

ESUCC

Executive Committee Meeting

Wednesday, April 13, 2016, 12:00 PM

Executive Committee Meeting Educational Service Unit No. 3 6949 So. 110th Street LaVista,  
NE 68128, 6949 South 110th Street, LaVista, NE 68128

Attendance Taken at 12:03 PM.

Beatty ESU 16: Present

Jeff West (NE): Present

Dr Kraig Lofquist: Present

Dan Schnoes (NE) (ESU 03): Present

1. Call to Order

2. Roll Call

3. Agenda Item

3.1. Executive Director Appraisal

3.2. ESUCC Officers

3.3. Approve Full-time BlendEd/Distance Education Director Position

3.4. Approve Bromm and Associates as Governmental Relations for the ESUCC

3.5. Approve Late Fee Policy

3.6. Approve Master Service Agreement 2016-2017

3.7. MSP Grant Proposal

3.7.1. Statewide Needs Assessment

3.8. NESUBA

3.9. ESU Staff Presenting Outside Their Service Agency

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}}

**LOBBY RETAINER AGREEMENT**

Educational Service Unit Coordinating Council (Client) hereby retains Bromm & Associates, LLC, (Lobbyist) to represent the Client before the Nebraska Legislature during the balance of the 2016 interim, the 2017 and 2018 Legislative Sessions, and to October 1, 2018. The purpose is to provide lobby services to monitor educational related issues of concern to the Client.

The Client agrees it will pay \$13,750.00 on or before November 1, 2016, and \$13,750.00 on or before March 1, 2017, or a total sum of \$27,500.00 in addition to a Registration cost for the 2017 session, which is expected to be \$200.00. In addition, for the balance of the interim for 2017 and the 2018 Legislative session, the client agrees to pay \$13,750.00 on or before November 1, 2017, and \$13,750.00 on or before March 1, 2018, or a total sum of \$27,500.00 in addition to the Registration cost for the 2018 session, which is expected to be \$200.00. Ordinary photocopying, telephone, travel and postage expenses will be paid by the Lobbyist. If unexpected or unusual expenses are expected to be incurred, the Lobbyist will obtain prior approval from the client prior to incurring any such additional expenses.

The Lobbyist will report directly to the Executive Director, David M. Ludwig. Lobbyist will attend relevant meetings and hearings, monitor the relevant legislation, consult on strategy and other communications with Senators. Lobbyist will file all reports with the Accountability and Disclosure Commission required by law to be filed by the retained Lobbyist. The Client will file all reports with the Accountability and Disclosure Commission required to be filed by principal.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 2016.

EDUCATIONAL SERVICE UNIT  
COORDINATING COUNCIL

By \_\_\_\_\_  
David M. Ludwig,  
Executive Director

BROMM & ASSOCIATES, LLC

By \_\_\_\_\_  
Jason Bromm

**2016-2017 Master Services Agreement  
Between the  
Educational Service Unit Coordinating Council and  
Educational Service Unit \_\_**

THIS MASTER SERVICES AGREEMENT (“Agreement”) is entered into this \_\_\_\_ day of \_\_\_\_\_, 2016 (“effective date”) by and between THE EDUCATIONAL SERVICE UNIT COORDINATING COUNCIL, a political subdivision of the State of Nebraska, hereinafter referred to as “the Council” or “the ESUCC,” and EDUCATIONAL SERVICE UNIT NO. \_\_\_\_, a political subdivision of the State of Nebraska referred to as “the ESU.”

**Recitals**

Whereas, ESUCC is charged by NEB. REV. STAT. § 79-1245 with the administration of statewide education initiatives and provision of statewide education services;

Whereas, the ESU wishes to receive certain services and participate in certain Projects that are conducted by the ESUCC; and

Whereas, the ESU wishes to have certain services and initiatives made available to its member school districts.

Now, therefore, the ESUCC and the ESU agree as follows:

**1. General Provisions**

- a. Purpose. The purpose of this Agreement is to establish the general terms and conditions applicable to the education initiatives, services and projects (collectively “Projects”) which ESUCC supplies to the ESU for the 2016-17 school year. This Agreement is intended to serve as a framework for the provision of services under one or more of the ESU CC’s Projects.
- b. Participation in Individual Projects. This Agreement outlines several Projects which ESUCC has undertaken for the statewide benefit of Nebraska educational service units and their member school districts. The ESU may choose to participate in some, but not all of the Projects referenced by this Agreement. The ESU shall indicate its intention to participate in a particular Project by marking, where indicated, each Project in which it wishes to participate or make available to its member school districts. ESUCC is only obligated to provide services to the ESU for the Projects which the ESU has marked as provided herein.
- c. Term. The term of this Agreement shall be one (1) year, commencing on August 1, 2016 and ending on July 31, 2017.
- d. Provision of Services by ESUCC’s Agents. The ESUCC may contract with third parties to provide some or all of the services described in this Agreement. The ESU hereby expressly agrees to the provision of those services by said third-party

agents and agrees to cooperate with all agents of ESUCC in the implementation of such Projects including, but not limited to, invoicing, payment and administration necessary for the delivery of Project services in the name of ESUCC.

- e. Compliance with State Law. Each Party will comply with applicable laws in its performance hereunder and will advise the other of changes in laws that concern the conduct of the Projects and services contemplated by this Agreement. Each Party shall obtain and maintain all approvals required to perform its obligations under this Agreement.
- f. Right to Make Changes. ESUCC reserves the right in its sole discretion, to make changes to the operation of each of the individual Projects referred to herein, including, but not limited to, an increase in the fees charged for particular Projects, if the ESUCC determines that such fee increase is necessary for the continued operation of the particular Project, provided, however, that no such change shall have a material adverse impact on the ESU.
- g. New Projects. In the event ESUCC determines to offer a new Project during the term of this Agreement and the ESU wishes to participate in said new Project, the parties may describe the new Project in writing and incorporate that writing as a formal addendum to this Agreement.
- h. Amendments in Writing. Notwithstanding any provision of this Agreement to the contrary, any amendment to this Agreement must be in writing and signed by an authorized representative of each Party. No oral understanding or agreement not incorporated in this Agreement is binding on any of the Parties.
- i. Indemnification. To the extent permitted by applicable law, but without waiving any rights under any applicable state governmental immunity act, the Parties hereto agree to indemnify each other from any and all liabilities, claims, expenses, losses or damages, including attorneys' fees, which may arise in connection with the execution of the work herein specified and which are caused, in whole or in part, by the negligent act or omission of the Indemnifying Party.
- j. Assignment. The ESU shall not assign any right or delegate any obligation arising hereunder without the prior written consent of ESUCC. This provision does not prevent the ESU from allowing its member school districts to participate in some or all of the Projects described herein.
- k. Third Party Beneficiaries. This Agreement shall be binding upon and inure solely to the benefit of and be enforceable by each Party hereto and their respective successors and permitted assigns. Nothing in this Agreement, express or implied, is intended to or shall confer upon any third party any right, benefit or remedy of any nature whatsoever under or by reason of this Agreement
- l. Entire Agreement. This Agreement supersedes and replaces all prior agreements or understandings and constitutes the entire agreement between the Parties concerning the subject matter hereof; there are no other agreements,

understandings, or representations, whether written or oral, between the ESU and ESUCC concerning the subject matter addressed herein.

- m. Governing Law. This Agreement shall be governed and construed in accordance with the laws of the State of Nebraska.
- n. Nondiscrimination. The parties shall not discriminate against any employee or applicant who is to be employed for performance of this MOU with respect to his or her hire, tenure, terms, conditions, or privileges of employment, because of his race, color, religion, sex, disability, or national origin.
- o. Employment Eligibility Verification. The parties shall use a federal immigration verification system to determine the work eligibility status of employees hired on or after October 1, 2009 and who are physically performing services within the State of Nebraska. If a party employs or contracts with any subcontractor in connection with this Agreement, the contracting party shall include a provision in the contract requiring the subcontractor to use a federal immigration verification system to determine the work eligibility status of new employees physically performing services within the State of Nebraska.
- p. Late Fees. Any party entitled to fees, charges or other amounts due under this agreement shall issue an invoice to the entity responsible for payment which indicates the basis for the fee, charge or other amount due. Invoices issued pursuant to this agreement are due and payable within 30 days of receipt. Past due invoices shall be charged at 3% penalty per month after the initial 30 day payment period. The ESUCC staff will follow policy number 4015 in communicating with ESUs and member school districts about delinquent accounts.

## 2. Professional Development Project (ESUPDO Project)

- a. Purpose of Professional Development Projects. One of the core services provided to school districts is professional development of their staff.
- b. Professional Development Advisory Committee. The ESUCC shall appoint educators and other experts to a Professional Development Advisory Committee. The initial committee shall consist of up to 20 members who possess expertise in professional development and specific curriculum areas. The Professional Development Advisory Committee shall provide the ESUCC's Executive Director with suggestions and input on technical and other matters related to professional development and specific special projects involving educators' professional development, within the State of Nebraska. The ESUCC Executive Director may also form ad hoc committees from time to time to address matters relevant to the various Professional Development Initiatives.
- c. Annual Professional Development Program. The ESUCC will develop an annual program of professional development offerings that will assist the ESU and its member districts in providing professional development to educators state-wide. The ESUCC will assist the ESU in meeting its obligations pursuant to Rule 84 of the Nebraska Department of Education in collaborating to create opportunities for educational training and staff development for the staff of educational service units, the Nebraska Department of Education, and school districts statewide.
- d. ESUPDO Project. The ESU Professional Development Organization serves as a collaborative effort to provide statewide training for all ESU employees. The ESUPDO Project consists of five (5) affiliate groups comprised of ESU employees across the seventeen ESU's. These groups are:
  - i. Staff Development Affiliate (SDA): Members are generally responsible for providing staff development to their school districts and have assisted the Nebraska Department of Education efforts on statewide and local assessment as well as school improvement.
  - ii. Technology Assistance Group (TAG): Members provide assistance to school districts in the dissemination and integration of new educational technologies deployed by school districts
  - iii. Network Operations Committee (NOC): NOC supports the extensive communications network within and among the ESU's and school districts. NOC provides network security and protocols for their districts and ESU's and ensures the communications network for distance education, internet, email, and phones are functioning and secure.
  - iv. Instructional Materials Affiliate (IMat): IMat consists of instructional materials professionals from across the state. It serves the dual role of providing for and assisting school districts make use of statewide educational resources as well as the integration of learning object resources in school districts.

- v. ESU Special Populations Directors (ESPD): This group consists of Special Education Directors and staff from across the state. This group was included in the ESUPDO as the need for special education professional development grew in the age of standards and assessment, and the need to develop and share professional development efforts for special education teachers and classroom teachers alike arose. ESPD is involved with the Nebraska Department of Education in providing leadership for special education training and support as well as programs such as Response To Intervention (RTI).
  - vi. ESUPDO Fees. Each ESU will participate in the ESUPDO Project and contribute \$4,720 to fund the activities of the Professional Development Annual Program.
- e. Professional Development Special Projects. The ESUCC may also facilitate special projects, organize and facilitate programs, or serve as a fiscal agent for activities to enhance professional development opportunities. These special projects may include but are not limited to special education grant programs, math grant professional development programs, NDE career education grant programs, and other grant or collaborative efforts that enhance statewide professional development.
- f. Fees for Participation in Specific Professional Development Activities. Professional Development activities may include a registration, material, and other fees. Such fees will be set at no more than \$20 per person per day. Material and other fees will be actually incurred costs beyond normal registration. Any fees billed through an agent of ESUCC must identify the specific core activity provided on behalf of the ESUCC and be appropriately allocated by such agent in accordance with agreed upon billing practices. ESUCC will provide to each ESU that participates in the Professional Development Project invoices that detail the expenditures for each event or meeting. Participation fees shall be billed bi-annually by ESUCC during the academic year.

