

October 2009

## Nebraska Statewide Mathematics and Science Partnership Program – Needs Assessment

Prepared for:  
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Needs Assessment**

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## Executive Summary

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In 2004, the state of Nebraska (NE) received funds under the *No Child Left Behind Act of 2001* (NCLB) *Title II, Part B* to conduct a state-level Mathematics and Science Partnership (MSP) program. The Nebraska Department of Education (NDE) released a Request for Proposals (RFP) with a submission date of December 1, 2005, for awards to be made for statewide projects, funded at \$600,000. After conducting a review of proposals, NDE rejected all proposals and reissued another RFP in spring 2006. After conducting a second review of proposals, NDE selected two projects to receive awards under this program: the Nebraska Mathematics Professional Development Series (NMPDS) operated by Education Service Unit (ESU) #8 and Science Keep Improving Content, Knowledge, and Skills (KICKS) operated by ESU #3.

RMC Research was selected in May 2006 to serve as external evaluator for the NE MSP statewide program. In this capacity, RMC Research provides leadership in assisting NMPDS and Science KICKS in undertaking a statewide needs assessment. Three primary evaluation questions guided the analysis of needs assessment data:

1. What are the areas of mathematics and science for which teachers presently feel least adequately prepared to teach?
2. What areas in mathematics and science are rated as the highest priority for professional development?
3. Are there significant differences on levels of preparedness to teach and needs for professional development in mathematics and science between teachers for the independent variables of years of teaching, school size, and ESU clusters?

Results in the report are based on data collected from a survey that was developed by RMC Research, and then reviewed and revised by NDE staff, the project directors for NMPDS and Science KICKS, and university faculty. The survey was created using SurveyMonkey.com, an online survey application, and was opened for administration on September 13, 2009 and closed on October 16, 2009, with a total of 904 respondents.

### Results

- **Mathematics teachers felt well prepared to teach elementary and middle school mathematics and algebra.** Respondents rated their undergraduate or graduate degree preparation level between well prepared and very well prepared for teaching elementary school mathematics and between somewhat prepared and well prepared for teaching middle school mathematics and algebra.
- **Mathematics teachers felt well prepared to teach mathematics using a variety of strategies, approaches, and instructional support activities.** Respondents rated their preparation level between well prepared and very well prepared to provide mathematics instruction that meets appropriate standards (district, state, or nation), encourage participation of females in mathematics, provide a challenging curriculum for all students, and teach problem solving strategies, along with five other approaches focused on teaching and learning.

- **Mathematics teachers identified professional development needs focusing on helping students.** Items rated highest priority for professional development focused on helping students develop the skills and depth of understanding to: perform estimations and computations of real numbers mentally, with paper and pencil, and with technology; justify solutions to mathematical problems; and select and use measuring units, tools, and/or technology and explain the degree of accuracy and precision of measurements.
- **Science teachers felt prepared to teach the science basics.** Respondents rated their undergraduate or graduate degree preparation level between somewhat prepared and well prepared for teaching elementary school science, life science, physical science, earth science, and middle school science, in that order.
- **Science teachers felt well prepared to teach science using a variety of strategies, approaches, and instructional support activities.** Respondents rated their preparation level between well prepared and very well prepared to provide science instruction that meets appropriate standards (district, state, or nation), provide a challenging curriculum for all students, encourage participation of females and minorities in science, select and/or adapt instructional materials to implement their written curriculum, and manage a class of students who are using hands-on or laboratory activities.
- **Science teachers identified professional development needs focusing on helping students.** Items rated highest priority for professional development focused on helping students develop: the abilities needed to do scientific inquiry; an understanding of change over time; an understanding of systems, order, and organization; and an understanding of evidence, models, and explanation.
- **School size has significant effect on levels of preparedness for teaching mathematics and science.** Statistically significant differences were found in a number of the mathematics and science scales. Teachers in large schools felt less prepared to teach mathematics. Teachers in small schools felt less prepared to meet student needs and had higher levels of mathematics and science professional development needs, especially professional development related to atoms, matter, and energy and life science.

## Recommendations

- **Incorporate customized instructional strategies that target specific student populations.**
- **Integrate the use of hands-on activities, manipulatives, and technology tools in instructional delivery.**
- **Focus professional development experiences to help develop participant and student understanding of problem solving and inquiry-based science.**
- **Target specific professional development to mathematics and science teachers based on school size.**

In January 2002, the *No Child Left Behind Act of 2001* became law. Title II, Part B authorized state 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 results of 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 effect improvements in student outcomes by providing K-12 teachers with strong mathematics and/or science content knowledge.

### **The Nebraska Mathematics and Science Partnership Program**

In 2004, the state of Nebraska received funds under the *NCLB Act of 2001 Title II, Part B* to conduct a state-level MSP program. The NDE released a RFP in fall 2005 with a submission date of December 1, 2005, for awards to be made for statewide projects, funded at \$600,000. After conducting a review of proposals, NDE rejected all proposals and reissued another RFP in spring 2006. After conducting a second review of proposals, NDE selected two projects to receive awards under this program: the NMPDS operated by ESU #8 and Science KICKS operated by ESU #3. In fall 2009, NDE plans on releasing a new RFP, with projects to be selected and awards to be made beginning in 2010.

### **NE MSP Program Goals**

The overall goals of the NE MSP program are to:

1. Improve and upgrade the status and stature of mathematics and science teaching by encouraging 4-year IHEs to assume greater responsibility for improving mathematics and science teacher education through the establishment of a comprehensive, integrated system of recruiting, training, and advising mathematics and science teachers;

2. Focus on the education of mathematics and science teachers as a career-long process that continuously stimulates teachers' intellectual growth and upgrades teachers' knowledge and skills;
3. Bring together mathematics and science teachers in elementary schools and secondary schools with scientists, mathematicians, and engineers to increase the subject matter knowledge of mathematics and science teachers and improve such teachers' teaching skills through the use of sophisticated laboratory equipment and work space, computing facilities, libraries, and other resources that 4-year IHEs are better able to provide than elementary schools and secondary schools;
4. Develop more rigorous mathematics and science curricula that are aligned with challenging state academic content standards and with the standards expected for postsecondary study in engineering, mathematics, and science; and
5. Improve and expand training of mathematics and science teachers, including training such teachers in the effective integration of technology into curricula and instruction.

### **Conducting a Needs Assessment**

All projects in mathematics and science funded under the MSP program must discuss, as part of their application process, the results of a comprehensive assessment of the teacher quality and professional development needs of all school districts or schools with respect to the teaching and learning of mathematics and/or science. RMC Research Corporation was requested by the NDE in September 2009 to construct and administer a statewide needs assessment in mathematics and science.

### **Report Organization**

The methodology section that follows describes the approach used by RMC Research to conduct the needs assessment. The results sections present tables and graphs of responses pertaining to perceived levels of preparedness and levels of professional development needs for teaching mathematics and science. The final presents a summary of findings and recommendations for consideration.

This report focuses on a statewide needs assessment in mathematics and science administered during the period September 13, 2009 through October 16, 2009. This section of the report identifies the questions that were used, the data used for analysis, and the analysis techniques.

### Evaluation Questions for Needs Assessment

Three primary evaluation questions guided the analysis of needs assessment data:

1. What are the areas of mathematics and science for which teachers presently feel least adequately prepared to teach?
2. What areas in mathematics and science are rated as the highest priority for professional development?
3. Are there significant differences on levels of preparedness to teach and needs for professional development in mathematics and science between teachers for the independent variables of years of teaching, school size, and ESU clusters?

Results in the report are based on data collected from a survey that was developed by RMC Research, and then reviewed and revised by NDE staff and the project directors for NMPDS and Science KICKS. The survey was created using SurveyMonkey.com, an online survey application, and was opened for administration on September 13, 2009 and closed on October 16, 2009. Nebraska teachers were contacted through a variety of online listservs, organization communications (email and newsletters), and word of mouth. Primary teacher targets are identified in Exhibit 1.

### Exhibit 1. Targeted Survey Participants

Nebraska Department of Education	Science KICKS	NMPDS
<ul style="list-style-type: none"> <li>• Administrators in schools not making adequate yearly progress or in need of improvement.</li> <li>• Statewide MSP Advisory Board</li> <li>• Public and non-public school administrators</li> </ul>	<ul style="list-style-type: none"> <li>• Nebraska Association of Teachers of Science (NATS)</li> <li>• Building a Presence</li> <li>• Science KICKS Institute participants</li> <li>• ESU Mathematics and Science Cadre</li> </ul>	<ul style="list-style-type: none"> <li>• Nebraska Association of Teachers of Mathematics (NATM)</li> <li>• NMPDS Institute and Academy participants</li> <li>• ESU Mathematics and Science Cadre</li> </ul>

## Methodology

### Quantitative Data

**Needs Assessment Survey.** A total of 904 K-12 teachers representing all ESUs across the state completed the survey online. The survey asked K-12 teachers to indicate whether they have participated in statewide MSP activities in the past; their level of preparedness for a variety of

teaching activities and experiences in mathematics and/or science; their preferences and perceptions of priority regarding needs for professional development; and teacher background information.

### **Data Analysis**

Descriptive statistics were used to summarize findings regarding respondent characteristics, participant levels of preparedness, and priorities for mathematics and science professional development. Measures of central tendency and frequencies were used to report descriptive data. Factor analysis using Principal Axis factoring<sup>1</sup> with a Varimax rotation<sup>2</sup> was conducted on the mathematics and science preparedness scales and on the mathematics and science professional development priority scales. Reliability analysis with Cronbach’s alpha<sup>3</sup> was utilized for scaled items that were revealed in the factor analysis. The reliability results presented in Exhibit 2 reveal each of the four scales formed one to three highly reliable subscales.

### **Exhibit 2. Reliability Analysis**

<b>Scale</b>	<b>Number of Items</b>	<b>Cronbach’s Alpha</b>
<b>Mathematics Preparedness</b>		
Preparedness for Teaching Mathematics	10	.926
Preparedness to Meet Student Needs	5	.855
<b>Mathematics Professional Development Needs</b>	24	.928
<b>Science Preparedness</b>		
Preparedness for Teaching Science	12	.946
Preparedness to Meet Student Needs	6	.871
<b>Science Professional Development Needs</b>		
Scientific Method and Inquiry	8	.920
Atoms, Matter, and Energy	7	.933
Life Science	6	.939

Based on these 2009 Needs Assessment data subscales, the teachers were divided into three different groupings. The first grouping, years of teaching, was broken down into (a) teachers who have taught six years or less, (b) teachers who have taught seven to fourteen years, and (c) teachers who have taught fifteen or more years. The second grouping, school size, was broken down into (a) teachers who taught at schools with 500 or fewer students, (b) teachers who taught at schools with 501 to 2500 students, and (c) teachers who taught at schools with 2501 or more students. The third group, ESU clusters, was broken down into four clusters based upon geographic region of the state. Exhibit 3 provides the number of teacher participants in each of these grouping categories.

<sup>1</sup> This type of factor analysis examines the correlation matrix between the variables to determine how the variables “fit” together by creating communality to examine the covariation among the variables.

<sup>2</sup> An orthogonal rotation that places the final factors at right angles to each other so we can interpret that information provided by one factor is independent of information provided by the other factors.

<sup>3</sup> Cronbach’s alpha 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 3. Teacher Participants by Grouping Category

	Number of Teachers in Grouping
<b>Years of Teaching</b>	
6 or less years	213
7 to 14 years	240
15 or more years	444
<b>School Size</b>	
500 or fewer students	374
501 -2500 students	296
2501 or more students	204
<b>ESU Clusters</b>	
Cluster 1 (ESU 1, 2, 3, 4, 19)	233
Cluster 2 (ESU 5, 6, 7, 18)	179
Cluster 3 (ESU 8, 9, 10, 11)	292
Cluster 4 (ESU 13, 15, 16, 17)	184

One-way ANOVAs<sup>4</sup> were computed for each of the eight scale dependent variables using each of the three grouping variables. When significant differences were discovered and the assumption of equal variances was not violated, the post hoc Tukey HSD<sup>5</sup> test was utilized to determine exactly where the significant differences occurred. If the assumption of equal variances was violated, the post hoc Games-Howell<sup>6</sup> test was used. Effect sizes<sup>7</sup>, using Cohen's  $d$ <sup>8</sup>, are reported for any statistically significant grouping differences.

<sup>4</sup> Analysis of variance (ANOVA) is a statistical procedure that examines differences in outcomes for two or more groups.

<sup>5</sup> The Tukey HSD post hoc test examines each of the grouping variables one at a time to determine significance. It is typically employed when the overall ANOVA is significant and the assumption of equal variances is not violated.

<sup>6</sup> The Games-Howell post hoc test is slightly more conservative than the Tukey HSD test and is used when the assumption of equal variances is violated in order to determine where significant differences exist within the groupings.

<sup>7</sup> 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.

<sup>8</sup> Cohen's  $d$  is a measure of effect size, designed to measure the magnitude of treatment effect. Cohen (1988) defined effect sizes as "small,  $d = .2$ ," "medium,  $d = .5$ ," and "large,  $d = .8$ ."



### Demographic Data

Demographic data presented in Exhibit 4 shows that over three times as many female as male teachers completed the survey, and most of the respondents are white. Additionally, the majority of respondents are veteran teachers with 15 years or more of teaching experience in K-12 schools, as well as both mathematics and science. The majority of respondents have not previously participated in 2008-09 NE MSP activities.

**Exhibit 4. Survey Respondent Characteristics**

<b>Respondent Characteristics</b>	<b>N<sup>9</sup></b>	<b>Percentage</b>
<b>Gender</b>		
Male	202	23
Female	690	77
<b>Race and Ethnicity</b>		
African-American (not of Hispanic origin)	3	<1
Hispanic	11	1
American Indian or Alaskan Native	3	<1
White (not of Hispanic origin)	871	97
Asian or Pacific Islander	0	0
Other	7	1
<b>Years of Experience Teaching at a K-12 School</b>		
3 or fewer years	108	12
4 to 6 years	105	12
7 to 9 years	103	11
10 to 14 years	137	15
15 or more years	444	50
<b>Years of Teaching Science Full Time at a K-12 School</b>		
3 or fewer years	155	25
4 to 6 years	89	14
7 to 9 years	66	11
10 to 14 years	81	13
15 or more years	230	37
<b>Years of Teaching Mathematics Full Time at a K-12 School</b>		
3 or fewer years	137	20
4 to 6 years	89	13
7 to 9 years	78	12
10 to 14 years	94	14
15 or more years	280	41
<b>Participant in 08 - 09 NE MSP Statewide Activities</b>		
Yes	179	20
No	710	80

<sup>9</sup> N is the total number in a sample.

Demographic data in Exhibit 5 show that the majority of respondents are from schools that are making adequate yearly progress and that more than half of respondents teach in districts with fewer than 1000 students. Additionally, the majority of respondents reported having at least one other teacher at their school teaching math or science besides the respondent.

