICIPANT CONFIDENCE - ITEMS

		Prior to Participation		At the Conclusion			
Confidence in Mathematical Knowledge	*N*	Mean	*SD*	Mean	*SD*	Mean Difference	Cohen's *d*
In your knowledge about current educational issues related to mathematics.							
All NMPDS Participants	152	3.03	0.87	3.70	0.80	0.67***	0.80
EMA Participants (*n* = 75)		2.95	0.94	3.57	0.87	0.62***	0.68
MS/HS Project Participants (*n* = 77)		3.12	0.79	3.83	0.72	0.71***	0.94
In your mathematics knowledge beyond and below what you teach.							
All NMPDS Participants	152	3.43	0.88	3.99	0.71	0.56***	0.70
EMA Participants (*n* = 75)		3.13	0.91	4.01	0.71	0.88***	1.08
MS/HS Project Participants (*n* = 77)		3.73	0.76	3.97	0.73	0.24***	0.32
In your ability to help colleagues improve their knowledge and skills related to mathematics and mathematics education.							
All NMPDS Participants	152	3.30	0.85	3.83	0.78	0.53***	0.65
EMA Participants (*n* = 75)		3.05	0.77	3.73	0.78	0.68***	0.88
MS/HS Project Participants (*n* = 77)		3.55	0.85	3.92	0.77	0.37***	0.46
In your mathematics knowledge with respect to the mathematics that you teach.							
All NMPDS Participants	152	4.04	0.84	4.44	0.65	0.40***	0.53
EMA Participants (*n* = 75)		3.75	0.82	4.37	0.61	0.62***	0.86
MS/HS Project Participants (*n* = 77)		4.32	0.75	4.51	0.68	0.19***	0.27

Note. Responses were rated on a 5-point scale where 1 = Not at All Confident, 2 = Somewhat Confident, 3 = Moderately Confident, 4 = Very Confident, and 5 = Extremely Confident. ***$p < .001$.

TEACHER PREPAREDNESS

Exhibit A10 displays findings for items assessing change in participant ratings of Preparedness to Teach Mathematics and Preparedness to Meet Needs of All Students. Participants showed statistically significant increases in ratings over time for each item. Effect sizes ranged between small and very large, with larger effects generally found for increases in the Preparedness to Teach Mathematics items. Largest increases for the Preparedness to Teach Mathematics items were found in EMA participants' ratings over time for their preparedness to *teach mathematics with the use of manipulative* and to *make connections between mathematics and other subject areas*. MS/HS participants reported largest increases in their preparedness to *use a variety of assessment strategies*. The largest increase within the Preparedness to Meet Needs of Students subscale was found for the items *take into account students' prior conceptions about mathematics when planning lessons.* Items relating to *Teaching mathematics to students who are English Language Learners* were rated as something participants only felt slightly prepared for before and after their participation in the Institute/Academy.