**The following is a cost summary for this project:**

Section 2	PD Annual Program Fees	\$4,720 (Each ESU will participate.)
Section 3	PD Participation Fees	\$20 per person per day (Each ESU will participate.)

*MSA Fees for 2015-2016: \$4,540/\$20*

**3. Northwest Evaluation Association Certified Trainer Consortium Project (NWEA Consortium Project)**

- a. Purpose of the NWEA Consortium Project. The ESUCC is facilitating a Northwest Evaluation Association Certified Trainer Consortium. Participation in the NWEA Consortium includes the opportunity to train ESU staff or sponsor the training of school district staff or local consultants. ESUs participating include: ESU 1, ESU 2, ESU 3, ESU 4, ESU 5, ESU 6, ESU 7, ESU 8, ESU 9, ESU 10, ESU 11, ESU 13, ESU 16, ESU 17 and ESU 19.
- b. Term of Consortium Participation. Although the NWEA Consortium project imposes a year-by-year financial obligation, participating ESUs are in the second year of a three-year project. Due to the nature of this project ESUs may not elect to withdraw or amend their participation in the NWEA Consortium Project mid-contract year after this Agreement has been approved.
- c. Annual Fees. The annual fee for 2016-17 is \$57,000 per Entity (ESUCC), to be divided equally by the number of participating ESU facilitators. The cost per facilitator is \$1,781.25.
- d. Additional Fees. In addition to the annual fee set out above, NWEA will charge additional fees per person for specific trainings. The ESUCC will bill these fees as they are incurred according to the agreement with NWEA and participating ESUs will be responsible for these additional training costs.
- e. Certifications: Applying Reports (AA); Information Instruction (II); Focusing on Growth (FOG)
- f. Onboarding Training Fees (adding additional new trainers). In addition to the annual fee set out above, NWEA will charge \$2500 per person per training session for new participants.

**The following is a cost summary for the project:**

Section 3	NWEA Annual Fees	\$ 1781.25 per facilitator by participating ESU
	Onboarding Training	\$2,500 per person/per training

*MSA Fees for 2015-2016: \$1728 per facilitator*

**(Within the Summary Page found on page 17 of the MSA, please check the box if the ESU will participate in the program.)**

**Fees per ESU/per facilitator 2016-2017 year:**

ESU 1	4	\$7125.00
ESU 2	1	\$1781.25
ESU 3	7	\$12468.75
ESU 4	1	\$1781.25
ESU 5	1	\$1781.25
ESU 6	1	\$1781.25
ESU 7	2	\$3562.50
ESU 8	3	\$5343.75
ESU 9	1	\$1781.25
ESU 10	3	5343.75
ESU 11/No trainer	1	\$1781.25
ESU 13	2	\$3562.50
ESU 15	0	0
ESU 16	1	\$1781.25
ESU 17	1	\$1781.25
ESU 18	0	0
ESU 19	3	\$5343.75

**4. BlendEd Initiative and Projects:  
Encompassing Distance Education,  
Instructional Materials, and Learning Management Systems**

- a. Purpose of BlendEd Initiative and Projects. The ESUCC shall provide distance education services including brokering and facilitating the exchange of distance education courses, the administration of learning management systems, and the assessment of distance education needs and evaluation of distance education services as provided for in NEB. REV. STAT. § 79-1248 and other state statutes and regulations. Additionally, the ESUCC is charged with the administration of statewide initiatives and provision of statewide services among other duties in NEB. REV. STAT. § 79-1246. The ESUCC also has managed statewide services in “core services” as that term is defined in statute, including instructional materials services. The purpose of the BlendEd Initiative is to assure cost-efficient and equitable delivery of digital education opportunities in partnership with educational service units, school districts, and other potential partners. The BlendEd Initiative will unify ESUCC projects and seeks to collaborate to provide students and school districts across the state with access to a mix of different learning environments to best support the combination of traditional face-to-face classroom methods with more technology-mediated activities.
- b. Fees. The ESUCC shall charge fees for services, related equipment, and other fees as described in this Article. Additional fees may be determined and assessed by the ESUCC to provide necessary services. Each ESU will be invoiced \$5,400 for Projects Administration Fee to support the BlendEd Initiative.

**The following is a cost summary for the project:**

Projects Administration	\$ 5,400	<i>no increase</i>
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- c. BlendEd Advisory Committee. The ESUCC shall appoint educators and other experts to a BlendEd Advisory Committee. The initial committee shall consist of up to 20 members representing distance education, instructional materials, learning management systems, and general knowledge about professional development relevant to the initiative. The Advisory Committee shall provide the ESUCC’s Executive Director and BlendEd/Distance Education Director with suggestions and input on technical and other matters related to distance education, learning management systems, or instructional materials, within the State of Nebraska. The ESUCC Executive Director and BlendEd/Distance Education Director may also form ad hoc committees from time to time to address matters relevant to the BlendEd Initiative.
- d. Conditions of Participation.
  - i. Intellectual Property. The ESU and each of its participating school districts agrees to comply with all relevant laws governing copyright and other intellectual property. The ESU agrees to hold ESUCC harmless for any violation of this provision by the ESU or its agents.

- ii. **No Assignment.** No Party shall assign any of its rights or obligations under this Project without the prior written consent of the ESUCC's Executive Director or the ESUCC board.
  
- e. **Projects and Services.** The BlendEd Initiative is designed to create a more integrated approach for both instructors and learners. The Initiative assumes projects from existing distance education efforts, Instructional Materials projects, and Learning Management Systems. ESUs may choose to participate in all or none of the projects and services and many of the services are made available to school districts directly. The BlendEd Initiative will also seek to organize professional development through existing ESUPDO and other ESU staff as appropriate.

**(Within the Summary Page found on page 17 of the MSA, please check the box if the ESU will participate in the program.)**

- f. **Distance Education Brokering.** The ESUCC will provide the NVIS course clearinghouse for use in finding and exchanging distance education courses between participating ESUs and school districts. If fees for distance education brokering become necessary, they will be approved by the ESUCC with at least one month's prior notice to participating ESUs.

**(Within the Summary Page found on page 17 of the MSA, please check the box if the ESU will participate in the program.)**

- g. **Instructional Materials.** The Instructional Materials portion of the BlendEd Project consists of four separate initiatives. On an annual basis, ESUs may participate in none, some or all of the Instructional Materials initiatives. Due to the nature of this project ESUs may not elect to withdraw or amend their participation in any Instructional Materials Project mid-contract year after this Agreement has been approved.
  - i. **Media on Demand (IMat):** Learn360 is the current provider for statewide streaming media resources. This agreement with Learn360 can be renewed annually or another provider will be selected based upon the recommendations of the IMAT affiliate. This is a statewide digital media subscription service which includes a feature to manage and deliver custom content. Participating ESUs will be charged a fee based on the actual contract cost. Each ESU will pay a fee based on a schedule equivalent to fifty percent of the Media on Demand contract (\$59,500) divided equally among the participating ESUs and the remaining fifty percent of the contract (\$59,500) divided based on participating Nebraska schools' enrollment. The Media on Demand service may be made available to school districts in non-participating ESUs. The ESUCC will establish fees and invoice any participating districts in coordination with the non-participating ESU. The ESUCC will provide an estimate for budget

purposes for each participating ESU. Invoices will be sent in April 2017 for the 2017-18 subscription.

**The following is a cost summary of project:**

Media On Demand \$119,000  
 (Fee up to 280,000 students; nonpublic & additional students \$0.425 per)

**(Within the Summary Page found on page 17 of the MSA, please check the box if the ESU will participate in the program.)**

**Estimated fee per ESU for Learn360 2017-18 (Year 3)**

*Actual cost TBD after 2016-17NDE Student Report is published. Estimated cost is based upon 2015-16 NDE Student Report and number of participating ESUs. (ESU 2, 6 did not opt in for Learn360.)*

ESU	Public School Student	Nonpublic School Student	50% of Total Fee Divided Equally	Cost per Nonpublic School Student (\$0.425)	Cost per Public School Student (\$0.207636)	TOTAL Estimated Cost 2017-18	Learn360 2016-17 Cost
1	11,480	947	\$3,966.67	\$402.48	\$2,383.66	\$6,752.81	\$6,356.00
3	54,922		\$3,966.67		\$11,403.78	\$15,370.45	\$14,466.00
4	6,440	608	\$3,966.67	\$258.40	\$1,337.18	\$5,562.25	\$5,235.00
5	5,603	352	\$3,966.67	\$149.60	\$1,163.38	\$5,279.65	\$4,969.00
7	12,605	2,388	\$3,966.67	\$1,014.90	\$2,617.25	\$7,598.82	\$7,152.00
8	10,764	2,069	\$3,966.67	\$879.33	\$2,234.99	\$7,080.99	\$6,664.00
9	9,571	686	\$3,966.67	\$291.55	\$1,987.28	\$6,245.50	\$5,878.00
10	30,132	1,422	\$3,966.67	\$604.35	\$6,256.49	\$10,827.51	\$10,191.00
11	4,765	66	\$3,966.67	\$28.05	\$989.39	\$4,984.11	\$4,691.00
13	14,473	548	\$3,966.67	\$232.90	\$3,005.12	\$7,204.69	\$6,781.00
15	3,667	195	\$3,966.67	\$82.88	\$761.40	\$4,810.95	\$4,528.00
16	8,330	668	\$3,966.67	\$283.90	\$1,729.61	\$5,980.18	\$5,628.00
17	1,556	39	\$3,966.67	\$16.58	\$323.08	\$4,306.33	\$4,053.00
18	39,842		\$3,966.67		\$8,272.63	\$12,239.30	\$11,519.00
19	51,966		\$3,966.67		\$10,790.01	\$14,756.68	\$13,889.00
Total	266,116	9,988	\$59,500.05	\$4,244.90	\$55,255.26	\$119,000.21	\$112,000.00

- ii. Learning Object Repository (LOR): Through this service, ESUCC will coordinate a digital library that will enable educators from within participating ESUs to share, manage and use educational resources with a common metadata standard. The ESUCC's learning object repository will also include access to previous media acquisitions (Nebraska Titles), subscription media, National Repository of Online Courses, and other content as it becomes available. Fees for hardware updates, training, software licensing, and other associated project costs will be based on the vendor-provided schedule of fees. Participating ESUs will be invoiced for their share of the costs as they occur. It is recommended that all ESUs participating in the Learning Object Repository elect to participate in Special Projects.