### Exhibit 5. School Characteristics Reported by Respondents

School Characteristics	N	Percentage
<b>School is NOT making Adequate Yearly Progress (AYP)</b>		
Yes	85	9
No	457	51
Not Sure	339	40
<b>Number of Students in District</b>		
Fewer than 200 students	112	13
201 to 500 students	262	30
501 to 1000 students	141	16
1001 to 1500 students	67	8
1501 to 2000 students	50	6
2001 to 2500 students	38	4
2501 to 3000 students	34	4
3001 to 5000 students	77	9
More than 5000 students	93	11
<b>Number of Teachers at School Employed to Teach Full-Time</b>		
<b>Math</b>		
Respondent only	26	3
1 to 2 teachers	191	23
3 to 5 teachers	167	20
6 to 10 teachers	173	21
11 to 15 teachers	123	15
More than 15 teachers	148	18
<b>Science</b>		
Respondent only	24	3
1 to 2 teachers	189	24
3 to 5 teachers	158	20
6 to 10 teachers	182	24
11 to 15 teachers	92	12
More than 15 teachers	133	17

Demographic data presented in Exhibit 6 shows that more than half of respondents hold advanced degrees. The majority of respondents hold a standard or professional teaching certificate and are teaching in an area for which they hold an endorsement. Two-thirds of the respondents report they are currently teaching or will be teaching mathematics and over one-half currently teach or will be teaching science. Additionally, the majority of respondents are interested in receiving college or university credit for professional development while about one-third of respondents are interested in earning an advanced degree in science or mathematics. The majority of respondents reported having no membership in state or national professional organizations for math and science.

## Exhibit 6. Respondent Degrees, Certification, Endorsements, and Memberships

Respondent Characteristics	N	Percentage
<b>Degrees Held<sup>a</sup></b>		
BA or BS	886	98
MA, MS, or MEd	464	51
PhD or EdD	12	1
Other	49	5
<b>Type of Teaching Certificate</b>		
Initial	54	6
Standard	491	55
Professional	323	36
Provisional	9	1
Substitute	0	0
Other	14	2
<b>Teaching in an area for which an endorsement is held</b>		
Yes	802	90
No	89	10
<b>Currently teaching or will teach mathematics in next school year</b>		
Yes	655	73
No	241	27
<b>Currently teaching or will teach science in next school year</b>		
Yes	503	59
No	354	41
<b>Interested in earning an advanced degree in science or mathematics</b>		
Yes	247	28
No	642	72
<b>Interested in receiving college credit for professional development</b>		
Yes	587	66
No	303	34
<b>Membership in professional organizations<sup>b</sup></b>		
Nebraska Association of Teachers (NATS)	98	11
National Science Teachers Association (NSTA)	77	9
Nebraska Association of Teachers of Mathematics (NATM)	113	13
National Council of Teachers of Mathematics (NCTM)	97	11
No membership	641	71

<sup>a</sup> Percentages do not total to 100 due to teachers reporting multiple degrees.

<sup>b</sup> Percentages do not total to 100 due to teachers reporting membership in multiple organizations.

Respondents were asked to identify areas of certification or endorsements that they initially received, presently hold, and have interest in obtaining. Exhibit 7 presents the percentage of responses for the areas of early childhood and elementary education. A larger percentage of teachers currently hold an endorsement for elementary education than early childhood education. However, respondents indicated no interest in obtaining the elementary education certificate or endorsement.

**Exhibit 7. Areas of Certification and Endorsements –  
Early Childhood and Elementary Education**

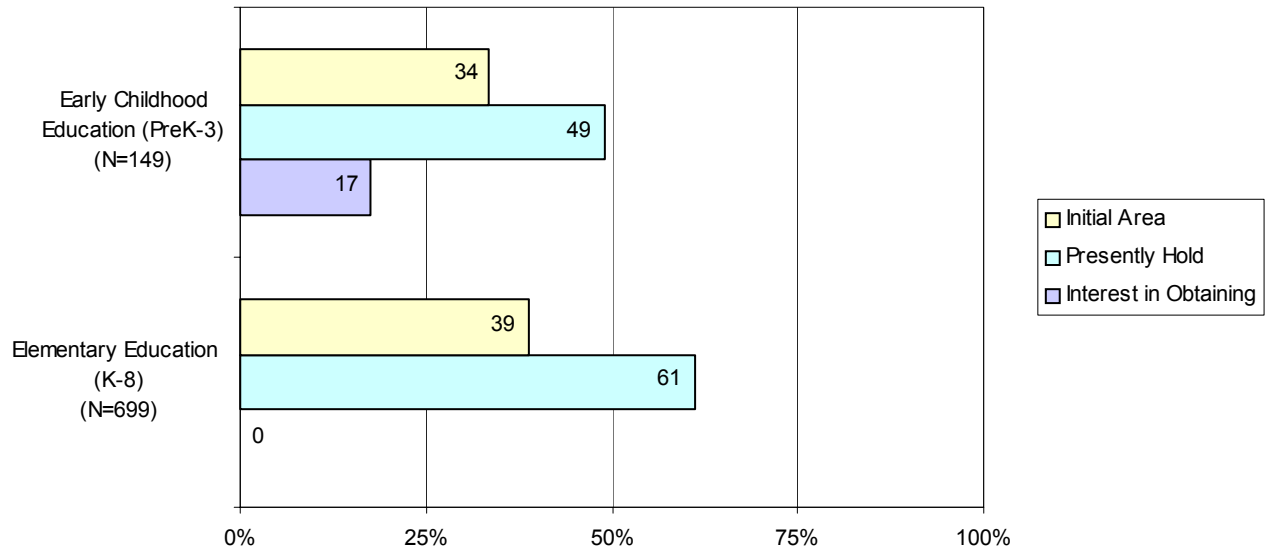


Exhibit 8 presents data on the certification and endorsements for middle grades education. Across all three areas for middle school, a larger percentage of respondents indicated that they currently hold the endorsement or certification. The area of specialization in mathematics presents the largest percentage of respondents interested in obtaining the certification or endorsement while the least interest among respondents was obtaining a middle grades education certificate or endorsement.

**Exhibit 8. Areas of Certification and Endorsements – Middle Grades Education**

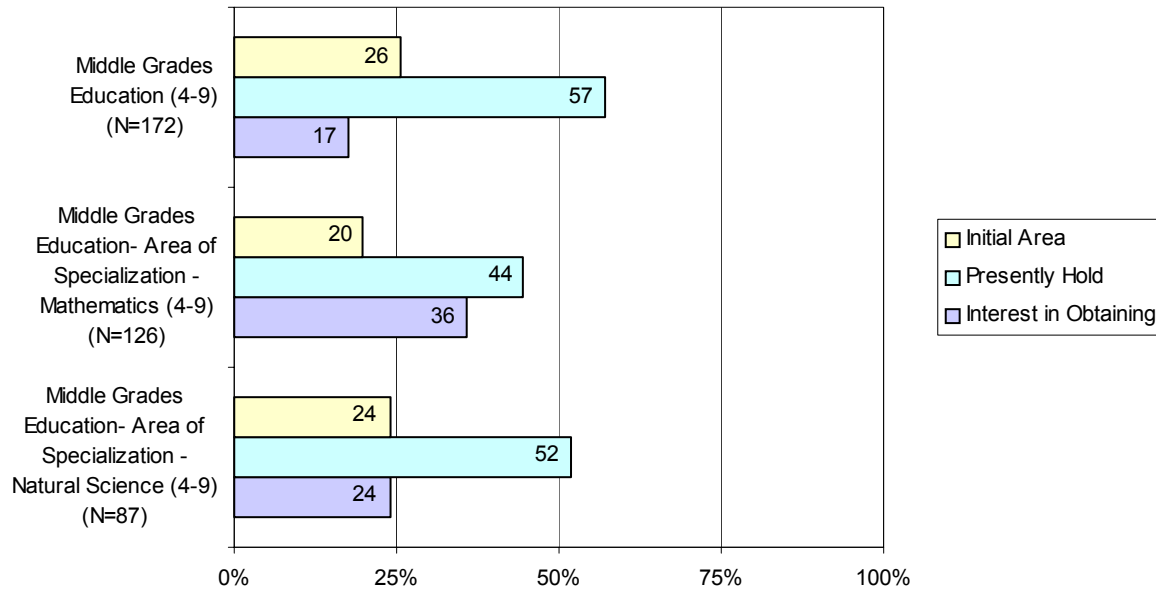
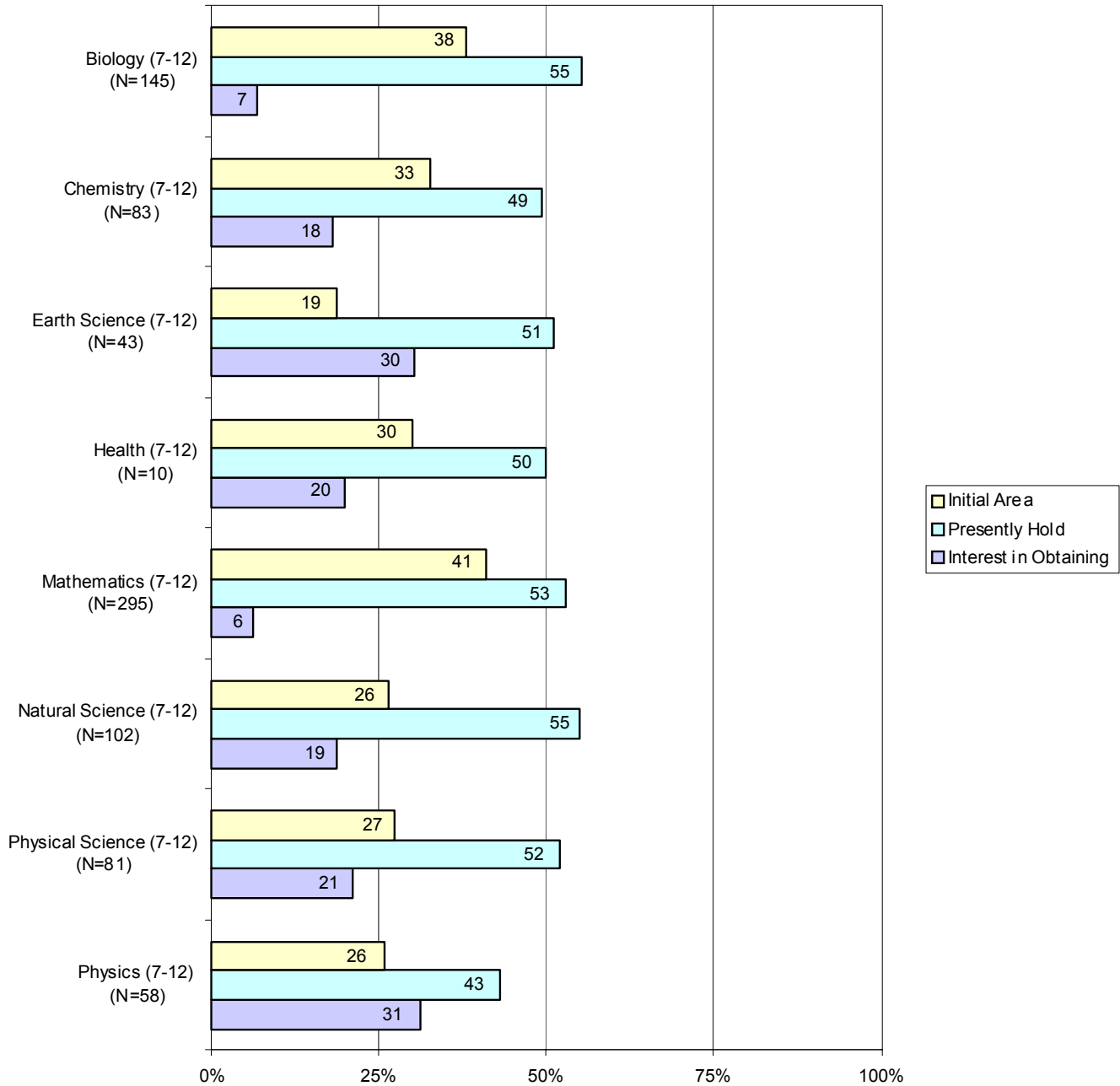


Exhibit 9 presents data on the certification and endorsements for high school education. Across all areas of endorsements or certification, almost half of all responses indicate that teachers presently hold a specific endorsement or certificate. Areas in which there is the least amount of interest in obtaining an endorsement or certificate include biology and mathematics.

**Exhibit 9. Areas of Certification and Endorsements – High School Education (7-12)**



Demographic data presented in Exhibit 10 shows that the distribution of respondents across all ESUs was inconsistent, with respondents from five ESUs (3, 7, 8, 10, and 13) representing over half of the total respondents.

**Exhibit 10. Respondent Distribution Across ESUs**

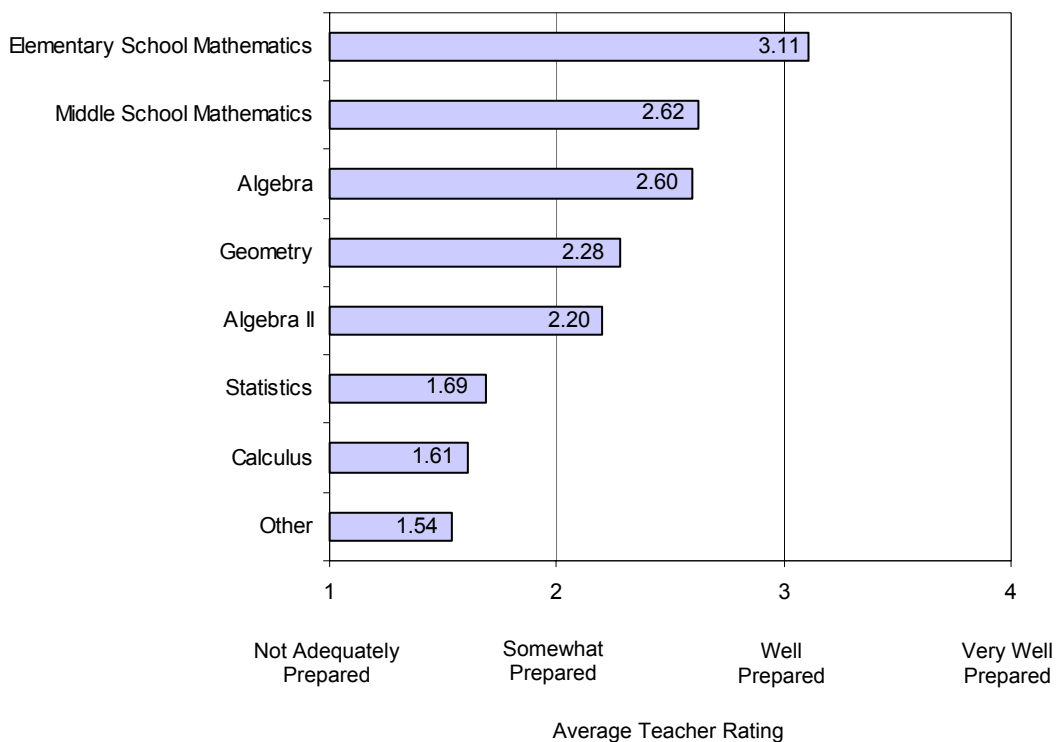
<b>ESU</b>	<b>N</b>	<b>Percentage</b>
ESU 1	62	7
ESU 2	30	3
ESU 3	104	12
ESU 4	11	1
ESU 5	15	2
ESU 6	47	5
ESU 7	89	10
ESU 8	107	12
ESU 9	60	7
ESU 10	97	11
ESU 11	28	3
ESU 13	95	11
ESU 15	12	1
ESU 16	61	7
ESU 17	16	2
ESU 18 (LPS)	28	3
ESU 19 (OPS)	26	3

## Mathematics

### Levels of Preparedness

Respondents rated how well their undergraduate or graduate degree prepared them for teaching in various areas in mathematics, using a 4-point scale with 1 corresponding to not adequately prepared and 4 corresponding to very well prepared. Exhibit 11 illustrates that respondents rated their preparation level the lowest for teaching calculus while rating the highest level of preparation for teaching elementary school mathematics.