EXHIBIT A10. CHANGE OVER TIME IN PARTICIPANTS' PREPAREDNESS TO TEACH - ITEMS

		Prior to Participation		At the Conclusion			
Item	*N*	Mean	*SD*	Mean	*SD*	Mean Difference	Cohen's *d*
Preparedness to Teach Mathematics							
Select and/or adapt instructional materials to implement your written curriculum to provide challenging curriculum for all students.							
All NMPDS Participants	151	3.02	0.79	3.77	0.77	0.75***	0.96
EMA Participants (*n* = 74)		3.00	0.83	3.80	0.78	0.80***	0.99
MS/HS Project Participants (*n* = 77)		3.04	0.75	3.74	0.77	0.70***	0.92
Teach problem solving strategies.							
All NMPDS Participants	150	3.25	0.77	3.99	0.65	0.74***	1.04
EMA Participants (*n* = 73)		3.21	0.82	3.97	0.71	0.76***	0.99
MS/HS Project Participants (*n* = 77)		3.29	0.72	4.01	0.60	0.72***	1.09
Teach mathematics with the use of manipulative materials.							
All NMPDS Participants	152	3.29	0.89	3.97	0.81	0.68***	0.80
EMA Participants (*n* = 75)		3.33	0.89	4.28	0.63	0.95***	1.23
MS/HS Project Participants (*n* = 77)		3.25	0.89	3.68	0.87	0.43***	0.49
Apply mathematical practices to classroom instruction.							
All NMPDS Participants	152	3.49	0.77	4.16	0.67	0.67***	0.93
EMA Participants (*n* = 75)		3.53	0.79	4.17	0.67	0.64***	0.87
MS/HS Project Participants (*n* = 77)		3.45	0.75	4.14	0.68	0.69***	0.96
Use a variety of assessment strategies.							
All NMPDS Participants	152	3.24	0.84	3.88	0.82	0.64***	0.77
EMA Participants (*n* = 75)		3.27	0.91	3.75	0.90	0.48***	0.53
MS/HS Project Participants (*n* = 77)		3.21	0.78	4.00	0.73	0.79***	1.05
Make connections between mathematics and other subject areas.							
All NMPDS Participants	151	3.28	0.77	3.87	0.76	0.59***	0.77
EMA Participants (*n* = 74)		3.22	0.78	4.07	0.69	0.85***	1.15
MS/HS Project Participants (*n* = 77)		3.35	0.76	3.68	0.79	0.33***	0.43
Teach mathematics with the use of technology tools, such as calculators, graphing calculators, simulation software, and spreadsheets.							
All NMPDS Participants	151	2.91	0.99	3.35	0.88	0.44***	0.47
EMA Participants (*n* = 74)		2.51	0.97	3.23	0.88	0.72***	0.78
MS/HS Project Participants (*n* = 77)		3.30	0.86	3.47	0.87	0.17**	0.20

Item	*N*	Prior to Participation Mean	Prior to Participation *SD*	At the Conclusion Mean	At the Conclusion *SD*	Mean Difference	Cohen's *d*
Provide sequenced instruction in mathematics that aligns to NE mathematics content standards							
All NMPDS Participants	151	3.64	0.86	4.00	0.75	0.36***	0.45
EMA Participants (*n* = 74)		3.66	0.86	3.99	0.73	0.33***	0.41
MS/HS Project Participants (*n* = 77)		3.61	0.86	4.01	0.77	0.40***	0.49
Use results from student assessments to inform practice.							
All NMPDS Participants	151	3.49	0.82	3.85	0.77	0.36***	0.45
EMA Participants (*n* = 74)		3.54	0.85	3.84	0.88	0.30*	0.35
MS/HS Project Participants (*n* = 77)		3.44	0.79	3.87	0.68	0.43***	0.58
Encourage participation females and minorities in mathematics.							
All NMPDS Participants	152	3.55	0.96	3.78	0.97	0.23***	0.24
EMA Participants (*n* = 75)		3.60	1.05	3.92	1.06	0.32***	0.30
MS/HS Project Participants (*n* = 77)		3.49	0.87	3.64	0.86	0.15**	0.17
Preparedness to Meet Needs of All Students							
Take into account students' prior conceptions about mathematics when planning lessons.							
All NMPDS Participants	152	3.36	0.86	3.97	0.76	0.61***	0.75
EMA Participants (*n* = 75)		3.35	0.89	3.99	0.81	0.64***	0.75
MS/HS Project Participants (*n* = 77)		3.36	0.84	3.95	0.71	0.59***	0.76
Teach students who struggle in learning mathematics.							
All NMPDS Participants	151	3.43	0.75	3.89	0.72	0.46***	0.63
EMA Participants (*n* = 74)		3.34	0.80	3.91	0.78	0.57***	0.72
MS/HS Project Participants (*n* = 77)		3.52	0.70	3.87	0.66	0.35***	0.51
Teach mathematics to students with diverse abilities.							
All NMPDS Participants	152	3.35	0.82	3.72	0.79	0.37***	0.47
EMA Participants (*n* = 75)		3.31	0.87	3.75	0.86	0.44***	0.51
MS/HS Project Participants (*n* = 77)		3.39	0.76	3.70	0.73	0.31***	0.42
Teach mathematics to students who are English Language Learners.							
All NMPDS Participants	152	2.52	1.03	2.75	1.06	0.23***	0.22
EMA Participants (*n* = 75)		2.57	1.09	2.83	1.12	0.26**	0.24
MS/HS Project Participants (*n* = 77)		2.46	0.96	2.67	1.00	0.21***	0.21
Teach mathematics to students from a variety of cultural backgrounds.							
All NMPDS Participants	151	3.13	0.88	3.32	0.90	0.19***	0.21
EMA Participants (*n* = 74)		3.11	0.95	3.31	0.98	0.20**	0.21
MS/HS Project Participants (*n* = 77)		3.14	0.81	3.33	0.82	0.19***	0.23