**The following is a cost summary of the project:**

LOR	Per negotiated contract through ESUCC
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**(Within the Summary Page found on page 17 of the MSA, please check the box if the ESU will participate in the program.)**

- iii. Instructional Materials: Special Projects. Special projects will support and maintain the library of learning objects in a state-endorsed LOR, cover costs associated with the review and alignment of resources to the Nebraska State Standards, and fund additional learning objects. Working in conjunction with ESU staff (PDO Staff), this project will identify those needs to further enhance education for all learners. It is recommended that all ESUs participating in the Learning Object Repository elect to participate in Special Projects. The fee for Special Projects is \$4,500. Fees will not exceed this amount and will be based on actual costs incurred.

**The following is a cost summary of the project:**

Special Projects	\$4,500	<i>no increase</i>
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**(Within the Summary Page found on page 17 of the MSA, please check the box if the ESU will participate in the program.)**

- iv. Instructional Materials: Learning Object Acquisitions. This project will identify learning objects that will enhance education for all learners in Nebraska schools. ESUCC staff will work in conjunction with relevant staff members from participating ESUs, to identify, acquire and integrate learning objects that will be hosted on the LOR for statewide use. This fund will be used to offset expenses related to obtaining and integrating these learning objects into the statewide LOR. Fee for Learning Object Acquisitions is \$5,000. Fees will not exceed this amount and will be based on actual costs incurred.

**The following is a cost summary of the project:**

Learning Object Acquisitions	\$ 5,000	<i>no increase</i>
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**(Within the Summary Page found on page 16 of the MSA, please check the box if the ESU will participate in the program.)**

- h. Federated Identity and Access Management: Through this service ESUCC will provide a framework for authentication into digital services.
  - i. Additional Fees/Costs (if any): The ESUCC and participating ESUs may amend this agreement to expand services based on planning efforts for content hosting, identity management infrastructure and related services. Any such fees/costs will be presented by the ESUCC Technology Committee for approval by the ESUCC board.

**(Within the Summary Page found on page 17 of the MSA, please check the box if the ESU will participate in the program.)**

- i. Clarity by BrightBytes: Clarity is an online software platform operated by the BrightBytes Company that measures whether technology programs are impacting student learning and then delivering customized technology plans to educators to improve student learning. ESUCC has negotiated a statewide contract, through which ESUs can purchase the 21st Century ESA Module Clarity software at a discounted price. Participating ESUs are 1, 3, 5, 7, 8, 9, 10, 13, 15, 16, 17, 19.

**The following is a cost summary of the project:**

21st Century ESA Model	\$1,417.00 per participating ESU	<i>new service</i>
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**(Within the Summary Page found on page 17 of the MSA, please check the box if the ESU will participate in the program.)**

## 5. Cooperative Purchasing Project

- a. Purpose of Cooperative Purchasing. The Cooperative Purchasing Project aggregates demand for certain items commonly purchased by school districts to get lower prices and more favorable terms from selected suppliers.
- b. Duties of ESUCC. In connection with the Cooperative Purchasing Program, the ESUCC shall:
  - i. Combine statewide data relevant to cooperative purchasing in order to promulgate a valid basis upon which to solicit bids.
  - ii. Coordinate activities which are commensurate with updating and perpetuating proper specifications inherent within the bidding process.
  - iii. Prepare official bid documents and invite suppliers to bid in connection with supplies to be purchased by ESUCC.
  - iv. Prepare and cause to be published the official legal notices of the bid opening in connection with supplies to be purchased by ESUCC as required by applicable law or policy.
  - v. Conduct the public bid opening and resulting bid reviews in accordance with applicable Nebraska statutory “public lettings” provisions, if any, or ESUCC policy and practice, and be responsible for selecting bids based upon such provisions.
  - vi. Compile price lists and order sheets for each participating educational service unit and make such order lists and price sheets available through the Nebraska ESU Cooperative Purchasing Web Site.
  - vii. Provide technical support for ESUs and school districts in placing orders with suppliers through the website. Merchandise will be shipped as directed by the participating ESU or school district.
  - viii. Through the website, provide participating ESUs and school districts the capabilities to track items ordered, confirm receipt, check invoices and detect and report shortages.
  - ix. Retrieve order documents from the website and prepare aggregate orders to be sent to respective suppliers so that merchandise is shipped to each participating school/educational service unit.
  - x. Assist any participating school/educational service unit with problems related to the processing and delivery of orders from the suppliers.
  - xi. Participate in an annual audit of cooperative purchasing accounts and records conducted by a Certified Public Accountant.

**(Within the Summary Page found on page 17 of the MSA, please check the box if the ESU will participate in the program.)**

## 6. Special Education Project

- a. Student Records System (SRS Project): SRS is an online special education record keeping system. It creates all special education documents required by Rule 51 and Rule 52, including IEP, MDT, IFSP and all required notices. The SRS is a highly secured system that organizes and stores documents and provides easy access to files from anywhere via the internet. SRS training is provided across the state for district staff and college and university staff.
- b. Improving Learning for Children with Disabilities (ILCD Project): ILCD is a state self-assessment project that gathers information for federal reporting requirements. The ILCD Project utilizes parent, teacher and administration survey assessments. The survey results can be accessed via the ILCD Website. The ESU's technology role includes purchasing, distributing and scanning surveys. ESU staff provide technical assistance for the ILCD website and survey design.
- c. Project PARA: Project PARA is a web-based method for school districts to provide introductory training for their paraeducators. The Project assists schools in meeting the paraeducator training requirements of No Child Left Behind, Rule 11 and IDEA. Project PARA is a collaborative effort between the University of Nebraska, the Nebraska Department of Education and Nebraska educational service units.
- d. Fees. Each Participating ESU will pay a fee of \$5,500 to fund the Special Education Project.
- e. Additional SRS Fee. School Districts that are members of one of the participating Parties to the SPED SRS Project must pay an additional fee to receive access to SRS. Fees will be assessed in accordance with the following table.

<u>2015-16 Fee</u>	<u>2016-17</u>	<u>Tier</u>
136	143	<100
354	372	100-249
706	741	250-499
2119	2225	500-999
2826	2967	1000-1999
3532	3709	2000-3999
7062	7415	4000-17999

**The ESU wishes ESUCC to:**

- Bill the ESU for the fees allocated to each of the ESU's participating member school districts**

**OR**

- Bill each of its participating member school districts directly for their participation in SRS.**

**The following is a cost summary of the project:**

Special Education Project	\$ 5500
Additional SRS Fees (Tier)	\$see chart above

*MSA Fees for 2015-2016: \$5000*

**(Within the Summary Page found on page 17 of the MSA, please check the box if the ESU will participate in the program.)**

## 7. Legislative and Governmental Relations Project

- a. Purpose Legislative and Governmental Relations Project. The Legislative and Governmental Relations Project will assist member ESUs in strategically planning legislative initiatives that support the mission of the ESUCC and its member service units, tracking legislation that affects service units and state-wide educational efforts in the state, and influencing state lawmakers to support the vital work of the ESUCC, service units and public schools in the state of Nebraska.
- b. Duties of ESUCC. In connection with the Cooperative Purchasing Program, the ESUCC shall:
  - i. Solicit input and direction on legislative and governmental relations issues from its members through the ESUCC legislative committee and in other forums;
  - ii. Direct employees of ESUCC to draft, support or oppose state legislation related to matters affecting education in the state of Nebraska;
  - iii. Contract with experts in the field of governmental relations to assist the ESUCC in legislative and governmental matters
- c. Fees. Each Participating ESU will pay a fee of to be determined by the ESUCC board upon approval of relevant expert contracts to fund the Legislative and Governmental Relations Project. In no event will the fee for participation exceed ESUCC's actual costs. Due to the nature of this project ESUs may not elect to withdraw or amend their participation in the Legislative and Governmental Relations Project mid-contract year after this Agreement has been approved.

### **The following is a cost summary for this project.**

Govt. Relations (2017 & 2018) \$ 1629.41

*MSA Fees for 2015-2016: \$ \$1641.18*

**(Within the Summary Page found on page 17 of the MSA, please check the box if the ESU will participate in the program.)**

## Summary of MSA Fees 2016-2017

Please *check and initial* the relevant boxes below indicating the Projects in which the Service Unit wishes to participate. (Please note all projects within the MSA are provided with a either (1) a specific charge, (2) no charge for the project, or (3) a required participation fee for all ESU's.)

**ESUPDO with the following costs for services: (Each ESU will participate.)**

Section 2	PD Annual Program Fees	\$ 4,720
Section 3	PD Participation Fees	\$ 20 per person/per day

**NWEA Certified Trainer Consortium with the following costs for services:**

Section 3	NWEA Annual Fees	\$ 1781.25 per facilitator/ESU
	Onboarding Training (if needed)	\$ 2,500 per person/per training

**BlendEd Projects Administrative Fee (Each ESU will participate.)**

Project Administration	\$ 5,400
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**BlendEd Projects/BlendEd** \$ 0.00

**BlendEd Projects/Distance Education** \$ 0.00

**Media on Demand/Learn360**

Media On Demand (see table on pg. 10)  
(\$119,000 for up to 280,000 students; non-public & additional students \$0.425 per)

**Learning Object Repository**

LOR Per negotiated contract

**IMat Learning Objects**

Learning Objects Acquisitions \$ 5,000

**IMat Special Projects**

Special Projects \$ 4,500

**Blended Projects/Identity Management** \$ 0.00

**Blended Projects/21st Cent. ESU Module (BrightBytes)** \$ 1,417

**Coop Purchasing** \$ 0.00

**SRS**

Special Education Project \$ 5500  
Additional SRS Fees (Tier) \$ see chart above

**Legislative and Governmental Relations**

Govt. Relations \$ 1629.41

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their duly authorized officers.

FOR EDUCATIONAL SERVICE UNIT # \_\_\_\_:

I certify that I have checked the relevant boxes above indicating the Projects in which the Service Unit wishes to participate.

OR

I certify that the Service Unit Wishes to Participate in ALL of the above projects.

**FOR THE EDUCATIONAL SERVICE UNIT:**

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
(Printed name)

\_\_\_\_\_  
(Title)

**FOR THE EDUCATIONAL SERVICE COORDINATING COUNCIL:**

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)

David Ludwig  
ESUCC Executive Director

## **PART A – STATEMENT OF NEED**

Since initial project activities were delivered in 2006 through the current 2012/13 institutes, over 900 K-12 classroom teachers have been served by the Nebraska Science KICKS and KICKS<sub>2</sub> MSP projects. The objectives and professional development activities of the project have been continually refined based on external evaluation recommendations (integration of ELL strategies in institute curricula), statewide needs assessments (direct instruction/processing of guided inquiry experiences embedded within content lessons), participant input (expanded institute offerings) and national trends in exemplary instructional practices in science (notebooking, student discourse).

### **NEEDS ASSESSMENT RESULTS**

In the fall, 2009 the Nebraska Department of Education (NDE) commissioned RMC Research Corporation to construct and administer a statewide needs assessment of teacher preparedness and the professional development needs of schools and school districts with regards to math and science instruction. A total of 904 K-12 teachers representing both public and nonpublic schools from Educational Service Units (ESU) across the state participated in the survey. Analysis of survey results, relative to the Science KICKS<sub>2</sub> proposal, from the MSP Nebraska Statewide Needs Assessment <sup>1</sup> include recommendations to:

- Incorporate research based instructional strategies that target specific student populations (ELL, SPED, cultural diversity).
- Integrate the use of hands on activities and technology tools in instructional delivery.
- Focus professional development on participant and student understanding of inquiry-based science.