**Exhibit 11. Ratings of Preparedness  
for Various Areas in Mathematics (N = 655)**



Respondents rated various teaching strategies and/or approaches, along with other instructional support activities, using a 4-point scale with 1 being not adequately prepared and 4 being very well prepared. Exhibit 12 presents the average response ratings for survey items for which respondents felt least prepared in mathematics. For mathematics, respondents gave lowest ratings to *teaching mathematics to students who have limited English proficiency*, *teaching students with a learning disability which impacts mathematics learning*; and *teaching mathematics with the use of technology tools such as calculators, graphing calculators, and spreadsheets*.

**Exhibit 12. Items for Which Respondents Felt Least Prepared in Mathematics (N = 655)**

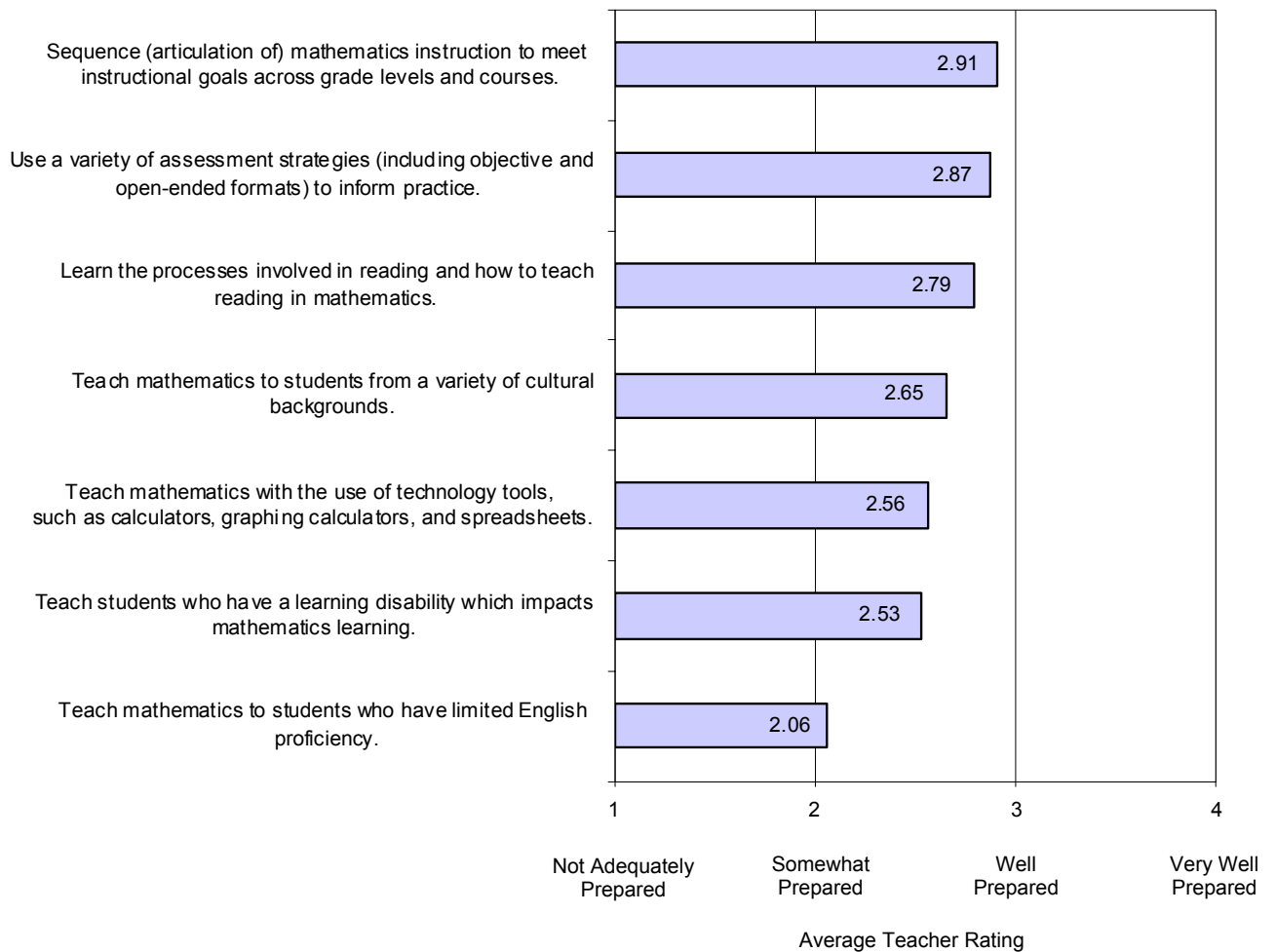
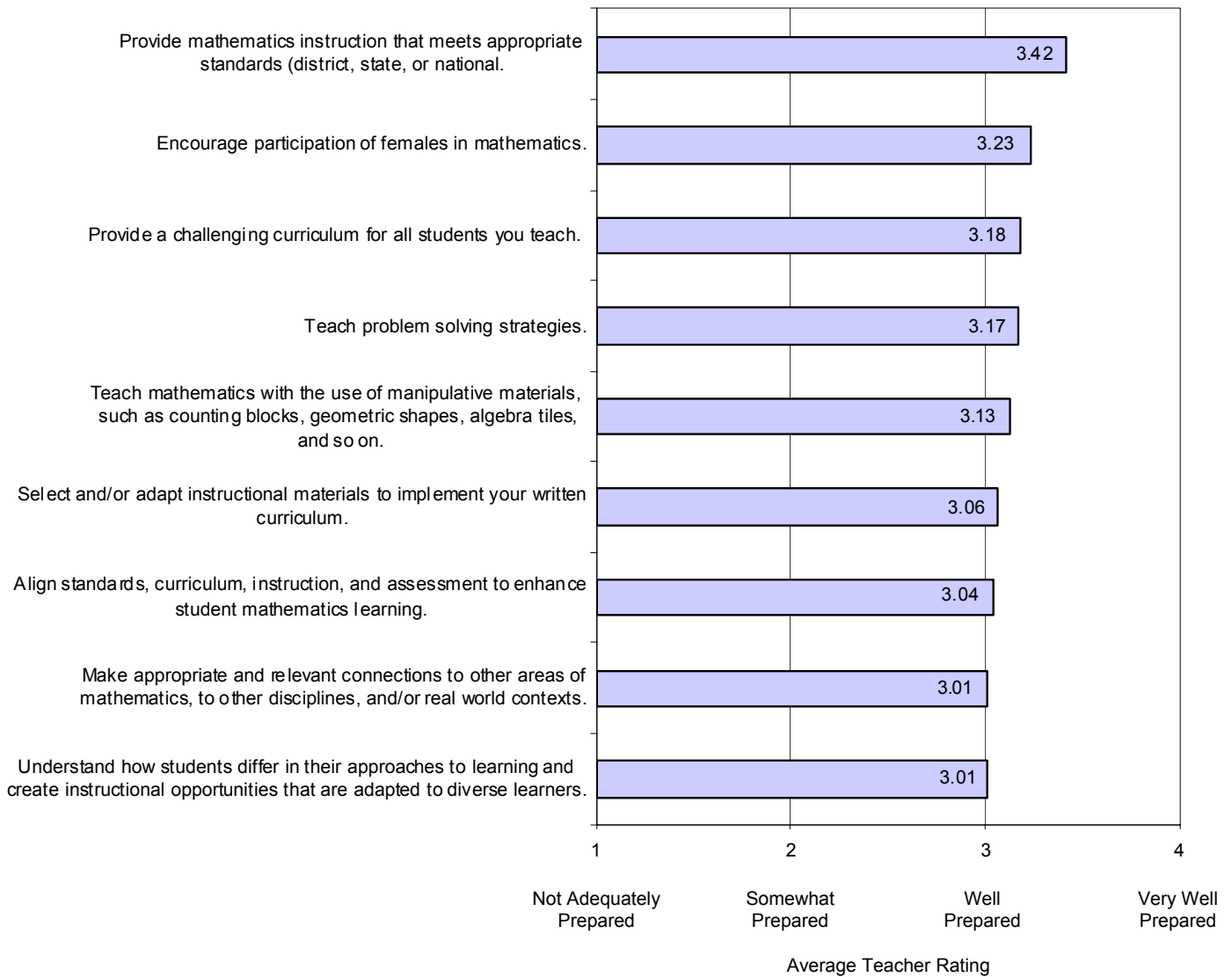


Exhibit 13 presents the average response ratings for survey items for which respondents felt best prepared in mathematics. For mathematics, respondents gave the highest ratings to the *providing mathematics instruction that meets appropriate standards, encouraging participation of females in mathematics, and providing a challenging curriculum for all students*.

**Exhibit 13. Items for Which Respondents Felt Best Prepared in Mathematics (N = 655)**



### Professional Development Priorities

Respondents rated the degree to which they felt topics were a priority for professional development at their grade levels, whether or not those topics are in their curriculum, using a 4-point scale with 1 corresponding to not a priority and 4 corresponding to a high priority. Exhibit 14 presents the average response ratings for survey items on topics respondents rated a

low priority. For mathematics, the lowest priority for professional development was identified as *helping students develop the skills and depth of understanding to evaluate how transformations on data affect the measures of central tendency and variability.*

**Exhibit 14. Items Given Ratings of Lowest Priority for Professional Development in Mathematics (N = 655)**

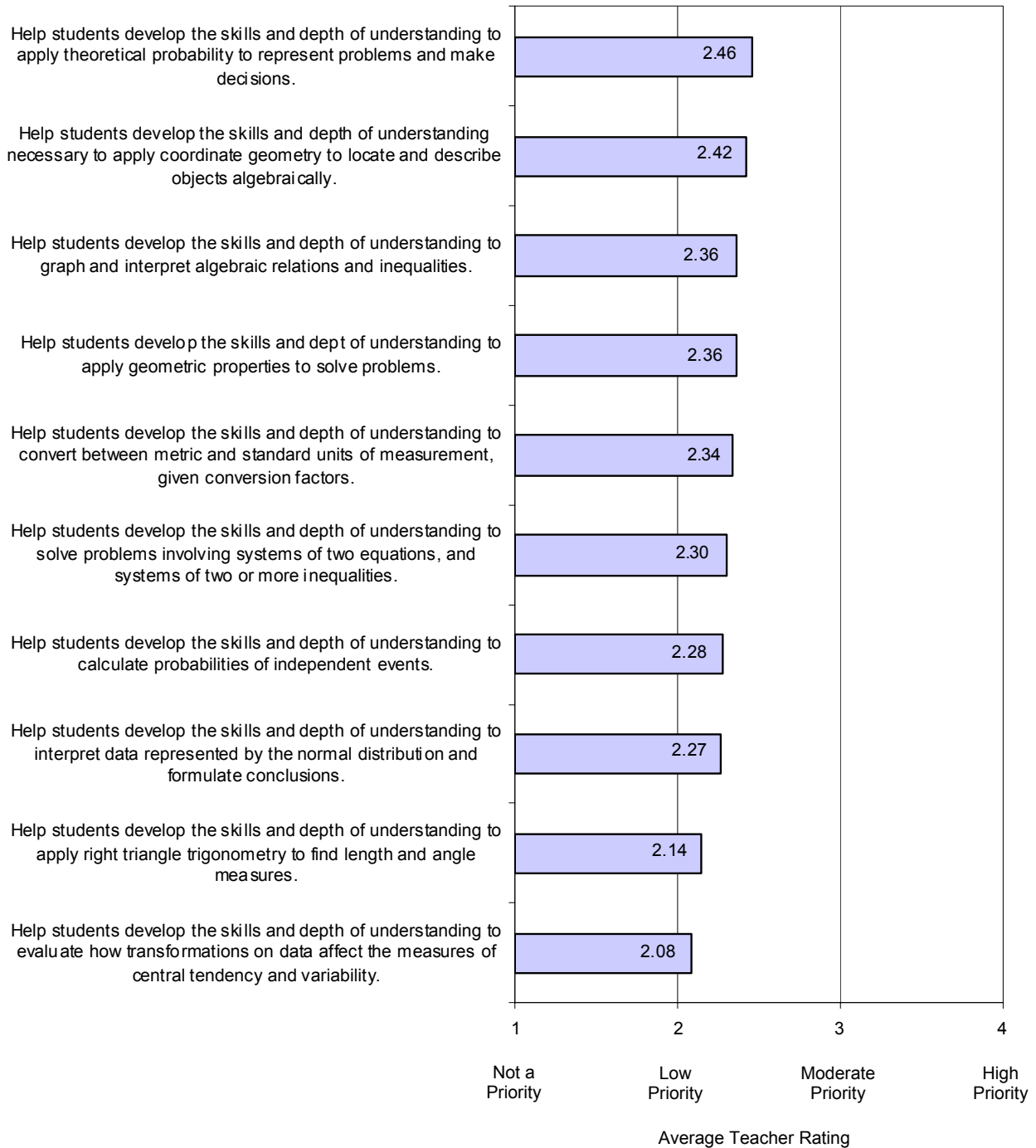


Exhibit 15 presents the average response ratings for survey items on topics respondents rated as low to moderate priority.