Note. Responses were rated on a 5-point scale where 1 = Not at All Prepared, 2 = Somewhat Prepared, 3 = Moderately Prepared, 4 = Well Prepared, and 5 = Very Well Prepared. *$p < .05$; **$p < .01$; ***$p < .001$.

IMPACT OF NMPDS

The teacher survey asked NMPDS participants to rate the extent to which their participation in NMPDS influenced their ability level to provide mathematics instruction. Exhibit A11 presents the average group rating for each item, along with the distribution of responses. Participants indicated that their participation in NMPDS had the greatest impact on their *ability to apply mathematical practices to classroom instruction*, followed by their *ability to craft good mathematics questions*.

EXHIBIT A11. IMPACT OF NMPDS PARTICIPATION

To what extent did your participation in NMPDS influence your ability level to:	*M*	*SD*	Percentages of Responses				
			Not Well	Somewhat	Moderately	Well	Very Well
Apply mathematical practices to classroom instruction?							
All NMPDS Participants (*N* = 152)	4.01	0.90	0.7	5.9	17.8	43.4	32.2
EMA Participants (*n* = 75)	4.23	0.83	1.3	1.3	13.3	41.3	42.7
MS/HS Project Participants (*n* = 77)	3.79	0.91	0.0	10.4	22.1	45.5	22.1
Craft good mathematics questions for your students?							
All NMPDS Participants (*N* = 152)	3.80	0.87	0.0	7.9	26.3	44.1	21.7
EMA Participants (*n* = 75)	3.81	0.83	0.0	6.7	25.3	48.0	20.0
MS/HS Project Participants (*n* = 77)	3.78	0.91	0.0	9.1	27.3	40.3	23.4
Provide alternative explanation or example when your mathematics students are confused?							
All NMPDS Participants (*N* = 152)	3.74	0.99	2.0	9.2	25.0	40.1	23.7
EMA Participants (*n* = 75)	4.01	0.89	1.3	4.0	18.7	44.0	32.0
MS/HS Project Participants (*n* = 77)	3.48	1.01	2.6	14.3	31.2	36.4	15.6
Gauge student comprehension of a mathematics lesson you just taught?							
All NMPDS Participants (*N* = 151)	3.68	0.87	2.6	7.3	20.5	58.3	11.3
EMA Participants (*n* = 74)	3.73	0.90	4.1	5.4	16.2	62.2	12.2
MS/HS Project Participants (*n* = 77)	3.64	0.84	1.3	9.1	24.7	54.5	10.4
Contribute actively about making decisions about mathematics curriculum with others in your school and/or district?							
All NMPDS Participants (*N* = 152)	3.60	1.03	2.6	13.8	23.0	42.1	18.4
EMA Participants (*n* = 75)	3.85	1.01	1.3	12.0	14.7	44.0	28.0
MS/HS Project Participants (*n* = 77)	3.35	0.98	3.9	15.6	31.2	40.3	9.1
Adjust your mathematics lesson to the proper level for individual students?							
All NMPDS Participants (*N* = 151)	3.52	0.94	2.6	13.2	24.5	49.0	10.6
EMA Participants (*n* = 75)	3.79	0.89	0.0	12.0	16.0	53.3	18.7
MS/HS Project Participants (*n* = 76)	3.25	0.93	5.3	14.5	32.9	44.7	2.6
Respond to difficult mathematics questions from your students?							
All NMPDS Participants (*N* = 152)	3.50	0.94	2.6	11.8	29.6	44.7	11.2
EMA Participants (*n* = 75)	3.69	0.92	2.7	8.0	21.3	53.3	14.7
MS/HS Project Participants (*n* = 77)	3.31	0.92	2.6	15.6	37.7	36.4	7.8