The RMC recommendations are further corroborated in the Nebraska Science Matters Survey.<sup>2</sup> The Science Matters assessment finds that;

- 82% of respondents strongly agree that one of the most pressing needs of science

teachers and students in their districts is for increased inquiry based science instruction.

- 77% identified a need for support integrating elements of effective science instruction.

The objectives and activities of the current Nebraska Science KICKS<sub>2</sub> proposal reflect the goals of the Nebraska MSP as well as incorporation of recommendations from the RMC Research Fall 2009 Nebraska Statewide Needs Assessment, the 2011-12 Science Matters Survey, the 2011-12 NeSA Science Assessment results<sup>3</sup>, and feedback gathered through daily and summative surveys administered to past participants (Summers 2011 and 2012). Nebraska Science KICKS<sub>2</sub> objectives are to:

- Improve science content knowledge and pedagogical content knowledge for K-12 educators.
- Integrate scientific inquiry as both an instructional strategy and a fundamental process of science.
- Emphasize/model effective research-based instructional practices that support the needs of diverse learners (ELL, SPED, HAL, socioeconomics, cultural diversity, etc.).
- Support teacher transfer of science content and effective content pedagogy to classroom practice.
- Continue to build Nebraska's professional learning community of science educators and teacher leaders.

### **NeSA SCIENCE ASSESSMENT**

A KICKS<sub>2</sub> emphasis on strategies to support diverse learners is further reinforced by state NeSA science assessment data. Disaggregation of assessment data reveals significant achievement gaps for English language learners (ELL), minority, as well as students in special education. Assessment results for 2011-12 for both aggregate and subscale scores show that the percentage of these populations scoring proficient is anywhere from 30%-50% lower than

white/non-Hispanic students depending on grade level. Within the framework of effective science instruction, KICKS<sub>2</sub> course instructors model research based modifications and/or extensions that support diverse learners.

### **MEETING NONPUBLIC TEACHER NEEDS**

Input from nonpublic schools regarding their science education needs have been gathered from four sources. The October 2009 Nebraska Statewide Needs Assessment includes an analysis of both the preparedness and the professional development needs of nonpublic educators. Sister Mary Michael from the Lincoln Archdiocese participated in the December 7, 2009 Nebraska Math and Science Partnership statewide videoconference to discuss the needs of nonpublic teachers in Nebraska. Dr. Barbara Schweiger, Administrator of Human Resources/School Improvement, representing the Archdiocese of Omaha Catholic Schools, the largest consortium of nonpublic schools in the state of Nebraska, participated in a consultation on January 18, 2010. The three nonpublic schools within district boundaries of the grant proposal's partner LEA, North Platte Public Schools, were all consulted regarding their science professional development needs on January 16, 2013.

The concerns of Nebraska's nonpublic schools mirror those of their public school counterparts. All parties consulted indicate professional development needs that include improving teacher content knowledge, the use of scientific inquiry, teaching science to diverse student populations (ELL, SPED, et al), and expansion of teacher networking opportunities. Administration in both the public and nonpublic partner schools is interested in increasing the capacity of their faculty to embed aforementioned instructional strategies within the content of science.

### **HIGH NEEDS SCHOOL DISTRICT**

North Platte Public Schools (NPPS), located in west-central Nebraska, has 10 elementary schools, two middle schools, one high school, one alternative high school and an early childhood program. The district serves just over 4,100 students. NPPS meets multiple

criteria of a high needs school district: 1) approximately 42% or 1,758 students receive free or reduced meals, and 2) the district level federal AYP status for 2011-12 is: not met, improvement shown.

#### **CRITERIA FOR TEACHER PARTICIPATION**

Applicants from schools/districts that meet one or more of the following criteria will receive priority:

- One or more of the high needs criteria established by NDE: number of students receiving free or reduced meals, AYP not met/needs improvement, less than 66.93% of students proficient on NeSA Science assessment
- Teachers assigned to ELL and SPED students
- Other extenuating circumstances (ex. performance on local science assessments, implications of multiple teacher preps, consequences of frequent teacher turnover, etc.)

The more criteria met the higher priority assigned to the application. After all, KICKS<sub>2</sub> applicants who meet priority criteria have been accepted any science teacher interested in professional growth will be included in the Science KICKS<sub>2</sub> institutes, to the extent that project resources allow.

Ten percent of the available KICKS<sub>2</sub> slots will be reserved for science educators from nonpublic schools. This equals the percentage of nonpublic school teachers in the state of Nebraska. Nonpublic slots that are not filled will be opened to public school educators.

#### **PROMOTING TEACHER CONTENT/SKILLS**

Over the course of a year KICKS<sub>2</sub> institutes will provide intensive summer and follow up sessions designed to deepen teacher science content knowledge, help teachers to make connections between developmentally and age appropriate content in their classrooms as well as within the broader articulated K-12 curriculum, understand and elicit student thinking relative to science content, and engage in strategies that move **all** students toward greater understanding of science. Participants not only experience content lessons as students but also

process/evaluate lessons relative to content acquisition and purpose and effectiveness of instructional strategies. The KICKS<sub>2</sub> institutes are grounded in the notion that if teachers experience effective science instruction and have an opportunity to process that experience they will be able to transfer both content and pedagogy to their own professional practice.<sup>4</sup>

One of the strengths of the current MSP KICKS project is the quality of the course instructors.<sup>5</sup> KICKS<sub>2</sub> instructional staff will continue to include master teachers who have been recognized either nationally and/or locally as outstanding educators skilled in both content and methodology. Course instructors consistently integrate and model best practice lesson design and delivery.

The state of Nebraska covers 77,359 square miles. It includes school districts as diverse as the urban districts of the Omaha and Lincoln areas, the remote rural districts of the western Sandhills, and the small to medium sized schools found throughout the state. The KICKS<sub>2</sub> project provides consistent equitable statewide professional development in science content. The KICKS<sub>2</sub> institute model ensures that educators, regardless of their location, have access to regional training. Rotation of those trainings means that over the three year term of the grant, again regardless of location, educators have opportunity to be involved in professional development that supports their greatest content needs. These professional development opportunities will allow teachers to minimize travel and maximize learning.

The Nebraska State Science Standards establish the content around which professional development will be designed. Institute format and content remain consistent, however each institute adapts to accommodate the resources and particular needs of any region as well as integrating regional “flavor” into project activities.

The success and impact of the Nebraska Science KICKS<sub>2</sub> project is reflected in teacher evaluations gathered by the external reviewer, teacher involvement in statewide professional organizations such as the Nebraska Association of Teachers of Science (NATS), expansion of the Nebraska Science Matters project, and teacher feedback.

## **NON-DUPLICATION OF SERVICES**

Currently teacher options for professional development in the sciences in the state of Nebraska are limited. Most of the state's ESUs simply do not have the staff and/or resources to deliver science specific training opportunities. Alternative professional development opportunities for improving science content knowledge are typically regional in their impact and/or inaccessible given the constraints of availability, time, distance, and cost. In many cases the only option available to educators is graduate coursework at a university or state college. KICKS<sub>2</sub> institutes are designed to provide for a variety of teacher professional development needs. As such it is the only professional development option to provide consistent, equitable statewide delivery of teacher training in the sciences.

KICKS<sub>2</sub> staff in collaboration with higher education partners will work to ensure that KICKS<sub>2</sub> institutes do not conflict with or duplicate the summer course offerings of either the university or the state colleges. The project director and technical advisor will work closely with university and state college partners to ensure that the KICKS<sub>2</sub> professional development aligns with existing masters programs. As a result, teachers have the option to participate for graduate credit.

Of particular note is the collaboration between the University of Nebraska at Lincoln Coaching Science Inquiry in Rural Schools (CSI) research project <sup>6</sup> and Nebraska Science KICKS<sub>2</sub>. Because both projects serve an overlapping secondary teaching audience (rural 7-12 teachers), there is ongoing communication, co-promotion efforts around the state, as well as an ongoing exchange of instructional resources and insights. Project staff representing both CSI and KICKS<sub>2</sub> are working to design coaching protocols for KICKS<sub>2</sub> follow up sessions to support teacher implementation of summer institute learnings.

The KICKS<sub>2</sub> project will continue to work with existing partnerships with informal science organizations such as the Henry Doorly Zoo, Nebraska Game and Parks, University of

Nebraska State Museum, et al. Regional resources such as these serve to enhance and extend the content of the KICKS<sub>2</sub> institutes as they move across the state.

**PART B — PROPOSED OBJECTIVES AND ACTIVITIES: YEARS 1 – 3**

**OBJECTIVE 1:** Implement model professional development designed to improve K-12 teacher content knowledge and pedagogical content knowledge.

**OBJECTIVE 2:** Integrate scientific inquiry as both an instructional strategy and a fundamental process of science.

**ACTIVITIES:** In the summer of 2014, Science KICKS<sub>2</sub> content specific (Life, Earth/Space, and Physical Sciences) institutes will be hosted at various locations across the state. Locations will be assigned to ensure demographic and geographic representation. Institutes will rotate across the state over the course of the three year grant cycle providing all teachers regional access to each of the institute offerings. Each institute will accommodate from 12-16 teacher participants. Based on an average of 12 participants per institute there is potential to improve both the content knowledge and classroom practice of nearly 140+ science teachers statewide each year of the three year project. Institute instructors will include locally, as well as nationally, recognized master teachers, college instructors, and staff development professionals.

Each Science KICKS<sub>2</sub> Institute includes:

- 1) A two-week (10 days) summer session with intensive content emphasis (approximately 63% of total KICKS<sub>2</sub> teacher training activities). Content for each of the respective institutes will be aligned with appropriate grade band standards as defined in the Nebraska Science Standards document.
- 2) Three days of attendance at the fall conference of the Nebraska Association of Teachers of Science (NATS) will provide the first round of follow up to the summer sessions. This three-day follow up (19% of total KICKS<sub>2</sub> teacher training activities) will include a maximum of three sessions specific to KICKS<sub>2</sub> participants. The balance of conference time is reserved for

teachers to design their own professional learning plan from the available NATS conference offerings.

- 3) Two days of follow up scheduled over the balance of the school year will emphasize implementation and teacher practice (13% of total KICKS<sub>2</sub> teacher training activities). Participants will be asked to evaluate their own instruction relative to content (as defined by Nebraska Science Standards) and use of pedagogy appropriate to content. See OBJECTIVE 3 for activities.
- 4) It is anticipated that KICKS<sub>2</sub> participants will commit approximately six to eight hours in preparation for the follow up coaching activities (5% of total KICKS<sub>2</sub> teacher training activities).
- 5) Participants will have access to on-line discussion groups through Moodle course software and e-conferencing capabilities via Adobe Connect. Use of these technologies supports multiple objectives of the grant proposal. It extends both content instructional time as well as supporting regional and statewide teacher networking. Additionally, the Moodle learning management system serves as a repository for course content from each institute.