**Exhibit 15. Items Given Ratings of Low to Moderate Priority for Professional Development in Mathematics (N = 655)**

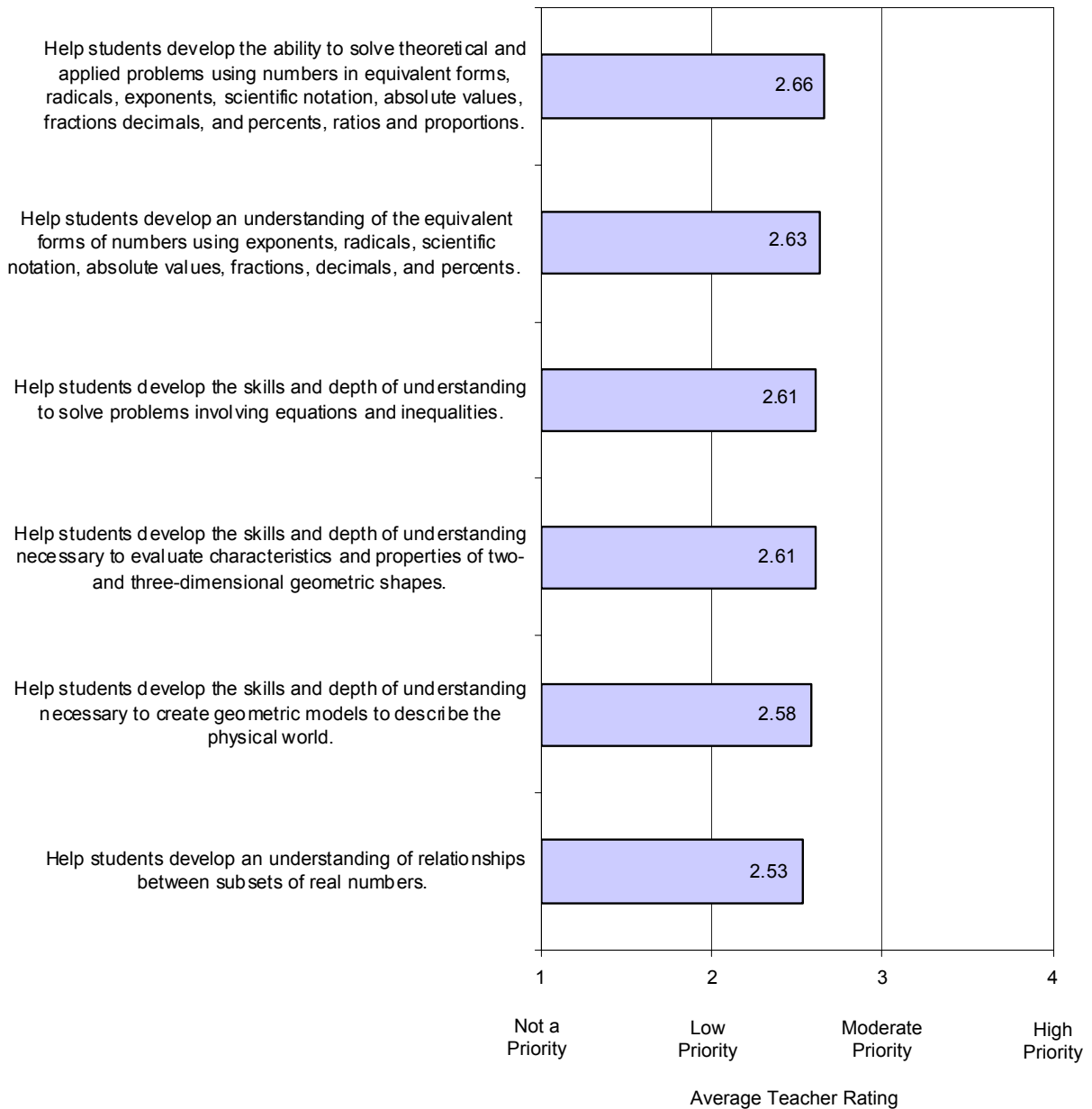
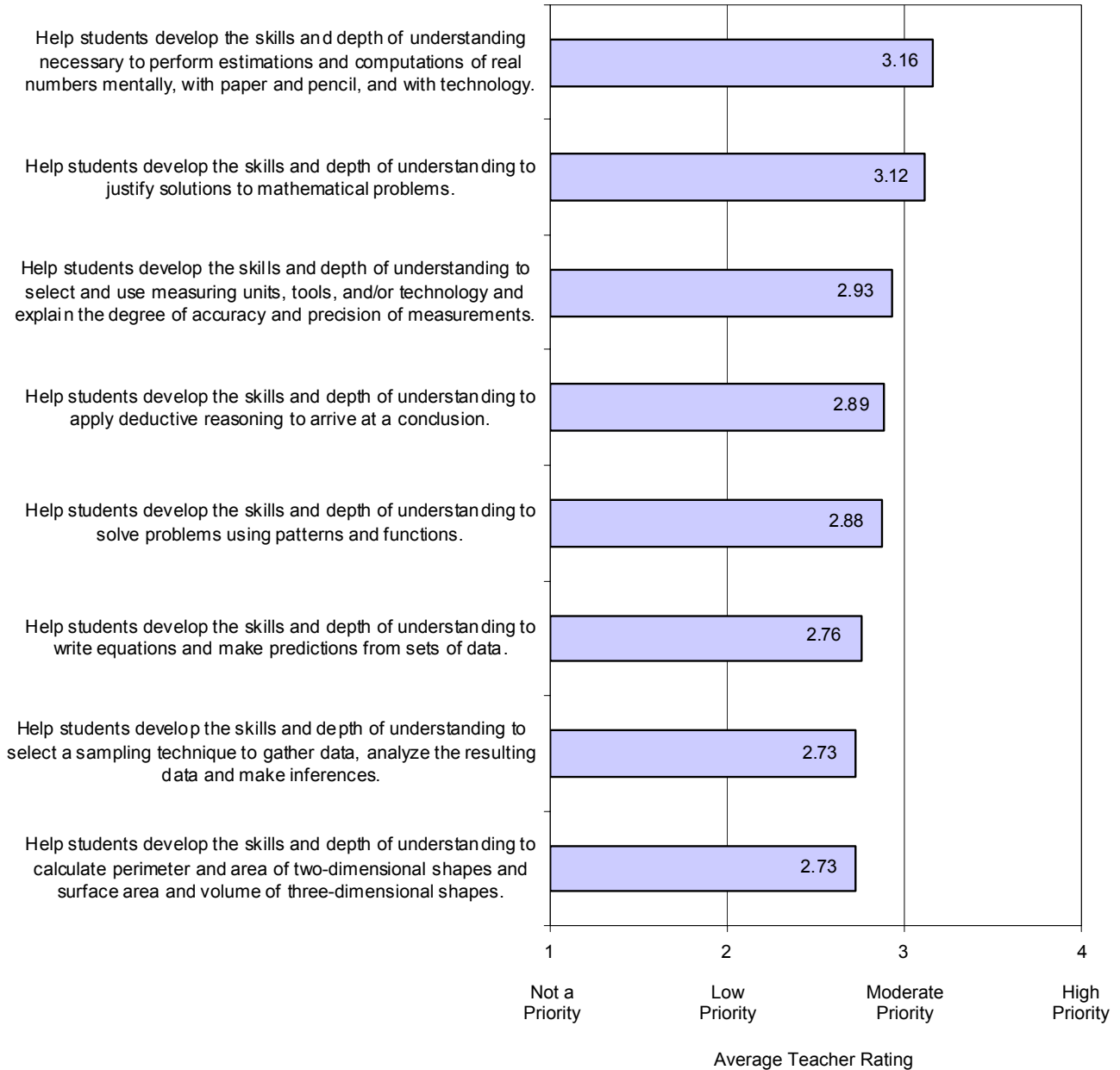


Exhibit 16 presents the average response ratings for those survey items that are at the top of the respondents rating scale, becoming the highest priority, even though in all cases the ratings were close to a moderate rating. For mathematics, of the choices contained in the survey, the item rated highest as a need for professional development was *helping students develop the skills and depth of understanding necessary to perform estimations and computations of real number mentally, with paper and pencil, and with technology.*

**Exhibit 16. Items Given Ratings of Highest Priority for Professional Development in Mathematics (N = 655)**

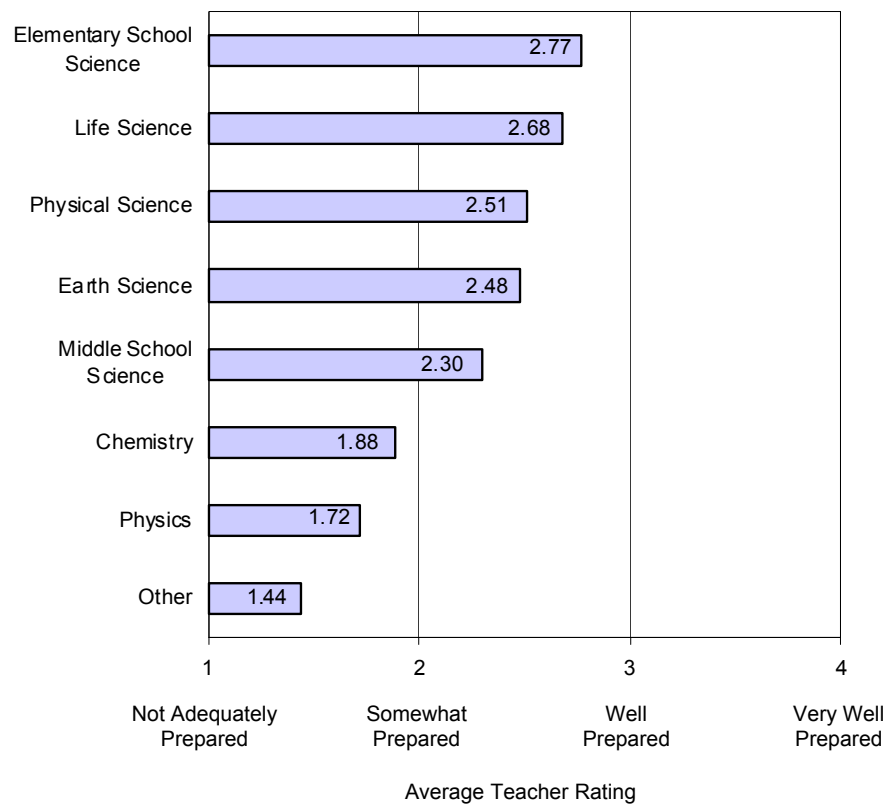


## Science

### Levels of Preparedness

Respondents rated how well their undergraduate or graduate degree prepared them for teaching in various areas in science, using a 4-point scale with 1 corresponding to not adequately prepared and 4 corresponding to very well prepared. Exhibit 17 illustrates that respondents rated their preparation level the lowest for teaching physics while rating the highest level of preparation for teaching elementary school science.

**Exhibit 17. Ratings of Preparedness for Various Areas in Science (N = 503)**



Respondents rated various teaching strategies and/or approaches, along with other instructional support activities, using a 4-point scale with 1 corresponding to not adequately prepared and 4 corresponding to very well prepared. Exhibit 18 presents the average response ratings for survey items for which respondents felt least prepared in science. For science, respondents gave lowest ratings to *teaching science to students who have limited English proficiency, teaching students with a learning disability which impacts science learning, and using a variety of technological tools to enhance student learning.*

**Exhibit 18. Items for Which Respondents Felt Least Prepared in Science (N = 503)**

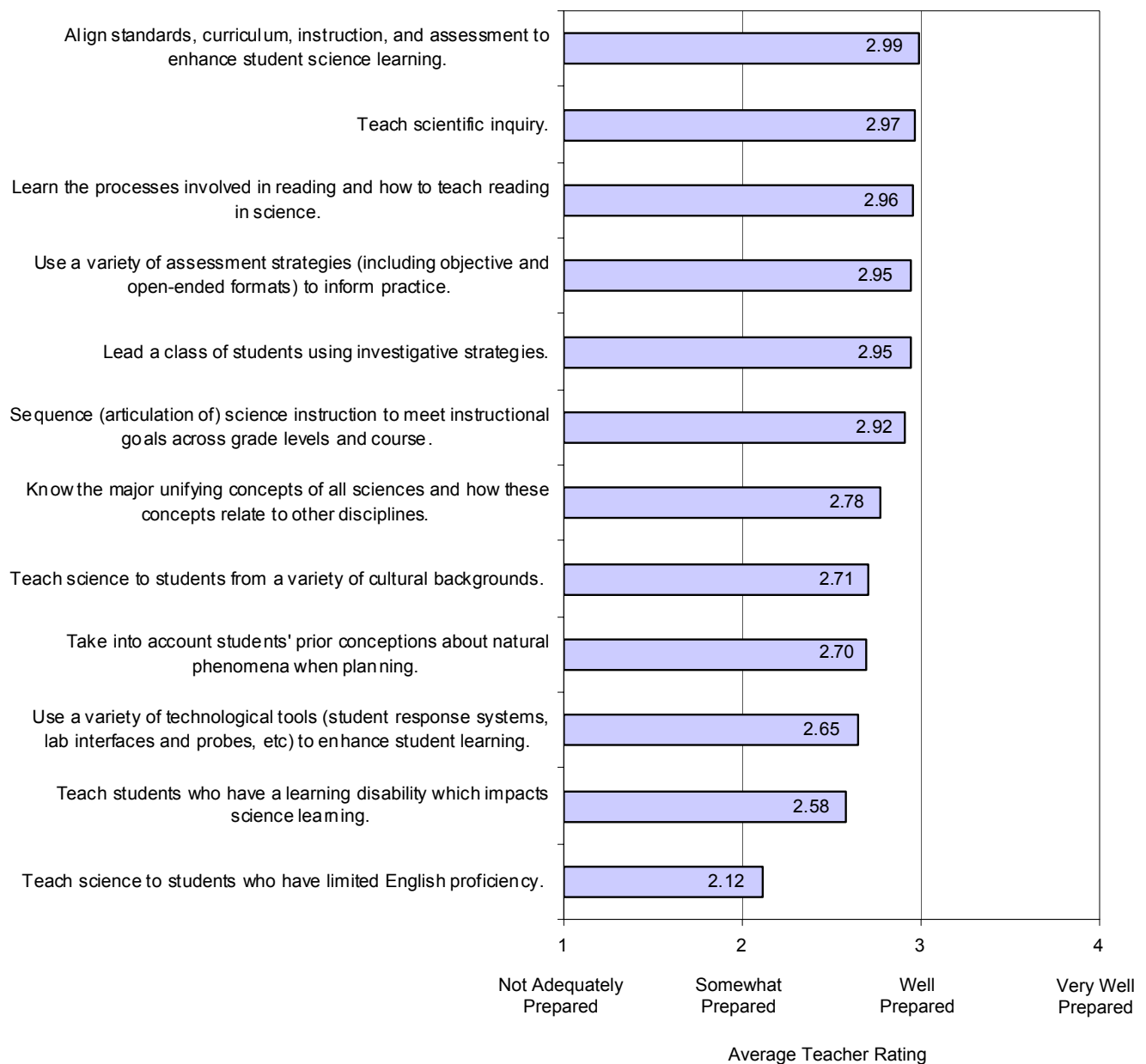
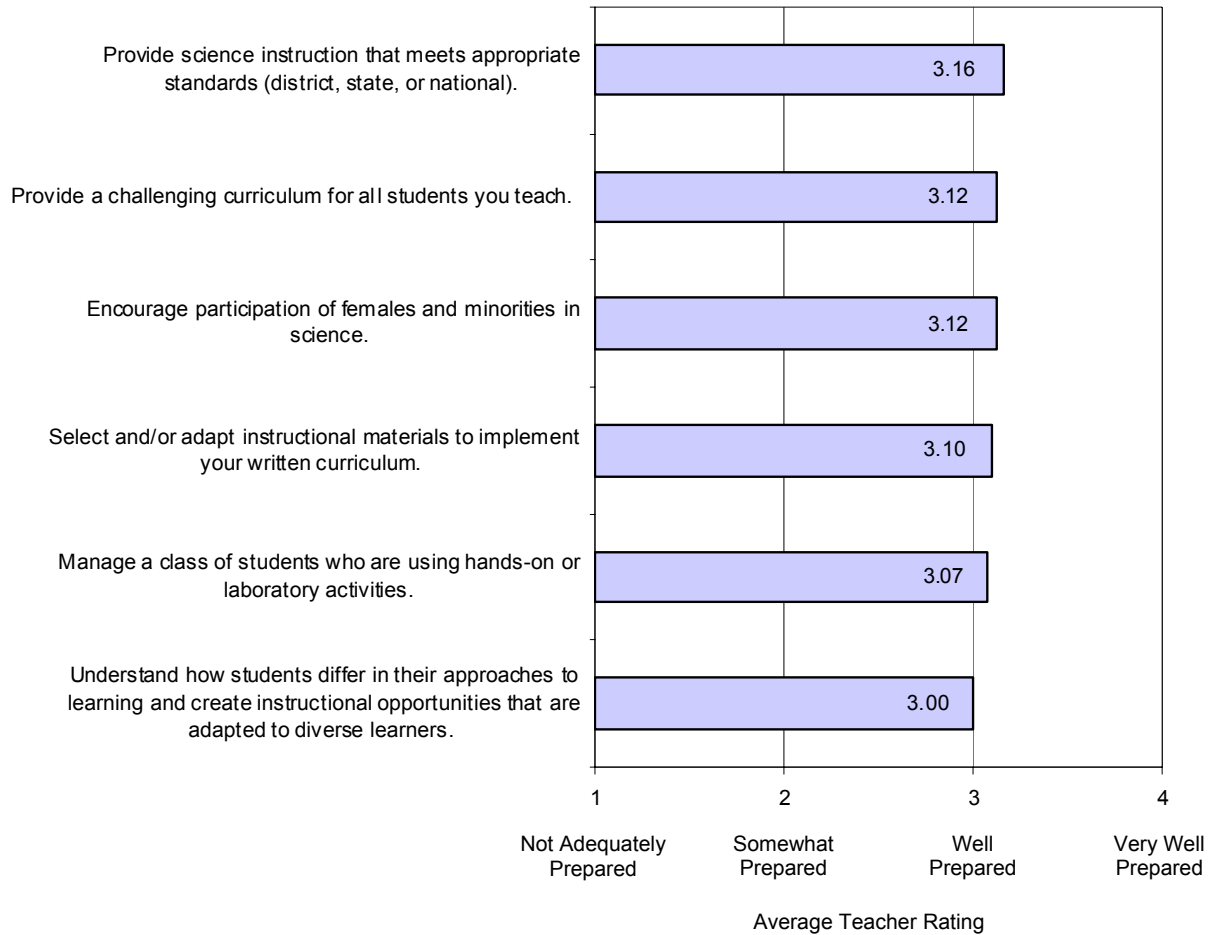


Exhibit 19 presents the average response ratings for survey items for which respondents felt well prepared in science. For science, respondents gave highest ratings to *providing science instruction that meets appropriate standards, providing a challenging curriculum for all students and encouraging participation of females and minorities in science.*

**Exhibit 19. Items for Which Respondents Felt Best Prepared in Science (N = 503)**



## Professional Development Priorities

Respondents rated the degree to which they felt topics were a priority for professional development at their grade levels, whether or not those topics are currently in their curriculum, using a 4-point scale with 1 corresponding to not a priority and 4 corresponding to a high priority. Exhibit 20 presents the average response ratings for survey items on topics respondents rated a low priority. For science, the lowest priority for professional development was identified as *helping students develop an understanding of the theory of biological evolution*.

**Exhibit 20. Items Given Ratings of Lowest Priority for Professional Development in Science (N = 503)**

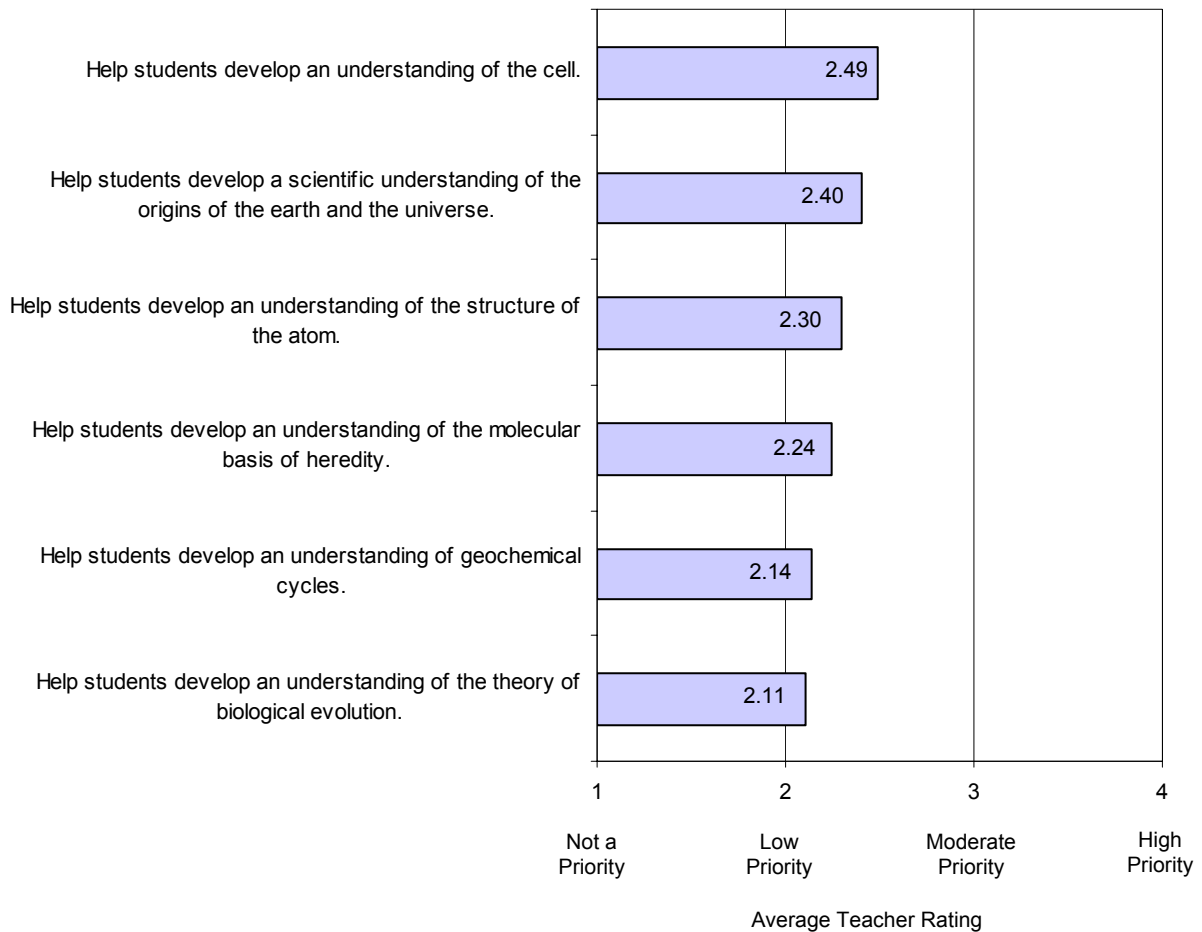


Exhibit 21 presents the average response ratings for survey items on topics respondents rated as low to moderate priority.

### Exhibit 21. Items Given Ratings of Low to Moderate Priority for Professional Development in Science (N = 503)

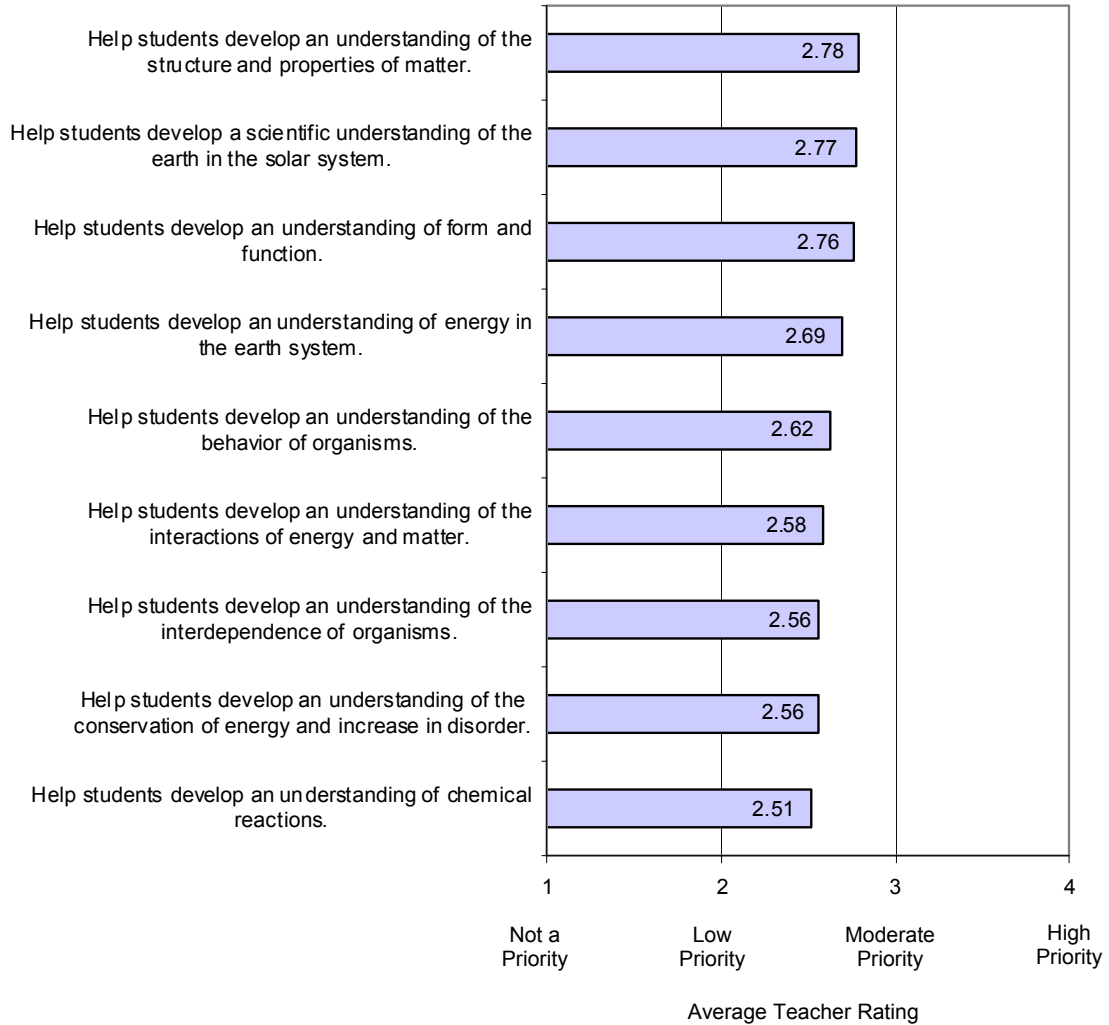
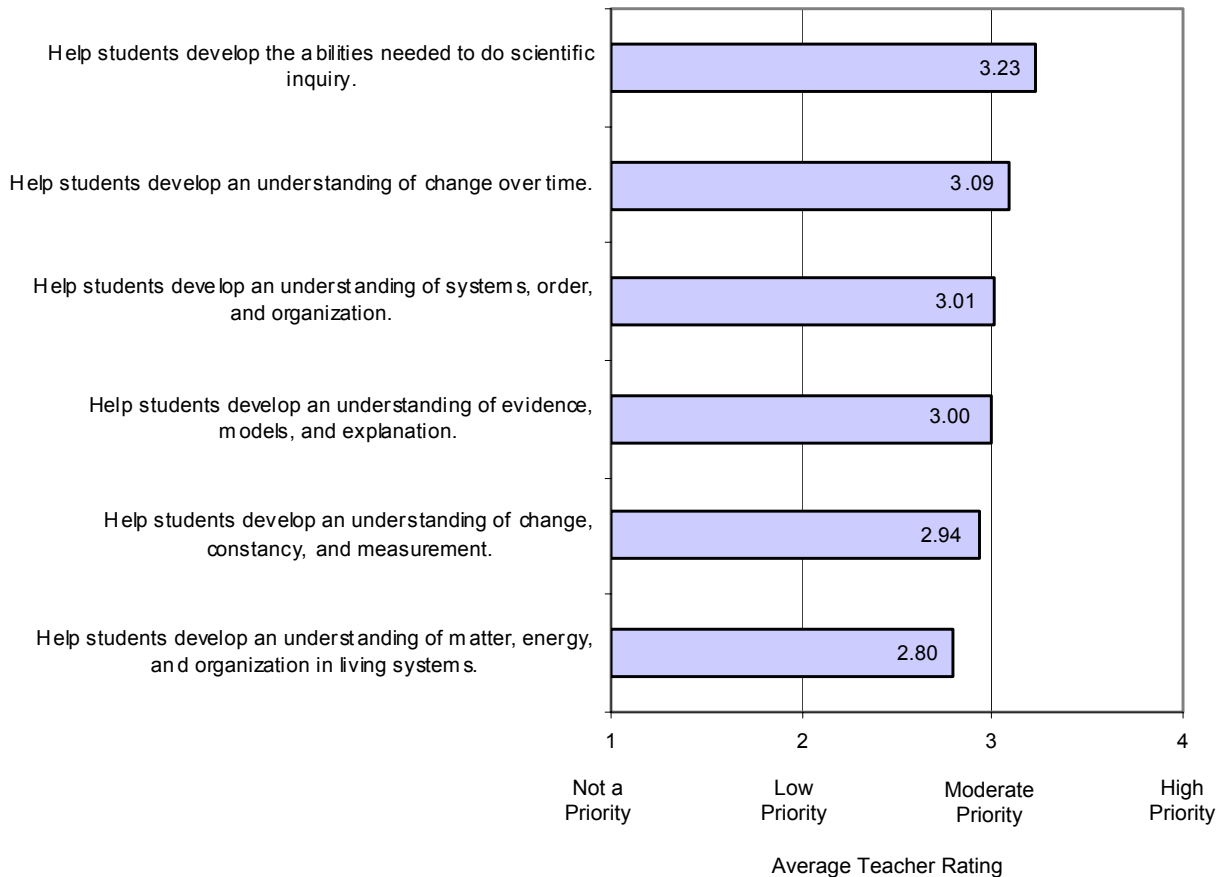


Exhibit 22 presents the average response ratings for those survey items that are at the top of the respondents rating scale, becoming the highest priority, even though in all cases the ratings were close to a moderate rating. For science, of the choices contained in the survey, the item rated highest as a need for professional development was *helping students develop the abilities needed to do scientific inquiry*.