In total 82% of KICKS<sub>2</sub> institute activities have a focus on improving teacher subject matter knowledge. The balance of the institute activities provide for teacher implementation of both content knowledge and pedagogical content knowledge.

#### **YEAR 1 INSTITUTES**

Each of the content specific KICKS<sub>2</sub> institutes will be aligned to the K-12 learning progressions identified by the grade band standards (further defined at the curricular indicator level) in the Nebraska Science Standards document. In the spirit of the Next Generation Science Standards (final release anticipated March 2013) design of the Nebraska Science KICKS<sub>2</sub> curriculum will include a clear and consistent integration of science and engineering practices and crosscutting concepts. Project activities/curricula will model for teacher participants *“how knowledge and practice must be intertwined in designing learning experiences*

*in K–12 science education.”*<sup>7</sup> KICKS<sub>2</sub> institutes are designed to strike a balance between developing teacher content knowledge and addressing the very real content/pedagogical needs of teachers at their assigned grade levels..

### **K-5 Elementary Institutes**

K-5 elementary institutes will include up to five days of concurrent breakout sessions. One set of sessions would address the specific content/pedagogical needs of K-2 science teachers and concurrent sessions would address the content/pedagogical needs of 3-5 science teachers. The balance of the elementary KICKS<sub>2</sub> summer institutes (approximately 5 days) would include K-5 teachers collectively and would target building teacher content knowledge.

### **6-8 Middle Grades and 9-12 Secondary Institutes**

Both 6-8 and 9-12 content specific institutes will address developing teacher content knowledge, understanding the implications and instructional/content limitations of Nebraska’s secondary standards, as well as addressing the specific pedagogical content needs of the respective grade bands. As an example, the Science KICKS<sub>2</sub> institutes for year one could include:

- Three K-5 Elementary Science KICKS<sub>2</sub> institutes (Life Science-western NE, Earth/Space-central NE, Physical Science-eastern NE)
  - *five days summer session, K-5 together*
  - *five days concurrent summer sessions, K-2 and 3-5*
  - *three days at NATS concurrent sessions, K-2 and 3-5*
  - *six – eight hours follow up prep, individual teacher participant*
  - *two days of follow-up together*
- Three 6-8 Middle Grades Science KICKS<sub>2</sub> (Life Science-western NE, Earth/Space-central NE, Physical Science-eastern NE)
- Three 9-12 Science KICKS<sub>2</sub> (Life Science-western NE, Earth/Space-central NE, Physical Science-eastern NE)

Secondary institutes will follow the same format as the K-5 institutes.

## **YEAR 2 AND 3 INSTITUTES**

Content institutes would rotate around the state such that each region (west, central, and east) will have access to the three major content areas of science over the three year term of the project. Determination of actual institute offerings and locations is a highly collaborative effort and will be determined in response to input from grant partners, Science Cadre members, and ESUs.

**OBJECTIVE 3:** Integrate research-based instructional strategies to support content delivery to the diversity of learners found in a typical classroom.

**ACTIVITIES:** Strategies/interventions will be modeled in all of the KICKS<sub>2</sub> institutes. The potential and purpose of the interventions will be a critical component of content/pedagogical processing. It is significant to note that research indicates that hands-on activities and inquiry-based instruction that moves, over time, along a continuum from guided inquiry to more open-ended approaches ...” has shown promise for improving achievement outcomes in both science and literacy, as well as narrowing achievement gaps for students identified as English language learners”.<sup>8</sup> The Science KICKS<sub>2</sub> project integration of scientific processes and science inquiry are aligned with what is known about instructional practices that support diverse learners. The Center for Applied Linguistics and West Ed will be a primary resource for best practice in working with English language learners.

**OBJECTIVE 4:** Support teacher transfer of science content and effective science instruction to their own classroom practice.

**ACTIVITIES:** The two days of winter and spring follow up meetings will be designed to support teacher reflection on their own practice. Participants will be asked to evaluate their own instruction relative to content (as defined by Nebraska Science Standards) and use of pedagogy appropriate to content. Follow up sessions will use a peer coaching model to partner participants and allow for professional dialogue regarding content knowledge and pedagogical

content knowledge as it is demonstrated in classroom instruction, either their own or examples of others. Personal and professional assessment of practice will be structured through the use of protocols developed in conjunction with the UNL CSI research team and coaching staff, and the Horizon Research findings regarding elements of effective science instruction.

**OBJECTIVE 5:** Refine and expand a network for science teachers and teacher leaders across Nebraska.

**ACTIVITIES:** The networking aspect of the current MSP KICKS project has been identified by participants as one of the most valuable components.<sup>5</sup> Science KICKS<sub>2</sub> will continue the use of learning management software to provide ongoing access to institute resources including materials, activities, instructors, and fellow participants. E-conferencing will be incorporated to further strengthen statewide connections and extend content instruction time.

The KICKS<sub>2</sub> project will provide continued support to strengthen the existing Science Matters network. Each ESU in Nebraska will be asked to identify 1-2 Key Leaders (more for larger ESUs) to participate in a 2-day LINKS institute (Leadership in Nebraska KICKS<sub>2</sub> Science) with NATS follow-up training. These Key Leaders will receive training in science content, pedagogy, current research, technology, resources, as well as state and national updates. LINKS Key Leaders return to their respective ESUs to design and deliver up to two professional development trainings per year for area science educators. The Science Matters network is a vehicle for communication regarding regional, state, and national science education opportunities. Over the three year term of the KICKS<sub>2</sub> project there is the potential for 60 additional Key Leaders to become involved with the Science Matters initiative. If each of these Key Leaders reaches 24 classroom teachers (aka Points of Contact) there is potential to impact the practice of over 1,440 educators over the next three years.

Attendance at the NATS Fall Conference serves multiple purposes of the grant proposal, in particular, expanding the network of science educators statewide. Participants are

asked to contribute back to their profession and their peers as presenters. They also have opportunity to take advantage of the expertise of both Nebraska as well as national presenters.

### **RECRUITMENT/MARKETING**

**WHO:** Individuals and organizations that will be asked to support the marketing and recruitment efforts of the KICKS<sub>2</sub> project include, but are not limited to, the membership of the Science Cadre, ESU personnel, NDE, statewide science professional organizations including NATS, Nebraska Academy of Science (NAS), Nebraska Junior Academy of Science (NJAS), the existing Science Matters network, and past KICKS<sub>2</sub> participants.

ESUs are essential partners in the KICKS<sub>2</sub> project. ESU staff development personnel will work with KICKS<sub>2</sub> administrative staff to determine regional needs in order to identify appropriate institute offerings. In addition, ESU personnel will support recruitment efforts and assist with logistics for the KICKS<sub>2</sub> institutes. Recruiting efforts will target district administration, science curriculum specialists where appropriate, and school personnel. The existing Science Matters network of Key Leaders and Points of Contact will be of particular importance in disseminating information at the teacher level.

**WHAT:** Recruitment and marketing strategies include but are not limited to: 1) KICKS<sub>2</sub> brochures available statewide, 2) KICKS<sub>2</sub> DVD distributed through ESUs for school administration and on KICKS<sub>2</sub> website, 3) KICKS<sub>2</sub> promotions at regional meetings (ex. ESU Administrators meetings), 4) KICKS<sub>2</sub> website distributed via email link out to ESUs, Science Matters network, and previous KICKS<sub>2</sub> participants 5) on-site school visits as appropriate (ex. low performing schools/districts), and 6) a KICKS<sub>2</sub> presence at statewide conferences such as Administrator Days, NAMLE Conference, NAG Spring Conference, etc.

### **RESEARCH BASE**

In their report, *Lessons from a Decade of Mathematics and Science Reform*, evaluators from Horizon Research weigh in on the ongoing need for professional development that deepens both teacher content knowledge as well as effective instructional design.<sup>9</sup> In a

separate study Horizon researchers concluded that effective science instruction necessitates professional development opportunities for teachers to “learn important science content (as identified by national and state standards documents) and to develop a vision of science instruction that is based on what is known about how people learn.”<sup>4</sup> Science teachers need ongoing professional development that addresses both content knowledge and content-specific pedagogical knowledge particularly as it transfers to classroom practice.

The objectives of the Science KICKS<sub>2</sub> proposal are directly aligned with the research regarding both teacher and student learning. Fundamental to the structure and design of the KICKS<sub>2</sub> professional development institutes is the notion that if teachers experience science instruction that includes rigorous and relevant standards-based content, effective best practice methodology, and have an opportunity to process that experience they are more likely to transfer both to their own professional practice. “Research tells us that teachers with stronger content knowledge are more likely to teach in ways that help students construct knowledge, pose appropriate questions, suggest alternative explanations, and propose additional inquiries.” Additional studies have shown a relationship between teacher content knowledge and student learning.<sup>4</sup>

The consensus report, *Taking Science to School: Learning and Teaching Science in Grades K-8*, points out that “content and process are inextricably linked in science.” One cannot be presented, discussed, or experienced to the exclusion of the other. The report further suggests that professional development should be focused not only on teachers’ knowledge of science, but also on how students learn as well as specific methods and technologies that support science learning for all students.<sup>10</sup> Science KICKS<sub>2</sub> proposes integrating opportunities for teachers to reflect on the “what and why” of effective science instruction in terms of the pedagogy that supports content delivery. The KICKS<sub>2</sub> emphasis on both technology and the skills and processes of scientific inquiry, including questioning, critical thinking, data gathering/analysis, reflect the current national 21<sup>st</sup> Century learning initiative.

Weiss, et al have summarized the research on student learning and the implications for content delivery and lesson design. Effective lesson design includes the following components: motivation, eliciting students' prior knowledge, intellectual engagement, use of evidence to make and critique claims, and sense-making.<sup>4</sup> These elements of effective lesson design will be the model for KICKS<sub>2</sub> curriculum development. They will also guide the work of **OBJECTIVE 3**: Support teacher transfer of science content and effective science instruction to their own classroom practice.

The goals and activities of the Science KICKS<sub>2</sub> project are integrated and mutually supportive. The incorporation of scientific inquiry as both an instructional strategy and a fundamental process of science has been shown to support the learning of mainstream students but more particular to the goals of this proposal it is one of the more effective strategies for diverse learners. Minner, Levy, & Century in their 2009 meta-analysis find that “teaching strategies that actively engage students in the learning process through scientific investigations are more likely to increase conceptual understanding.” The Inquiry Synthesis Project meta-analysis also addressed the significance of active engagement with science content for the learning disabled student.<sup>11</sup> In its official position statement regarding science for English language learners, NSTA finds that the “research on instructional interventions—such as culturally responsive teaching, guided inquiry, and sheltered English instruction—has shown promise for improving achievement outcomes in both science and literacy, as well as narrowing achievement gaps for students identified as English language learners”.<sup>8</sup>

## **SUSTAINABILITY**

In the short term the KICKS<sub>2</sub> model provides professional development that is extended over an entire year. Teacher participants are supported over time as they improve both science content knowledge and their classroom practice. The logic model for the project assumes the following institutional outcomes for teacher participants and their districts: alignment of elementary and secondary science experiences with Nebraska Standards, implementation of

inquiry based curriculum, development of teacher leaders, enhanced professional development offerings, and changes in policies and practices. Classroom observations and teacher feedback both formal and informal confirm that curricular revisions and policy/practice changes do in fact occur.