**Exhibit 22. Items Given Ratings of Highest Priority for Professional Development in Science (N = 503)**





*This section presents an analysis of data based on three different grouping of responses in order to determine if any differences exist on levels of preparedness for teaching mathematics and science and on levels of needs for professional development in mathematics and science.*

#### Years of Teaching

Teacher participants were grouped according to years of teaching experience. No significant differences were discovered for any of the scale measures for these teacher groupings.

#### School Size

Teacher participants were grouped according to the size of the school in which they taught. As shown in Exhibit 23, significant differences were found in all three of the mathematics scales. For Preparedness to Teach Mathematics, teachers in large schools had significantly lower levels of preparedness than teachers in small or medium schools. For Preparedness to Meet Student Needs in Mathematics, teachers in small schools had significantly lower levels of preparedness than teachers in medium or large schools. For Mathematics Professional Development Needs, teachers in small and medium schools had significantly higher levels of need than teachers in large schools. Effect sizes are considered small (.20) to medium (.50).

### Exhibit 23. Significant Differences in Teacher Groupings by School Size for Mathematics Preparedness and Professional Development Needs

	<i>N</i>	Mean <sup>10</sup>	SD <sup>11</sup>	<i>p</i> <sup>12</sup>	Effect Size ( <i>d</i> )
<b>Preparedness for Teaching Mathematics<sup>a</sup></b>				<b>.000</b>	
<b>Grouping 1</b>				<b>.000</b>	<b>.35</b>
500 or fewer students	325	2.98	.83		
2501 or more students	180	2.68	.91		
<b>Grouping 2</b>				<b>.000</b>	<b>.37</b>
510 to 2500 students	267	3.00	.83		
2501 or more students	180	2.68	.91		
<b>Preparedness to Meet Student Needs<sup>a</sup></b>				<b>.014</b>	
<b>Grouping 1</b>				<b>.050</b>	<b>.20</b>
500 or fewer students	324	2.39	.72		
510 to 2500 students	266	2.54	.52		
<b>Grouping 2</b>				<b>.034</b>	<b>.25</b>
500 or fewer students	324	2.39	.72		
2501 or more students	180	2.58	.86		
<b>Mathematics Professional Development Needs<sup>b</sup></b>				<b>.000</b>	
<b>Grouping 1</b>				<b>.000</b>	<b>.50</b>
500 or fewer students	313	2.55	.88		
2501 or more students	176	2.08	1.01		
<b>Grouping 2</b>				<b>.000</b>	<b>.41</b>
501 to 2500 students	264	2.48	.96		
2501 or more students	176	2.08	1.01		

<sup>a</sup> Ratings are on a 4-point scale where 1 = Not Adequately Prepared, 2 = Somewhat Prepared, 3 = Well Prepared, and 4 = Very Well Prepared.

<sup>b</sup> Ratings are on a 4-point scale where 1 = Not a Priority, 2 = Low Priority, 3 = Moderate Priority, and 4 = High Priority.

As shown in Exhibit 24, significant differences were found in three of the five science scales. For Preparedness to Meet Student Needs in Science, teachers in small schools had significantly lower levels of preparedness than teachers in medium schools or large schools. For Science Professional Development Needs in Atoms, Matter, and Energy, teachers in small schools had significantly higher levels of need than teachers in medium schools. For Science Professional Development Needs in Life Science, teachers in small schools had significantly higher levels of need than teachers in medium schools. Effect sizes are considered small (.26) to medium (.41).

<sup>10</sup> The mean or average value is a measure of central tendency computed by adding a set of values and dividing the sum by the total number of values.

<sup>11</sup> The standard deviation (*SD*) is a measure of how spread out a set of values is. Higher standard deviations indicate greater variability in data across respondents.

<sup>12</sup> 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 24. Significant Differences in Teacher Groupings by School Size for Science Preparedness and Professional Development Needs

	<i>N</i>	Mean	<i>SD</i>	<i>p</i>	Effect Size ( <i>d</i> )
<b>Science Preparedness – Preparedness to Meet Student Needs<sup>a</sup></b>				<b>.001</b>	
<b>Grouping 1</b>				<b>.042</b>	<b>.26</b>
500 or fewer students	216	2.60	.71		
501 to 2500 students	151	2.79	.71		
<b>Grouping 2</b>				<b>.002</b>	<b>.41</b>
500 or fewer students	216	2.60	.71		
2501 or more students	109	2.89	.76		
<b>Science Professional Development Needs – Atoms, Matter, and Energy<sup>b</sup></b>				<b>.043</b>	
<b>Grouping 1</b>				<b>.033</b>	<b>.27</b>
500 or fewer students	212	2.56	.87		
510 to 2500 students	152	2.32	.94		
<b>Science Professional Development Needs – Life Science<sup>b</sup></b>				<b>.012</b>	
<b>Grouping 1</b>				<b>.016</b>	<b>.30</b>
500 or fewer students	211	2.62	.93		
501 to 2500 students	152	2.33	1.00		

<sup>a</sup> Ratings are on a 4-point scale where 1 = Not Adequately Prepared, 2 = Somewhat Prepared, 3 = Well Prepared, and 4 = Very Well Prepared.

<sup>b</sup> Ratings are on a 4-point scale where 1 = Not a Priority, 2 = Low Priority, 3 = Moderate Priority, and 4 = High Priority.

### ESU Clusters

Teacher participants were grouped according to ESU clusters by region of the state. Significant differences were discovered for the scale measure Preparedness to Meet Student Needs in Science, ( $p < .05$ ), but post hoc tests revealed no statistically significant differences between any of the grouping pairs.



## Results and Recommendations

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### Results

According to survey respondents,

- ***Mathematics teachers felt well prepared to teach elementary and middle school mathematics and algebra.*** Respondents rated their undergraduate and graduate degree preparation level between well prepared and very well prepared for teaching elementary school mathematics and between somewhat prepared and well prepared for teaching middle school mathematics and algebra. They rated their level of preparation for teaching statistics and calculus between not adequately prepared and somewhat prepared.
- ***Mathematics teachers felt well prepared to teach mathematics using a variety of strategies, approaches, and instructional support activities.*** Respondents rated their preparation level between well prepared and very well prepared to provide mathematics instruction that meets appropriate standards (district, state, or nation), encourage participation of females in mathematics, provide a challenging curriculum for all students, and teach problem solving strategies, along with five other approaches focused on teaching and learning. The respondents felt only somewhat prepared to teach mathematics to students who have limited English proficiency.
- ***Mathematics teachers identified professional development needs focusing on helping students.*** Respondents rated several items near moderate priority, which became the items ranked as highest priority for professional development needs. These items all focused on helping students develop the skills and depth of understanding to: perform estimations and computations of real numbers mentally, with paper and pencil, and with technology; justify solutions to mathematical problems; and select and use measuring units, tools, and/or technology and explain the degree of accuracy and precision of measurements.
- ***Science teachers felt prepared to teach the science basics.*** Respondents rated their undergraduate or graduate degree preparation level between somewhat prepared and well prepared for teaching elementary school science, life science, physical science, earth science, and middle school science, in that order. They rated their level of preparation for teaching chemistry and physics between not adequately prepared and somewhat prepared.
- ***Science teachers felt well prepared to teach science using a variety of strategies, approaches, and instructional support activities.*** Respondents rated their preparation level between well prepared and very well prepared to provide science instruction that meets appropriate standards (district, state, or nation), provide a challenging curriculum for all students, encourage participation of females and minorities in science, select and/or adapt instructional materials to implement their written curriculum, and manage a class of students who are using hands-on or laboratory activities. The respondents felt only somewhat prepared to teach science to students who have limited English proficiency.

- ***Science teachers identified professional development needs focusing on helping students.*** Respondents rated several items near moderate priority, which became the topics ranked as highest priority for professional development. These items all focused on helping students develop: the abilities needed to do scientific inquiry; an understanding of change over time; an understanding of systems, order, and organization; and an understanding of models, and explanation.
- ***School size has significant effect on levels of preparedness for teaching mathematics and science.*** Statistically significant differences were found in a number of the mathematics and science scales. For Preparedness to Meet Student Needs in Mathematics and Science, teachers in small schools had significantly lower levels of preparedness than teachers in medium or large schools. For Preparedness to Teacher Mathematics, teachers in large schools had significantly lower levels of preparedness than teachers in small or medium schools. For Mathematics Professional Development Needs, teachers in small or medium schools had significantly higher levels of need than teachers in large schools. For Science Professional Development Needs in Atoms, Matter, and Energy, and in Life Science, teachers in small schools had significantly higher levels of need than teachers in medium schools. Effect sizes were small (.20) to medium (.50).

## Recommendations

NE MSP statewide projects should use the information from the needs assessment to inform the content, audience, and delivery of future project professional development experiences. In order to help focus this information, the following recommendations are offered for project leaders.

- ***Incorporate customized instructional strategies that target specific student populations.*** To the extent possible, encourage course and institute instructors to examine and include specific strategies that are research based and are shown to have significant positive impacts on specific student populations; in particular, students from different cultures, special needs students, and students with limited English proficiency.
- ***Integrate the use of hands-on activities, manipulatives, and technology tools in instructional delivery.*** In many instances, what gets modeled gets learned and transfers to classroom practices. These learning approaches and tools were identified by respondents, in both mathematics and science, as ones they felt less than well prepared to use effectively.
- ***Focus professional development experiences to help develop participant and student understanding of problem solving and inquiry-based science.*** In both mathematics and science, helping to develop an understanding of connections, systems, models, and how to justify and explain the thinking used to arrive at solutions or understandings is an important outcome of the professional development experience.
- ***Target specific professional development to mathematics and science teachers based on school size.*** In both mathematics and science, teachers in small schools need professional development to better meet student needs, as well as specific mathematics and science topics including atoms, matter, and energy and life science.

## Appendix

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Survey Invitation Letter  
SurveyMonkey.com Survey Summary

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Dear Nebraska Mathematics and Science Teachers:

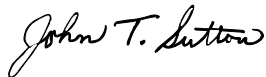
RMC Research Corporation, in cooperation with the Nebraska Mathematics and Science Partnership (NE MSP) projects, is conducting a statewide science and mathematics needs assessment. The purpose of this needs assessment is to document and prioritize professional development needs for both content and instructional approaches to support high quality teaching and learning in mathematics and science. The results of this needs assessment are expected to provide valuable information at the local, state, and national levels about professional development priorities and inform the NE MSP projects statewide. In addition, this information will enable participating schools to ensure that their teachers are engaged in effective mathematics and science professional development that will have positive influences on students. As part of the needs assessment, we are asking that mathematics and science teachers from schools throughout Nebraska complete an Online Nebraska Mathematics and Science Partnership Needs Assessment.

**Please plan to complete the online needs assessment by October 16, 2009.** Following are instructions for accessing and completing the online needs assessment:

1. Set aside 15 minutes to complete the online needs assessment survey. This is an approximated amount of time; the survey may not take you 15 minutes to complete.
2. Go to the webpage containing the survey. Enter the following address into your browser [http://www.surveymonkey.com/s.aspx?sm=WAk\\_2bJRIJql7QaHfhYVPeOg\\_3d\\_3d](http://www.surveymonkey.com/s.aspx?sm=WAk_2bJRIJql7QaHfhYVPeOg_3d_3d) or you can access the link through the RMC Research website (CTRL + click) at <http://www.rmcdenver.com>, then clicking on the Online Tools menu, then click the Nebraska Mathematics and Science Teacher Needs Assessment Survey 2009. This will provide another link that says “click here to take survey.”
3. From either of these access points you will be taken directly to the first page of the survey. Upon accessing this page, you will be provided with an informed consent statement.
4. You may go back and edit your responses while completing the survey, but once you click “Done” at the end of the survey, you will not be able to edit your answers.

If at any time you have questions about the needs assessment survey, please contact us at RMC Research Corporation at (800) 922-3636. We will be happy to answer any questions you may have. Thank you for your help.

Best Regards,



John T. Sutton  
NE MSP Statewide Evaluation Coordinator  
RMC Research Corporation



# NE Mathematics and Science Partnership Needs Assessment



**1. Please enter an eight digit number in the box below. The first four digits should be the year you graduated from high school. The last four digits should be the last four digits of your home phone number. This information is requested for identification purposes to minimize duplication of entries.**

		Response Count
		970
	<i>answered question</i>	<b>970</b>
	<i>skipped question</i>	<b>0</b>


















**2. Today's Date: (Please enter today's date in the text box in the format mm/dd/yyyy.)**

		Response Count
		910
	<i>answered question</i>	<b>910</b>
	<i>skipped question</i>	<b>60</b>

**3. Your Gender (Choose one)**

		Response Percent	Response Count
Male		22.8%	205
Female		77.2%	695
	<i>answered question</i>		<b>900</b>
	<i>skipped question</i>		<b>70</b>

4. Please identify the ESU in which your school is located? (Choose one option from the pull down menu.)

		Response Percent	Response Count
ESU 1		6.9%	62
ESU 2		3.3%	30
ESU 3		11.8%	106
ESU 4		1.2%	11
ESU 5		1.7%	15
ESU 6		5.4%	48
ESU 7		10.1%	91
<b>ESU 8</b>		<b>12.0%</b>	<b>108</b>
ESU 9		6.7%	60
ESU 10		10.8%	97
ESU 11		3.1%	28
ESU 13		10.7%	96
ESU 15		1.3%	12
ESU 16		6.8%	61
ESU 17		1.9%	17
ESU 18 (LPS)		3.1%	28
ESU 19 (OPS)		3.0%	27
		<b><i>answered question</i></b>	<b>897</b>
		<b><i>skipped question</i></b>	<b>73</b>

5. Approximately how many students are in your district? (Choose one option from the pull down menu)			
		Response Percent	Response Count
Fewer than 200		12.7%	112
<b>201-500</b>		<b>29.7%</b>	<b>262</b>
501-1000		16.4%	145
1001-1500		7.6%	67
1501-2000		5.7%	50
2001-2500		4.4%	39
2501-3000		4.0%	35
3001-5000		8.7%	77
More than 5000		10.8%	95
		<b>answered question</b>	<b>882</b>
		<b>skipped question</b>	<b>88</b>

6. Please indicate whether the school in which you teach was identified as NOT making Adequate Yearly Progress (AYP) during the 2005 - 2006 year? (Choose one)			
		Response Percent	Response Count
Yes		9.6%	85
<b>No</b>		<b>52.0%</b>	<b>461</b>
Not Sure		38.4%	341
		<b>answered question</b>	<b>887</b>
		<b>skipped question</b>	<b>83</b>

**7. Which of the following best describes your race/ethnicity? (Choose one option from the pull down menu. If you chose other, please specify in the text box.)**

		Response Percent	Response Count
African-American (not of Hispanic origin)	<input type="checkbox"/>	0.3%	3
Hispanic	<input type="checkbox"/>	1.2%	11
American Indian or Alaskan Native	<input type="checkbox"/>	0.3%	3
<b>White (not of Hispanic origin)</b>	<input checked="" type="checkbox"/>	<b>97.3%</b>	<b>878</b>
Asian or Pacific Islander	<input type="checkbox"/>	0.0%	0
Other (please specify)	<input type="checkbox"/>	0.8%	7
<b>answered question</b>			<b>902</b>
<b>skipped question</b>			<b>68</b>

**8. Including this year ... (Choose only one response per question)**

	3 or less years	4 - 6 years	7 - 9 years	10 - 14 years	15 or more years	N/A	Rating Average	Response Count
How many years have you taught on a full-time basis at a K-12 school?	11.9% (108)	11.7% (106)	11.5% (104)	15.3% (139)	<b>49.3%</b> <b>(447)</b>	0.3% (3)	3.79	907
How many years have you taught science on a full time basis in a K-12 school?	17.5% (155)	10.3% (91)	7.6% (67)	9.1% (81)	26.1% (231)	<b>29.5%</b> <b>(261)</b>	3.23	886
How many years have you taught mathematics on a full time basis in a K-12 school?	15.2% (137)	9.9% (89)	8.9% (80)	10.6% (95)	<b>31.3%</b> <b>(282)</b>	24.1% (217)	3.43	900
<b>answered question</b>								<b>908</b>
<b>skipped question</b>								<b>62</b>


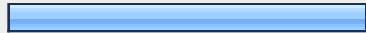



**9. At your school, besides you, how many other teachers are employed full time to teach... (Choose only one response per question)**

	Just Me	1-2	3-5	6-10	11-15	More than 15	Rating Average	Response Count
a. Mathematics	3.4% (28)	<b>22.9%</b> <b>(191)</b>	20.2% (169)	20.8% (174)	14.9% (124)	17.8% (149)	3.74	835
b. Science	3.2% (25)	<b>24.2%</b> <b>(190)</b>	20.4% (160)	23.3% (183)	11.8% (93)	17.1% (134)	3.68	785
	<i>answered question</i>							<b>872</b>
	<i>skipped question</i>							<b>98</b>

**10. Please identify any degree that you have earned and list the institution name and state where you completed that degree.**

		Response Percent	Response Count
BA or BS: Institution Name and State	<input type="text"/>	98.8%	893
MA, MS, or MEd: Institution Name and State	<input type="text"/>	52.0%	470
PhD or EdD: Institution Name and State	<input type="text"/>	1.7%	15
Other (describe)	<input type="text"/>	6.0%	54
	<i>answered question</i>		<b>904</b>
	<i>skipped question</i>		<b>66</b>

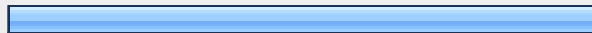

11. What type of teaching certificate do you presently hold? (Choose one response from the pull down menu. If you choose other, please specify in the text box.)

		Response Percent	Response Count
Initial		6.1%	55
<b>Standard</b>		<b>55.0%</b>	<b>494</b>
Professional		36.3%	326
Provisional		1.0%	9
Substitute		0.0%	0
Other (please specify)		1.6%	14
		<b><i>answered question</i></b>	<b>898</b>
		<b><i>skipped question</i></b>	<b>72</b>

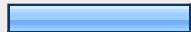
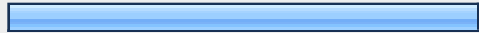
**12. From the list below, please identify areas of certification or endorsements you initially received, any endorsements you presently hold, and any endorsements you are interested in obtaining. (Choose all that apply)**

	<b>Initial Area</b>	<b>Presently Hold</b>	<b>Interest in Obtaining</b>	<b>Response Count</b>
Early Childhood Education (PreK – 3)	40.0% (50)	<b>59.2% (74)</b>	20.8% (26)	125
Elementary education (K - 8)	51.7% (274)	<b>80.8% (428)</b>	0.2% (1)	530
Middle Grades Education (4 - 9)	29.9% (44)	<b>66.7% (98)</b>	20.4% (30)	147
Middle Grades Education – Area of Specialization – Mathematics (4 – 9)	23.1% (25)	<b>51.9% (56)</b>	41.7% (45)	108
Middle Grades Education – Area of Specialization – Natural Science (4 - 9)	29.2% (21)	<b>62.5% (45)</b>	29.2% (21)	72
Biology (7 – 12)	56.0% (56)	<b>81.0% (81)</b>	10.0% (10)	100
Chemistry (7 – 12)	45.0% (27)	<b>68.3% (41)</b>	25.0% (15)	60
Earth Science (7 – 12)	22.2% (8)	<b>61.1% (22)</b>	36.1% (13)	36
Health (7 – 12)	37.5% (3)	<b>62.5% (5)</b>	25.0% (2)	8
Mathematics (7 - 12)	61.2% (123)	<b>78.6% (158)</b>	9.0% (18)	201
Natural Science (7 – 12)	33.3% (27)	<b>70.4% (57)</b>	23.5% (19)	81
Physical Science (7 – 12)	33.3% (22)	<b>63.6% (42)</b>	27.3% (18)	66
Physics (7 – 12)	32.6% (15)	<b>54.3% (25)</b>	39.1% (18)	46
			Other (please specify)	213
			<b><i>answered question</i></b>	<b>880</b>
			<b><i>skipped question</i></b>	<b>90</b>

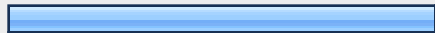

**13. Please indicate whether you are presently teaching in an area for which you hold an endorsement? (Choose one)**

		Response Percent	Response Count
Yes		90.0%	809
No		10.0%	90
		<i>answered question</i>	<b>899</b>
		<i>skipped question</i>	<b>71</b>

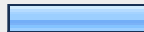
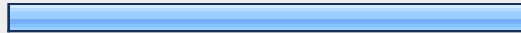
**14. Please indicate whether you are interested in earning an advanced degree in either science or mathematics? (Choose one)**

		Response Percent	Response Count
Yes		27.7%	248
No		72.3%	648
		<i>answered question</i>	<b>896</b>
		<i>skipped question</i>	<b>74</b>

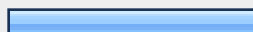

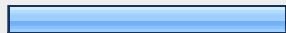
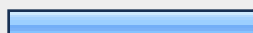
**15. Please indicate whether you are interested in receiving college or university credit for professional development? (Choose one)**

		Response Percent	Response Count
Yes		65.8%	591
No		34.2%	307
		<i>answered question</i>	<b>898</b>
		<i>skipped question</i>	<b>72</b>

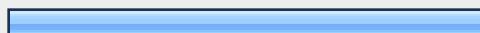
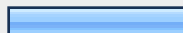
**16. Please indicate whether you are/were a participant in any of the NMPDS Algebra workshops and/or any of the Science KICKS institutes. (Choose one)**

		Response Percent	Response Count
Yes		20.5%	184
No		79.5%	713
		<i>answered question</i>	<b>897</b>
		<i>skipped question</i>	<b>73</b>

**17. Please indicate whether you are a member of any of the following professional organizations. (Choose all that apply)**

		Response Percent	Response Count
Nebraska Association of Teachers of Science (NATS)		37.5%	100
National Science Teachers Association (NSTA)		29.2%	78
<b>Nebraska Association of Teachers of Mathematics (NATM)</b>		<b>42.7%</b>	<b>114</b>
National Council of Teachers of Mathematics (NCTM)		37.5%	100
		<i>answered question</i>	<b>267</b>
		<i>skipped question</i>	<b>703</b>

**18. Do you currently teach mathematics, or will you teach mathematics in the next school year? (Choose one)**

		Response Percent	Response Count
Yes		73.2%	663
No		26.8%	243
		<i>answered question</i>	<b>906</b>
		<i>skipped question</i>	<b>64</b>

**19. Considering your undergraduate or graduate preparation to teach, please indicate how well your degree prepared you for teaching in the following areas.**

	<b>Not Adequately Prepared</b>	<b>Somewhat Prepared</b>	<b>Well Prepared</b>	<b>Very Well Prepared</b>	<b>Not Sure</b>	<b>Rating Average</b>	<b>Response Count</b>
a. Algebra	21.3% (142)	26.9% (180)	19.5% (130)	<b>28.3%</b> <b>(189)</b>	4.0% (27)	2.67	668
b. Algebra II	<b>38.2%</b> <b>(252)</b>	21.2% (140)	14.1% (93)	21.1% (139)	5.3% (35)	2.34	659
c. Geometry	<b>30.2%</b> <b>(199)</b>	29.3% (193)	19.8% (130)	16.0% (105)	4.7% (31)	2.36	658
d. Statistics	<b>51.5%</b> <b>(334)</b>	24.7% (160)	11.2% (73)	6.8% (44)	5.9% (38)	1.91	649
e. Calculus	<b>61.1%</b> <b>(396)</b>	16.5% (107)	9.0% (58)	7.4% (48)	6.0% (39)	1.81	648
f. Middle School Mathematics	19.2% (129)	22.1% (149)	23.0% (155)	<b>30.9%</b> <b>(208)</b>	4.8% (32)	2.80	673
g. Elementary School Mathematics	7.5% (57)	14.0% (106)	25.2% (191)	<b>48.1%</b> <b>(365)</b>	5.3% (40)	3.30	759
h. Other	17.3% (13)	5.3% (4)	8.0% (6)	22.7% (17)	<b>46.7%</b> <b>(35)</b>	3.76	75
If Other (please specify)							22
<b>answered question</b>							<b>798</b>
<b>skipped question</b>							<b>172</b>

20. Please indicate how well prepared you feel to do each of the following. (Choose only one response per statement)							
	Not Adequately Prepared	Somewhat Prepared	Well Prepared	Very Well Prepared	Not Sure	Rating Average	Response Count
a. Provide mathematics instruction that meets appropriate standards (district, state, or national).	5.2% (41)	12.3% (98)	35.2% (280)	<b>45.6% (363)</b>	1.8% (14)	3.27	796
b. Teach problem solving strategies.	2.8% (22)	17.9% (143)	<b>44.1% (352)</b>	34.3% (274)	1.0% (8)	3.13	799
c. Teach mathematics with the use of manipulative materials, such as counting blocks, geometric shapes, algebra tiles, and so on.	5.9% (47)	20.5% (163)	<b>36.5% (290)</b>	35.0% (278)	2.0% (16)	3.07	794
d. Teach mathematics with the use of technology tools, such as calculators, graphing calculators, and spreadsheets.	16.4% (130)	<b>33.8% (267)</b>	29.7% (235)	18.2% (144)	1.9% (15)	2.55	791
e. Align standards, curriculum, instruction, and assessment to enhance student mathematics learning.	9.3% (74)	20.2% (161)	<b>39.1% (312)</b>	29.4% (234)	2.0% (16)	2.95	797
f. Sequence (articulation of) mathematics instruction to meet instructional goals across grade levels and courses.	11.4% (90)	22.5% (178)	<b>40.3% (318)</b>	23.5% (186)	2.3% (18)	2.83	790
g. Select and/or adapt instructional materials to implement your written curriculum.	6.3% (50)	21.4% (170)	<b>41.7% (332)</b>	28.9% (230)	1.8% (14)	2.98	796
h. Make appropriate and relevant connections to other areas of mathematics, to other disciplines, and/or to real world contexts.	4.8% (38)	23.0% (183)	<b>45.7% (364)</b>	25.0% (199)	1.5% (12)	2.95	796
i. Understand how students differ in their approaches to learning and create instructional opportunities that are adapted to diverse learners.	3.9% (31)	21.6% (172)	<b>46.3% (369)</b>	26.7% (213)	1.5% (12)	3.00	797
j. Teach mathematics to students from a variety of cultural	14.0% (111)	30.9% (245)	<b>32.1% (254)</b>	20.1% (159)	2.9% (23)	2.67	792

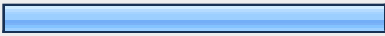

backgrounds.							
k. Teach mathematics to students who have limited English proficiency.	31.3% (247)	<b>38.2%</b> <b>(302)</b>	17.6% (139)	9.6% (76)	3.3% (26)	2.15	790
l. Teach students who have a learning disability which impacts mathematics learning.	14.2% (113)	<b>35.9%</b> <b>(285)</b>	32.4% (257)	15.1% (120)	2.3% (18)	2.55	793
m. Encourage participation of females in mathematics.	4.2% (33)	14.3% (113)	38.6% (306)	<b>40.3%</b> <b>(319)</b>	2.7% (21)	3.23	792
n. Provide a challenging curriculum for all students you teach.	3.1% (24)	14.9% (117)	<b>47.3%</b> <b>(371)</b>	33.2% (261)	1.5% (12)	3.15	785
o. Learn the processes involved in reading and how to teach reading in mathematics.	9.5% (75)	26.8% (211)	<b>40.0%</b> <b>(315)</b>	22.0% (173)	1.7% (13)	2.79	787
p. Use a variety of assessment strategies (including objective and open-ended formats) to inform practice.	6.4% (51)	24.7% (196)	<b>44.5%</b> <b>(353)</b>	22.4% (178)	2.0% (16)	2.89	794
	<b>answered question</b>						<b>801</b>
	<b>skipped question</b>						<b>169</b>

**21. Within mathematics, many teachers feel better prepared to teach some topics than others, resulting in differing needs for professional development. Please indicate the degree to which these professional development needs are a priority for you at the grade levels you teach, whether or not they are currently included in your curriculum. (Choose only one response per statement)**