Long term sustainability of KICKS<sub>2</sub> project goals of increased content knowledge for the purpose of transforming teacher practice is further supported by the expansion of the statewide network of science educators. The resources established via the Science Matters network of professional peers extends beyond the life of the grant. An anticipated outcome of the LINKS leadership training is that science educators will develop the capacity to deliver or arrange for professional development training. A direct result of the LINKS trainings has been a steady increase in statewide ESU participation and subsequent delivery of regional science professional development by trained teacher leaders. Teacher leader training is provided through LINKS. Coordination of the regional PD is facilitated through the ESUs.

An important aspect of the KICKS<sub>2</sub> experience is participant introduction to existing professional organizations like NATS and NSTA. Continued membership in professional organizations provides ongoing resource support, professional development opportunities as well as continued networking at both the state and national level.

#### **BUDGET AND PROJECT OBJECTIVES**

The budget adequately addresses the essential components of the KICKS<sub>2</sub> project. It includes adequate resources, both requested and in-kind, for administration of the grant. There are financial incentives to attract teacher participation in project activities. Grant funds include resources to compensate and retain master institute instructors. Sustainability has been built into the KICKS<sub>2</sub> project with monies allocated for LINKS teacher training, the Science Matters network and teacher participation in the Nebraska Association of Teachers of Science professional organization. There are sufficient budget allocations to support the statewide nature of Science KICKS<sub>2</sub> project.

**LEAD AGENCY CREDENTIALS**

Educational Service Unit #16 (ESU #16) located in west central Nebraska with offices in North Platte and Ogallala, has been serving schools for the past 40+ years. Administrators and staff meet regularly with school superintendents to facilitate the dissemination of information and identify professional development needs. ESU #16 processes nearly \$1.3 million in local, state, and federal grant funds annually. Key personnel are currently involved with a number of grants working to promote sustainability and continuity of these grant-funded projects including Rural Utilities Service grants, Title grants, special education, and career and technical education.

ESU #16 has a strong statewide presence. The service unit is represented on each of the statewide ESU affiliate groups including, ESU Administrators Coordinating Council (ESUCC), Staff Development Affiliate (SDA), Instructional Materials Affiliate (IMAT), Network Operating Committee (NOC), Technology Affiliate Group (TAG) and Special Education Affiliate (SPED). Fiscal Agent, Margene Beatty, is certified as a school administrator. She has served as President of the executive board for the ESU Administrators Coordinating Council. KICKS<sub>2</sub> Project Director, Deb Paulman has 33 years experience in 7-12 science classrooms both as an educator and peer coach. She has worked with school districts in the areas of science curriculum, assessment, and instruction. Deb has also served as regional coordinator for the previous MSP KICKS project and director for the MSP Nebraska Science KICKS<sub>2</sub> project from 2010-2013.

**STAFFING SUMMARY TABLE**

STAFFING SUMMARY				
Position	Name	Qualifications	Project Responsibilities	Percentage of FTE/hours per week
Project Director for Science KICKS <sub>2</sub>	Deb Paulman	<ul style="list-style-type: none"> <li>• Educational Consultant, ESU 16</li> <li>• Administrative certificate</li> </ul>	Overall grant management <ul style="list-style-type: none"> <li>• Assist in coordination of KICKS<sub>2</sub> activities statewide</li> </ul>	50%

STAFFING SUMMARY				
Position	Name	Qualifications	Project Responsibilities	Percentage of FTE/hours per week
Science Matters Coordinator	Sheree Person-Pandil	<ul style="list-style-type: none"> <li>Educational Consultant, ESU 3</li> <li>Administrative certificate</li> <li>Masters Degree in Science Education</li> </ul>	<ul style="list-style-type: none"> <li>Coordinate expansion of Science Matters statewide network</li> <li>Course Instructor</li> </ul>	8%
Clerical- Grant support secretary	Deb Frates	Clerical skills	Clerical as assigned, including material ordering, production, etc.	15%
Accounting	Stephanie Armour	ESU 16 bookkeeper	Grant payroll, substitute reimbursement	15%
Technical Advisor	Jim Woodland	NE Director of Science Education	<ul style="list-style-type: none"> <li>Content liaison with the NDE</li> <li>Alignment of activities with state science standards</li> </ul>	8%
IHE Coordinator	Dr. Charles Snare	Vice President Academic Affairs Chadron State College	<ul style="list-style-type: none"> <li>Member of KICKS Advisory Board</li> <li>Coordinates graduate credit</li> </ul>	4%
IHE Coordinator	Dr. Jon Pedersen	UNL Professor of College of Education and Human Sciences PhD	<ul style="list-style-type: none"> <li>Member of KICKS Advisory Board</li> <li>Coordinates graduate credit</li> </ul>	8%
External Evaluator	Brandie Good	RMC Research Research Associate	<ul style="list-style-type: none"> <li>Design research methodologies</li> <li>Coordinate data collection</li> <li>On-site qualitative data collection</li> <li>Technical assistance</li> </ul>	15%
KICKS Institute Instructor-Elementary	Joan Anthony	Presidential Award in Elementary Science Teaching Elementary certificate ESU 3 Key Leader	<ul style="list-style-type: none"> <li>Plan KICKS Institute curriculum</li> <li>Conduct KICKS Institutes during academic year as instructed</li> <li>Provide Technical and online support</li> <li>Assist in evaluation of participants and institutes</li> </ul>	8%
KICKS Institute Instructor-Elementary	Elissa Wolf	Elementary certificate Master Teacher ESU 3 Key Leader	<ul style="list-style-type: none"> <li>Plan KICKS Institute curriculum</li> <li>Conduct KICKS Institutes during academic year as instructed</li> <li>Provide Technical and online support</li> <li>Assist in evaluation of participants and institutes</li> </ul>	8%

STAFFING SUMMARY				
Position	Name	Qualifications	Project Responsibilities	Percentage of FTE/hours per week
KICKS Institute Instructor-Elementary	Sandra Seckel	Elementary certificate Master Teacher	<ul style="list-style-type: none"> <li>Plan KICKS Institute curriculum</li> <li>Conduct KICKS Institutes during academic year as instructed</li> <li>Provide Technical and online support</li> <li>Assist in evaluation of participants and institutes</li> </ul>	8%
KICKS Institute Instructor-Elementary	Julie McKeone	Elementary certificate Master Teacher ESU 3 Key Leader	<ul style="list-style-type: none"> <li>Plan KICKS Institute curriculum</li> <li>Conduct KICKS Institutes during academic year as instructed</li> <li>Provide Technical and online support</li> <li>Assist in evaluation of participants and institutes</li> </ul>	8%
KICKS Institute Instructor-Elementary	Jeremy Behnke	Elementary certificate Master Teacher	<ul style="list-style-type: none"> <li>Plan KICKS Institute curriculum</li> <li>Conduct KICKS Institutes during academic year as instructed</li> <li>Provide Technical and online support</li> <li>Assist in evaluation of participants and institutes</li> </ul>	8%
KICKS Institute Instructor- Middle	Katie Ramsey	Presidential Award Science Coach NATS President elect	<ul style="list-style-type: none"> <li>Plan KICKS Institute curriculum</li> <li>Conduct KICKS Institutes during academic year as instructed</li> <li>Provide Technical and online support</li> <li>Assist in evaluation of participants and institutes</li> </ul>	8%
KICKS Institute Instructor- Middle	Kirsten Smith	Science Director Lincoln Public Schools NATS President 2011 NATS Board	<ul style="list-style-type: none"> <li>Plan KICKS Institute curriculum</li> <li>Conduct KICKS Institutes during academic year as instructed</li> <li>Provide Technical and online support</li> <li>Assist in evaluation of participants and institutes</li> </ul>	8%

STAFFING SUMMARY				
Position	Name	Qualifications	Project Responsibilities	Percentage of FTE/hours per week
KICKS Institute Instructor- Physics	Tyler Berzina	DOE Star Teacher of the Year Secondary certificate, Physics endorsement Master Teacher	<ul style="list-style-type: none"> <li>Plan KICKS Institute curriculum</li> <li>Conduct KICKS Institutes during academic year as instructed</li> <li>Provide Technical and online support</li> <li>Assist in evaluation of participants and institutes</li> </ul>	8%
KICKS Institute Instructor- Biology	TBD			8%
KICKS Institute Instructor- Chemistry	TBD			8%
KICKS Institute Instructor- Earth/Space Science	Angela Bergman	Master Teacher Presidential Award Applicant 2013	<ul style="list-style-type: none"> <li>Plan KICKS Institute curriculum</li> <li>Conduct KICKS Institutes during academic year as instructed</li> <li>Provide Technical and online support</li> <li>Assist in evaluation of participants and institutes</li> </ul>	8%

### Part C – EVALUATION

KICKS<sub>2</sub> agrees to fully participate in a timely fashion with the state and federal evaluation requirements. RMC Research Corporation will serve as the external evaluator, and will be compensated no more than 10% of the grant award. RMC Research brings over 35 years of evaluation experience and deep knowledge of science content and pedagogy, research and inquiry-based learning, mentoring and coaching, leadership development, technology integration, and professional development, along with a history of evaluating MSP programs. Brandie Good will lead the evaluation team, with assistance from Arlene Mitchell, both of whom were involved in the evaluation of the previous two KICKS projects.

The evaluation design involves qualitative and quantitative methods, with dual aims of yielding evidence of the impact of the program activities and formative evaluation to highlight successes and areas for improvement. The evaluation will use a participant pre- and post

comparison over time for teachers, formal observations of project professional development activities, formal classroom observations of KICKS<sub>2</sub> teachers, and, to the extent possible, a quasi-experimental analysis of student achievement data if access is granted by NDE. Data collection tools will be selected or adapted from existing instruments; additional tools will be developed, as necessary.

RMC Research will work closely with the NDE, project leadership, and partners regarding instrument development, validation, data collection, and analysis. The evaluation team will work with the NDE and Project Management Team through meetings, teleconferences, and other activities to support the use of evaluation data in long-term planning and guidance, including an ongoing review of objectives and action plans.

Annual performance reports with program impacts, lessons learned, and recommendations will be submitted to the U.S. Department of Education and provided to project leadership and NDE to support continuous project improvement. A final summative report will document progress toward project goals, highlighting effective strategies and providing recommendations for establishing objectives and action plans, along with sustaining, improving, and replicating practices.

Table XX presents the evaluation questions and data collection methods.

Table XX. Evaluation Questions	Data Collection Method						
	PD Observations	Classroom Observations	Interviews & Focus Groups	Surveys	Knowledge Inventories	Document Analysis	Student Achievement Data
<p>1. To what extent has KICKS<sub>2</sub> met its articulated goals and objectives?</p> <p><i>To what extent does KICKS<sub>2</sub> . . .</i></p> <p>a. Implement model professional development to improve teacher content and pedagogical content knowledge?</p> <p>b. Integrate research-based instructional strategies to support the needs of diverse learners?</p> <p>c. Support teacher transfer of science content and effective science instruction to their own practice</p> <p>d. Refine and expand a network for science teachers and teacher leaders across Nebraska?</p>	X	X	X	X	X	X	X
2. To what extent does participation in the KICKS <sub>2</sub> activities enhance teachers' science content and pedagogical content knowledge?	X	X	X	X	X	X	
3. To what extent does participation in the KICKS <sub>2</sub> activities enhance teachers' levels of confidence, comfort, and preparedness to teach science?	X	X	X	X	X	X	
4. What factors impede or facilitate progress toward KICKS <sub>2</sub> goals and objectives?	X	X	X	X			
5. What progress has been made toward sustaining and "scaling up" KICKS <sub>2</sub> activities and strategies?	X		X			X	

## Brandie M. Good

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### Professional Preparation

M.S., (with honors) Iowa State University, Ames, Iowa, Human Development and Family Studies, 2008.

B.S., (with distinction) Iowa State University, Ames, Iowa, Psychology major, Child, Adult, and Family Services minor, 2005.

### Professional History

2011-Present Research Associate, RMC Research Corporation, Denver, Colorado.  
2009-2011 Research Assistant, RMC Research Corporation, Denver.  
2008-2009 Administrative Assistant, Eating Disorder Center of Denver.  
2007 Skills Specialist, Mid-Iowa Family Therapy Clinic, Ames, Iowa.  
2007 Teaching Intern, Communication in Family Development,  
Department of Human Development and Family Studies, Iowa State University,  
Ames.  
2005-2007 Graduate Research Assistant, Department of Human Development and Family  
Studies, Iowa State University, Ames.  
2005-2006 Therapist, Marriage and Family Therapy Clinic, Department of Human  
Development and Family Studies, Iowa State University, Ames.  
2004 Undergraduate Research Assistant, Department of Psychology, Iowa State  
University, Ames.

### Professional Experience

Research Associate, RMC Research. Responsibilities include leading project evaluations; designing research methodologies; managing timelines and budgets; preparing instruments; coordinating data collection; onsite qualitative data collection and professional development observations; analyzing quantitative and qualitative data; report writing; preparing IRB application packets; and providing technical assistance to projects.

#### *Leadership in Evaluation Projects*

- Nebraska Mathematics and Science Partnership (MSP): Nebraska Mathematics Professional Development Series (2008-present)
- Nebraska MSP: Keep Improving Content Knowledge and Skills<sup>2</sup> (2010-present)
- Wyoming Science MSP: Science for the Future: Redesigning Science Education via the Energy-Water-Climate Nexus (2012-present)
- Wyoming Mathematics MSP: Ready to Learn Math (2011-2012)

#### *Quantitative Analyst for Project Evaluations*

- Idaho MSP: Idaho Mathematical Thinking Initiative (2008-present)
- Illinois Statewide MSP Needs Assessment (2010)
- Nebraska NOYCE: National Science Foundation (NSF) Mathematics Teaching and Master Teaching Fellows (2012-present)
- Nebraska Science MSP: Keep Improving Content Knowledge and Skills (2008-2009)
- Nebraska Statewide MSP Needs Assessment (2009)
- New Hampshire MSP: Statewide Evaluation (2009-2010)

- University of Nebraska–Lincoln NSF MSP: Math in the Middle Institute Partnership (2010-2011)
- University of Nebraska–Lincoln NSF MSP: NebraskaMATH Targeted Partnership (2009-present)
- University of Nebraska–Lincoln NSF STEP: Strengthening Transitions into Engineering Programs (2009-2012)

#### *Quantitative Analyst for Student Achievement Impacts*

- Granite School District Graduation Initiative (2012)
- Idaho Statewide MSP (2010)
- School District of Philadelphia Partnerships in Character Education (2010)
- Wisconsin Learn and Serve (2009)

#### *Team Member*

- NSF Research Project: Examining Mathematics Coaching (2011-present)
- Louisiana NSF MSP: Louisiana Math and Science Teacher Institute (2009-present)
- NASA's JUNO Education and Outreach Program Evaluation (2011)
- REL Central, U.S. Department of Education Regional Educational Laboratory (2012-present)
- Rocky Mountain Middle School MSP: Enhancing STEM Leadership in Mapleton Public Schools (2010)

#### **Related Papers**

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- Good, B., & Mitchell, A. (2012, September). *Nebraska Statewide Mathematics and Science Partnership Program – Science – Keep Improving Content Knowledge and Skills (KICKS<sub>2</sub>), 2011-2012 evaluation report*. Denver, CO: RMC Research Corporation.
- Mitchell, A., & Good, B. (2012, September). *Nebraska Statewide Mathematics and Science Partnership Program – Nebraska Mathematics Professional Development Series, 2011-2012 evaluation report*. Denver, CO: RMC Research Corporation.
- Sutton, J., Good, B., Mitchell, A., & Heidema, C. (2011, December). *University of Nebraska–Lincoln NebraskaMATH targeted partnership, 2010-2011 evaluation report*. Denver, CO: RMC Research Corporation.
- Good, B., & Sutton, J. (2011, September). *Nebraska Statewide Mathematics and Science Partnership program–Keep Improving Content, Knowledge and Skills (KICKS<sub>2</sub>) evaluation report*. Denver, CO: RMC Research Corporation.
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- Sutton, J., Good (Ward), B., Heidema, C., Jesse, D., Meyer, Stephen, & Mitchell, A. (2011, July). *University of Nebraska-Lincoln Math in the Middle Institute Partnership: Final evaluation report*. Denver, CO:
- Sutton, J., Ward, B., Jaramillo, D., & Fredericks, F. (2010, November). *New Hampshire Statewide Mathematics and Science Partnership (MSP) program evaluation report*. Denver, CO: RMC Research Corporation.
- Sutton, J., Ward, B., & Freeman, F. (2010, October). *Evaluation report: Nebraska Statewide Mathematics and Science Partnership Program–Science–Keep Improving Content, Knowledge, and Skills (KICKS)*. Denver, CO: RMC Research Corporation.

- Sutton, J., Swackhamer, L. E., Ward, B., & Jaramillo, D. (2010, May). *Evaluation report: Nebraska Statewide Mathematics and Science Partnership Program – Nebraska Mathematics Professional Development Series*. Denver, CO: RMC Research Corporation.
- Jesse, D., Sutton, J., & Ward, B. (2010, March). *Idaho Statewide Mathematics and Science Partnership (MSP) evaluation 2010: Impact on student achievement*. Denver, CO: RMC Research Corporation.
- Ward, B. (2009, December). *Student achievement data analysis report: Wisconsin Learn and Serve*. Denver, CO: RMC Research Corporation.
- Sutton, J. T., Swackhamer, L. E., & Ward, B. (2009, October). *Nebraska Statewide Mathematics and Science Partnership Program – Needs Assessment evaluation report*. Denver, CO: RMC Research Corporation.

## **PART D – BUDGET**

### **BUDGET NARRATIVE**

The KICKS<sub>2</sub> project takes a three-pronged approach to improving teacher content knowledge and expanding networking opportunities for science educators. The KICKS<sub>2</sub> summer institutes with school year follow up are designed to improve science subject matter knowledge and pedagogy for practicing classroom teachers. Science Matters and LINKS are intended to build and sustain leadership at the local, regional and state levels. Over 70% of requested funds will go to support increased content knowledge and pedagogical competencies of teacher participants. Only 2% of project monies support the Science Matters network, and LINKS. The Science Matters Initiative is a joint project supplemented by NATS. LINKS partners with the NDE Science Director to design and deliver leadership training. The grant evaluation requires 10% of requested funds with the remaining 18% of funds supporting the administration of the statewide Science KICKS<sub>2</sub> project.

The proposed budget requests monies to support 13 Science KICKS<sub>2</sub> institutes. The projected cost of each KICKS<sub>2</sub> institute (12 participants/institute) is \$27,456. This projection reflects the cost of institute instructors, participant stipends, materials, attendance at the NATS Fall Conference, and substitute reimbursement for NATS.

The proposed budget requests monies to support the activities of LINKS and the Science Matters network. The projected cost of the Science Matters network and LINKS activities is \$10,600. This projection reflects the cost of the Science Matters and LINKS facilitators, participant stipends, and materials.

### **NATIONAL, STATE & LOCAL COLLABORATION**

The KICKS<sub>2</sub> project works to collaborate with a number of organizations on multiple levels.

NATIONAL: The KICKS<sub>2</sub> Science Matters network is an extension of the NSTA Science Matters network.

STATE: 1) The technical advisor to the grant is the NDE Science Director. The director works closely with project staff to help identify statewide science education needs to inform project objectives and identify activities to meet those needs. The director will also validate the alignment of all KICKS<sub>2</sub> activities to Nebraska Science Standards. In addition, the director is in attendance at each institute to present on state level science resources for standards, curriculum and assessments.

2) The KICKS<sub>2</sub> project has a unique and mutually supportive relationship with the NATS organization. This relationship is formalized by naming the Project Director as an ex-officio member to the NATS Board of Directors. The NATS board supports the work of the grant by providing in-kind resources such as use of their fall conference facilities and sponsorship of NSTA conference attendance. NATS input provides guidance to inform KICKS<sub>2</sub> planning decisions.

3) The ESUCC is a project partner. Margene Beatty, ESU 16 chief administrator and member of the executive board of the ESUCC, affords the project direct contact with the administrative leadership of the state's ESUs. A primary function of this relationship is statewide dissemination of KICKS<sub>2</sub> information.

4) State institutions of higher education serve as project partners, institute hosts, and consultants in the design and delivery of KICKS<sub>2</sub> professional development and coaching activities and institutes. Higher Ed faculty serve as part time instructional or supplemental staff as regional locations of the institutes permits. As an example, UNL researchers at the Cedar Point Biological Station are guest lecturers for the secondary institutes hosted at that facility. Chadron State College faculty serve as guest lecturers for institutes held in the western regions of the state.

LOCAL: Regionally school districts, ESU sites and informal science partners provide in-kind support in the form of facilities for institutes and meetings. In addition informal science staff


serve as part time faculty. Local school districts support the project with substitute pay for their teachers in attendance at the NATS fall conference.

## **CONCLUSION**

KICKS<sub>2</sub> capitalizes on the success of the previous MSP project. KICKS has earned a statewide reputation for excellence. The Nebraska Science KICKS<sub>2</sub> project is designed to enhance and build upon the professional development opportunities established in the initial Science KICKS institutes. KICKS<sub>2</sub> will provide strong leadership, strong infrastructure, and strong programming throughout the state of Nebraska.