	Not a Priority	Low Priority	Moderate Priority	High Priority	Not Sure	Rating Average	Response Count
a. Help students develop an understanding of relationships between subsets of real numbers.	15.8% (122)	20.5% (159)	<b>36.2% (280)</b>	17.8% (138)	9.7% (75)	2.85	774
b. Help students develop an understanding of the equivalent forms of numbers using exponents, radicals, scientific notation, absolute values, fractions, decimals, and percents.	19.7% (152)	16.5% (127)	<b>29.2% (225)</b>	27.8% (214)	6.9% (53)	2.86	771
c. Help students develop the ability to solve theoretical and applied problems using numbers in equivalent forms, radicals, exponents, scientific notation, absolute values, fractions decimals, and percents, ratios and proportions, order of operations, and properties of real numbers.	18.8% (145)	15.3% (118)	27.7% (214)	<b>30.4% (235)</b>	7.9% (61)	2.93	773
d. Help students develop the skills and depth of understanding to justify solutions to mathematical problems.	5.4% (42)	12.6% (98)	37.0% (287)	<b>38.1% (295)</b>	6.8% (53)	3.28	775
e. Help students develop the skills and depth of understanding necessary to perform estimations and computations of real numbers mentally, with paper and pencil, and with technology.	5.4% (42)	13.6% (105)	32.9% (254)	<b>41.6% (321)</b>	6.4% (49)	3.30	771
f. Help students develop the skills and depth of understanding to select and use measuring units, tools, and/or technology and explain the degree of accuracy and precision of measurements.	7.0% (54)	17.7% (137)	<b>38.6% (298)</b>	30.8% (238)	5.8% (45)	3.11	772
g. Help students the skills and depth of understanding to convert between metric and standard units	19.7% (152)	27.1% (209)	<b>32.7% (252)</b>	14.3% (110)	6.2% (48)	2.60	771

of measurement, given conversion factors.							
h. Help students develop the skills and depth of understanding to calculate perimeter and area of two-dimensional shapes and surface area and volume of three-dimensional shapes.	14.7% (113)	18.2% (140)	<b>33.7%</b> <b>(259)</b>	27.2% (209)	6.2% (48)	2.92	769
i. Help students develop the skills and depth of understanding necessary to create geometric models to describe the physical world.	12.6% (97)	27.1% (208)	<b>36.8%</b> <b>(282)</b>	17.1% (131)	6.4% (49)	2.77	767
j. Help students develop the skills and depth of understanding necessary to evaluate characteristics and properties of two- and three-dimensional geometric shapes.	11.4% (88)	27.3% (210)	<b>36.9%</b> <b>(284)</b>	17.0% (131)	7.3% (56)	2.81	769
k. Help students develop the skills and depth of understanding necessary to apply coordinate geometry to locate and describe objects algebraically.	22.1% (170)	22.4% (172)	<b>29.4%</b> <b>(226)</b>	18.5% (142)	7.6% (58)	2.67	768
l. Help students develop the skills and depth of understanding to apply right triangle trigonometry to find length and angle measures.	<b>30.5%</b> <b>(233)</b>	21.4% (163)	21.4% (163)	17.8% (136)	8.9% (68)	2.53	763
m. Help students develop the skills and depth of understanding to apply geometric properties to solve problems.	22.7% (173)	21.1% (161)	<b>29.9%</b> <b>(228)</b>	18.0% (137)	8.3% (63)	2.68	762
n. Help students develop the skills and depth of understanding to apply deductive reasoning to arrive at a conclusion.	9.2% (71)	16.1% (124)	<b>34.8%</b> <b>(268)</b>	32.8% (253)	7.1% (55)	3.13	771
o. Help students develop the skills and depth of understanding to select a sampling technique to gather data, analyze the resulting data and make inferences.	10.4% (80)	22.3% (171)	<b>34.3%</b> <b>(263)</b>	26.6% (204)	6.4% (49)	2.96	767
p. Help students develop the skills							

and depth of understanding to write equations and make predictions from sets of data.	12.1% (93)	19.3% (148)	<b>35.4%</b> <b>(272)</b>	27.0% (207)	6.3% (48)	2.96	768
q. Help students develop the skills and depth of understanding to apply theoretical probability to represent problems and make decisions.	18.2% (139)	24.9% (190)	<b>32.6%</b> <b>(249)</b>	17.6% (134)	6.7% (51)	2.70	763
r. Help students develop the skills and depth of understanding to evaluate how transformations on data affect the measures of central tendency and variability.	<b>30.7%</b> <b>(235)</b>	22.6% (173)	26.1% (200)	11.8% (90)	8.8% (67)	2.45	765
s. Help students develop the skills and depth of understanding to interpret data represented by the normal distribution and formulate conclusions.	23.8% (181)	22.7% (173)	<b>30.4%</b> <b>(232)</b>	15.4% (117)	7.7% (59)	2.61	762
t. Help students develop the skills and depth of understanding to calculate probabilities of independent events.	21.8% (166)	26.2% (200)	<b>32.4%</b> <b>(247)</b>	12.3% (94)	7.3% (56)	2.57	763
u. Help students develop the skills and depth of understanding to graph and interpret algebraic relations and inequalities.	24.7% (187)	19.4% (147)	<b>28.3%</b> <b>(214)</b>	19.6% (148)	8.1% (61)	2.67	757
v. Help students develop the skills and depth of understanding to solve problems involving equations and inequalities.	18.7% (142)	18.3% (139)	<b>29.6%</b> <b>(225)</b>	26.7% (203)	6.8% (52)	2.85	761
w. Help students develop the skills and depth of understanding to solve problems involving systems of two equations, and systems of two or more inequalities.	<b>27.0%</b> <b>(206)</b>	19.9% (152)	25.0% (191)	19.5% (149)	8.5% (65)	2.63	763
x. Help students develop the skills and depth of understanding to solve problems using patterns and functions.	11.0% (84)	17.3% (132)	<b>35.0%</b> <b>(267)</b>	30.3% (231)	6.3% (48)	3.04	762
	<b>answered question</b>						<b>781</b>
	<b>skipped question</b>						<b>189</b>

22. Do you currently teach science, or will you teach science in the next school year? (Choose one)				
			Response Percent	Response Count
Yes			58.8%	506
No			41.2%	355
<i>answered question</i>				<b>861</b>
<i>skipped question</i>				<b>109</b>

23. Considering your undergraduate or graduate preparation to teach, please indicate how well your degree prepared you for teaching in the following areas.							
	Not Adequately Prepared	Somewhat Prepared	Well Prepared	Very Well Prepared	Not Sure	Rating Average	Response Count
a. Chemistry	<b>43.2%</b> <b>(183)</b>	25.9% (110)	15.8% (67)	11.3% (48)	3.8% (16)	2.07	424
b. Physics	<b>48.9%</b> <b>(204)</b>	24.7% (103)	14.4% (60)	7.7% (32)	4.3% (18)	1.94	417
c. Life Science	14.4% (63)	23.4% (102)	<b>31.4%</b> <b>(137)</b>	28.0% (122)	2.8% (12)	2.81	436
d. Earth Science	14.8% (64)	30.9% (133)	<b>35.5%</b> <b>(153)</b>	16.2% (70)	2.6% (11)	2.61	431
e. Physical Science	16.1% (69)	26.6% (114)	<b>35.3%</b> <b>(151)</b>	18.9% (81)	3.0% (13)	2.66	428
f. Middle School Science	<b>26.0%</b> <b>(109)</b>	25.8% (108)	24.8% (104)	19.6% (82)	3.8% (16)	2.49	419
g. Elementary School Science	8.7% (41)	21.6% (102)	<b>34.5%</b> <b>(163)</b>	30.7% (145)	4.7% (22)	3.01	473
h. Other	14.3% (7)	6.1% (3)	16.3% (8)	18.4% (9)	<b>44.9%</b> <b>(22)</b>	3.73	49
If Other (please specify)							7
<i>answered question</i>							<b>498</b>
<i>skipped question</i>							<b>472</b>

24. Please indicate how well prepared you feel to do each of the following. (Choose only one response per statement)							
	Not Adequately Prepared	Somewhat Prepared	Well Prepared	Very Well Prepared	Not Sure	Rating Average	Response Count
a. Provide science instruction that meets appropriate standards (district, state, or national).	1.6% (8)	17.8% (88)	<b>40.8% (201)</b>	39.1% (193)	0.6% (3)	3.19	493
b. Teach scientific inquiry.	4.1% (20)	24.8% (122)	<b>38.7% (190)</b>	31.6% (155)	0.8% (4)	3.00	491
c. Manage a class of students who are using hands-on or laboratory activities.	3.9% (19)	18.8% (92)	<b>40.0% (196)</b>	36.3% (178)	1.0% (5)	3.12	490
d. Lead a class of students using investigative strategies.	4.7% (23)	24.0% (118)	<b>40.7% (200)</b>	29.9% (147)	0.6% (3)	2.98	491
e. Take into account students' prior conceptions about natural phenomena when planning.	7.3% (36)	28.8% (141)	<b>41.6% (204)</b>	20.2% (99)	2.0% (10)	2.81	490
f. Align standards, curriculum, instruction, and assessment to enhance student science learning.	4.3% (21)	21.3% (105)	<b>41.5% (204)</b>	31.9% (157)	1.0% (5)	3.04	492
g. Sequence (articulation of) science instruction to meet instructional goals across grade levels and courses.	5.5% (27)	23.0% (113)	<b>43.1% (212)</b>	27.8% (137)	0.6% (3)	2.95	492
h. Select and/or adapt instructional materials to implement your written curriculum.	1.6% (8)	19.5% (95)	<b>43.0% (210)</b>	35.0% (171)	0.8% (4)	3.14	488
i. Know the major unifying concepts of all sciences and how these concepts relate to other disciplines.	6.8% (33)	28.9% (141)	<b>36.9% (180)</b>	25.8% (126)	1.6% (8)	2.87	488
j. Understand how students differ in their approaches to learning and create instructional opportunities that are adapted to diverse learners.	3.5% (17)	22.2% (109)	<b>41.5% (204)</b>	32.1% (158)	0.8% (4)	3.05	492
k. Teach science to students from a variety of cultural backgrounds.	8.2% (40)	29.8% (145)	<b>37.7% (183)</b>	22.8% (111)	1.4% (7)	2.79	486

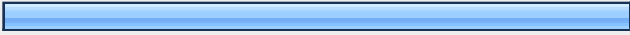

I. Teach science to students who have limited English proficiency.	26.4% (129)	<b>40.0%</b> <b>(195)</b>	20.7% (101)	11.1% (54)	1.8% (9)	2.22	488
m. Teach students who have a learning disability which impacts science learning.	10.8% (53)	<b>36.9%</b> <b>(181)</b>	32.7% (160)	19.0% (93)	0.6% (3)	2.62	490
n. Encourage participation of females and minorities in science.	1.6% (8)	16.7% (82)	<b>42.4%</b> <b>(208)</b>	37.5% (184)	1.8% (9)	3.21	491
o. Provide a challenging curriculum for all students you teach.	1.6% (8)	17.1% (83)	<b>46.1%</b> <b>(224)</b>	34.6% (168)	0.6% (3)	3.15	486
p. Learn the processes involved in reading and how to teach reading in science.	4.3% (21)	22.0% (107)	<b>42.9%</b> <b>(209)</b>	29.8% (145)	1.0% (5)	3.01	487
q. Use a variety of assessment strategies (including objective and open-ended formats) to inform practice.	3.5% (17)	24.4% (119)	<b>42.5%</b> <b>(207)</b>	28.7% (140)	0.8% (4)	2.99	487
r. Use a variety of technological tools (student response systems, lab interfaces and probes, etc) to enhance student learning.	9.8% (48)	33.3% (163)	<b>34.2%</b> <b>(167)</b>	21.5% (105)	1.2% (6)	2.71	489
	<b>answered question</b>						<b>494</b>
	<b>skipped question</b>						<b>476</b>

**25. Within science, many teachers feel better prepared to teach some topics than others, resulting in differing needs for professional development. Please indicate the degree to which these professional development needs are a priority for you the grade levels you teach, whether or not they are currently included in your curriculum. (Choose only one response per statement)**

	Not a Priority	Low Priority	Moderate Priority	High Priority	Not Sure	Rating Average	Response Count
a. Help students develop an understanding of systems, order, and organization.	5.9% (29)	15.5% (76)	<b>41.5% (203)</b>	35.0% (171)	2.0% (10)	3.12	489
b. Help students develop an understanding of evidence, models, and explanation.	5.9% (29)	14.8% (72)	<b>44.9% (219)</b>	32.4% (158)	2.0% (10)	3.10	488
c. Help students develop an understanding of change, constancy, and measurement.	5.1% (25)	17.6% (86)	<b>45.7% (223)</b>	29.1% (142)	2.5% (12)	3.06	488
d. Help students develop an understanding of form and function.	7.4% (36)	22.4% (109)	<b>41.8% (203)</b>	24.7% (120)	3.7% (18)	2.95	486
e. Help students develop an understanding of change over time.	4.3% (21)	13.6% (66)	<b>45.4% (221)</b>	35.3% (172)	1.4% (7)	3.16	487
f. Help students develop the abilities needed to do scientific inquiry.	4.7% (23)	10.1% (49)	37.2% (181)	<b>46.6% (227)</b>	1.4% (7)	3.30	487
g. Help students develop an understanding of the structure of the atom.	<b>29.4% (142)</b>	20.9% (101)	28.6% (138)	18.2% (88)	2.9% (14)	2.44	483
h. Help students develop an understanding of the structure and properties of matter.	11.9% (58)	18.3% (89)	<b>40.9% (199)</b>	26.7% (130)	2.1% (10)	2.89	486
i. Help students develop an understanding of chemical reactions.	19.3% (94)	25.1% (122)	<b>33.5% (163)</b>	20.2% (98)	1.9% (9)	2.60	486
j. Help students develop an understanding of the conservation of energy and increase in disorder.	16.3% (79)	24.7% (120)	<b>34.8% (169)</b>	21.4% (104)	2.7% (13)	2.69	485
k. Help students develop an understanding of the interactions of energy and matter.	17.5% (85)	22.7% (110)	<b>36.5% (177)</b>	21.4% (104)	1.9% (9)	2.67	485

i. Help students develop an understanding of the cell.	26.9% (130)	17.6% (85)	<b>27.9%</b> <b>(135)</b>	25.8% (125)	1.9% (9)	2.58	484
m. Help students develop an understanding of the molecular basis of heredity.	<b>33.3%</b> <b>(161)</b>	20.0% (97)	24.6% (119)	19.4% (94)	2.7% (13)	2.38	484
n. Help students develop an understanding of the theory of biological evolution.	<b>34.6%</b> <b>(168)</b>	22.7% (110)	24.7% (120)	14.4% (70)	3.5% (17)	2.29	485
o. Help students develop an understanding of the interdependence of organisms.	22.4% (109)	17.5% (85)	<b>32.9%</b> <b>(160)</b>	25.1% (122)	2.3% (11)	2.67	487
p. Help students develop an understanding of matter, energy, and organization in living systems.	14.8% (72)	16.5% (80)	<b>37.3%</b> <b>(181)</b>	30.1% (146)	1.2% (6)	2.86	485
q. Help students develop an understanding of the behavior of organisms.	16.5% (80)	22.0% (107)	<b>38.1%</b> <b>(185)</b>	21.8% (106)	1.6% (8)	2.70	486
r. Help students develop an understanding of energy in the earth system.	13.3% (64)	22.4% (108)	<b>39.5%</b> <b>(191)</b>	23.2% (112)	1.7% (8)	2.78	483
s. Help students develop an understanding of geochemical cycles.	<b>32.0%</b> <b>(155)</b>	22.5% (109)	30.0% (145)	11.8% (57)	3.7% (18)	2.33	484
t. Help students develop a scientific understanding of the earth in the solar system.	11.3% (55)	21.6% (105)	<b>39.2%</b> <b>(191)</b>	26.3% (128)	1.6% (8)	2.85	487
u. Help students develop a scientific understanding of the origins of the earth and the universe.	23.4% (113)	23.0% (111)	<b>35.1%</b> <b>(169)</b>	16.4% (79)	2.1% (10)	2.51	482
	<b>answered question</b>						<b>490</b>
	<b>skipped question</b>						<b>480</b>

26. Please indicate whether you presently teach in a public or non-public school. (Choose only one response)

		Response Percent	Response Count
Public school		96.8%	451
Non-Public school		3.2%	15
		<i>answered question</i>	466
		<i>skipped question</i>	504