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# NEBRASKA STATEWIDE MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM – NEEDS ASSESSMENT

REPORT

PREPARED FOR:  
NEBRASKA DEPARTMENT OF EDUCATION  
301 CENTENNIAL MALL SOUTH  
P.O. Box 94987  
LINCOLN, NE 68509-4987

DECEMBER 2015





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**REPORT**

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NEBRASKA MATHEMATICS AND SCIENCE PARTNERSHIP  
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**DECEMBER 2015**

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FOR QUESTIONS ABOUT THIS REPORT, PLEASE CONTACT DR. JOHN T. SUTTON  
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## TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
INTRODUCTION	1
METHODOLOGY	3
FINDINGS	7
PERCEPTIONS OF PREPAREDNESS AND NEEDS	7
TEACHER COMPARISON FOR PREPAREDNESS AND NEEDS	29
CONCLUSIONS AND RECOMMENDATIONS	61
APPENDIX	
SURVEY INVITATION LETTER	
SURVEYMONKEY.COM SURVEY	

---



## TABLE OF EXHIBITS

1.	NDE BULLETIN NOTICE	3
2.	TARGETED SURVEY PARTICIPANTS	4
3.	RELIABILITY ANALYSIS	5
4.	TEACHER PARTICIPANTS BY GROUPING CATEGORY	6
5.	SURVEY RESPONDENT CHARACTERISTICS	7
6.	SCHOOL CHARACTERISTICS REPORTED BY RESPONDENTS	8
7.	SCHOOL CHARACTERISTICS REPORTED BY STATE	9
8.	RESPONDENT DEGREES, CERTIFICATION, ENDORSEMENTS, AND MEMBERSHIPS	10
9.	AREAS OF CERTIFICATION AND ENDORSEMENTS	11
10.	PROFESSIONAL DEVELOPMENT PREFERENCES	12
11.	INSTRUCTIONAL TOOLS	13
12.	RESPONDENT DISTRIBUTION ACROSS ESUS	13
13.	ITEMS OF DISAGREEMENT WITH BELIEFS ABOUT TEACHING AND LEARNING	14
14.	ITEMS OF AGREEMENT WITH BELIEFS ABOUT TEACHING AND LEARNING	15
15.	ITEMS OF DISAGREEMENT WITH ATTITUDES ABOUT TEACHING AND LEARNING	16
16.	ITEMS OF AGREEMENT WITH ATTITUDES ABOUT TEACHING AND LEARNING	17
17.	RATINGS OF PREPAREDNESS FOR VARIOUS AREAS IN MATHEMATICS	18
18.	ITEMS FOR WHICH RESPONDENTS FELT LEAST PREPARED IN MATHEMATICS	19
19.	ITEMS FOR WHICH RESPONDENTS FELT BEST PREPARED IN MATHEMATICS	20
20.	STUDENT READINESS FOR MATHEMATICAL PROCESSES	21
21.	RATINGS OF PRIORITY FOR PROFESSIONAL DEVELOPMENT IN MATHEMATICS	22
22.	RATINGS OF PREPAREDNESS FOR VARIOUS AREAS IN SCIENCE	23
23.	PREPAREDNESS TO TEACH SCIENCE CONCEPTS	24
24.	PREPARATION TO MEET STUDENT NEEDS IN SCIENCE: ITEM OF LOW PREPAREDNESS	25
25.	PREPARATION TO MEET STUDENT NEEDS IN SCIENCE: ITEMS OF HIGH PREPAREDNESS	26
26.	STUDENT READINESS FOR SCIENTIFIC PROCESS	27
27.	PRIORITIES FOR PROFESSIONAL DEVELOPMENT IN SCIENCE	28
28.	SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY SCHOOL SIZE FOR MATHEMATICS PREPAREDNESS AND PROFESSIONAL DEVELOPMENT NEEDS	30
29.	RATINGS OF PREPAREDNESS FOR TEACHING MATHEMATICS WITH RESPONSES FOR SCHOOL SIZE BASED ON NUMBER OF STUDENTS	31
30.	STUDENT READINESS FOR MATHEMATICAL PROCESSES WITH RESPONSES FOR SCHOOL SIZE BASED ON NUMBER OF STUDENTS	32
31.	SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY SCHOOL SIZE FOR SCIENCE PREPAREDNESS AND PROFESSIONAL DEVELOPMENT NEEDS	32
32.	HIGHEST RATINGS OF READINESS TO MEET STUDENT NEEDS IN SCIENCE WITH RESPONSES FOR SCHOOL SIZE BASED ON NUMBER OF STUDENTS	34
33.	LOWEST RATINGS OF READINESS TO MEET STUDENT NEEDS IN SCIENCE WITH RESPONSES FOR SCHOOL SIZE BASED ON NUMBER OF STUDENTS	35
34.	SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY FRL COMPOSITION FOR MATHEMATICS PREPAREDNESS AND STUDENT READINESS	36
35.	RATINGS OF PREPAREDNESS FOR TEACHING MATHEMATICS WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH	37

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36.	STUDENT READINESS FOR MATHEMATICAL PROCESSES WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH	38
37.	SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY FRL COMPOSITION FOR SCIENCE PREPAREDNESS AND STUDENT READINESS	39
38.	RATINGS OF PREPAREDNESS FOR TEACHING SCIENCE WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH	40
39.	PREPAREDNESS TO TEACH SCIENCE CONCEPTS WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH	41
40.	STUDENT READINESS FOR SCIENTIFIC PROCESSES WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH	42
41.	SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY ESU SIZE FOR READINESS TO MEET STUDENT NEEDS IN MATHEMATICS	43
42.	HIGHEST RATINGS OF READINESS TO MEET STUDENT NEEDS WITH RESPONSES FOR SMALL AND LARGE ESUS	44
43.	LOWEST RATINGS OF READINESS TO MEET STUDENT NEEDS WITH RESPONSES FOR SMALL AND LARGE ESUS	45
44.	SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY ESU SIZE FOR SCIENCE PREPAREDNESS AND STUDENT READINESS	46
45.	RATINGS OF PREPAREDNESS FOR TEACHING SCIENCE WITH RESPONSES FOR SMALL AND LARGE ESUS	47
46.	PRIORITIES FOR PROFESSIONAL DEVELOPMENT IN SCIENCE WITH RESPONSES FOR SMALL AND LARGE ESUS	48
47.	SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY SCHOOL GRADE COMPOSITION FOR MATHEMATICS PREPAREDNESS AND READINESS TO MEET STUDENT NEEDS	49
48.	RATINGS OF PREPAREDNESS FOR TEACHING MATHEMATICS WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)	50
49.	HIGHEST RATINGS OF READINESS TO MEET STUDENT NEEDS WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)	51
50.	LOWEST RATINGS OF READINESS TO MEET STUDENT NEEDS WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)	52
51.	SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY SCHOOL GRADE COMPOSITION FOR SCIENCE PREPAREDNESS AND STUDENT READINESS	53
52.	RATINGS OF PREPAREDNESS FOR TEACHING SCIENCE WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)	54
53.	PREPAREDNESS TO TEACH SCIENCE CONCEPTS WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)	55
54.	HIGHEST RATINGS OF READINESS TO MEET STUDENT NEEDS IN SCIENCE WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)	57
55.	LOWEST RATINGS OF READINESS TO MEET STUDENT NEEDS IN SCIENCE WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)	58
56.	STUDENT READINESS FOR SCIENTIFIC PROCESSES WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)	59

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## EXECUTIVE SUMMARY

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. These two projects are continuing to operate with re-competed proposals in their third iteration but operating from ESU-Coordinating Council (ESUCC) and ESU #16 for NMPDS and KICKS, respectively. In winter 2015, NDE plans on releasing a new RFP, with projects to be selected and awards to be made beginning in 2016.

RMC Research was selected in May 2006 to serve as external evaluator for the NE MSP statewide program and has continued to serve in that role. In this capacity, RMC Research provides leadership in assisting the NDE MSP grant program 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, adequate yearly progress (AYP), ESU clusters, school size, free and reduced price lunch (FRL), ESU size, and Nebraska State Assessments (NeSA) Math and Science?

Results in the report are based on data collected from a survey that was co-designed by RMC Research and the NDE staff, with a draft prepared by RMC Research and then reviewed and revised by NDE staff. The survey was created using SurveyMonkey.com, an online survey application, and was opened for administration on September 8, 2015 and closed on September 30, 2015. Nebraska teachers were sent invitations directly by NDE, an information piece regarding the survey and a url link was included in the September 2015 issues (3, 10, 17, and 24) of the NDE Bulletin for four consecutive weeks. Additionally, invitation letters and announcements were shared at the Nebraska Association of Teachers of Mathematics (NATM) Annual Conference in Kearney, Nebraska on September 14, and at the Nebraska Association of Teachers of Science (NATS) Annual Conference on September 23 and 24 in Fremont, Nebraska, and word of mouth, with a total of 1,456 respondents.

### FINDINGS

- **The majority of respondents did not participate in previous NE MSP activities.** Those that have participated in NE MSP activities were fairly evenly distributed between NMPDS and KICKS. Almost 10% of respondents participated in the NMPDS Middle/High School Institute.

- **More than half of respondents hold advanced degrees.** The majority of respondents held a standard or professional teaching certificate and are teaching in an area for which they hold an endorsement.
- **The majority of participants held an elementary endorsement.** Almost 40% of the sample held an endorsement for mathematics, special education, and/or early childhood education (which includes early childhood inclusive education).
- **More than half the respondents indicated they preferred attending professional development for extended weeks during the summer.** Face-to-face was the preferred mode for professional development delivery, followed by hybrid sessions involving both face-to-face and online activities.
- **Respondents rated engaging students, supporting a range of strategies and productive struggle highly.** Respondents most strongly believe the role of the teacher is to engage students in tasks that promote reasoning and problem solving and facilitate discourse that moves students toward shared understanding of mathematics/science; all students need to have a range of strategies and approaches from which to choose in solving problems; and an effective teacher provides students with appropriate challenge, encourages perseverance, and supports productive struggle in learning mathematics/science.
- **Respondents rated continuous improvement, collaboration, and content-focused instructional coaching highly.** Respondents rated the highest agreement with statements about learning attitudes: *highly effective teachers become master teachers over time by continually improving their content knowledge for teaching/pedagogical skills/knowledge of students as learners; teachers who collaborate with colleagues inside and outside their school are more effective; and all professionals can benefit from content-focused instructional coaching.*
- **Mathematics teachers felt well prepared to teach elementary and middle school mathematics and algebra.** Respondents rated their level for teaching elementary, middle school mathematics, and algebra highest, while rating preparation for teaching calculus lowest.
- **Mathematics teachers felt well prepared to teach mathematics using a variety of strategies, approaches, and instructional support activities.** Respondents gave the highest ratings to *provide mathematics instruction that meets appropriate standards; facilitate a whole group and/or small group discussion; and facilitate the learning of problem-solving strategies.* The respondents felt only somewhat prepared to *develop authentic learning experiences for students in partnership with community partners, local businesses, etc.; facilitate a project-based learning experience in mathematics; and understand and integrate multiple disciplines into the instructional design.*
- **Mathematics teachers identified professional development needs focusing on a number of mathematics topics.** Respondents rated several items near moderate priority, which became the topics ranked as highest priority for professional development needs. These specific mathematics topics are *number-numeric relationships, data analysis and application, number-operations, algebra applications, algebra-algebraic relationships, and data-representation.*
- **Science teachers felt better prepared to teach the elementary school and life science.** Respondents rated their level of preparation 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 concepts.** Respondents rated their preparation level between well prepared and very well prepared to teach all science concepts. Highest ratings were provided for patterns, structure and function; cause and effect mechanisms; and explanation, 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. Respondents gave highest ratings to *facilitate a whole group and/or small group discussion; provide science instruction that meets appropriate standards; and manage a class of students who are using hands-on or laboratory activities*. Respondents gave lowest ratings to: *develop authentic learning experiences for students in partnership with community partners, local businesses, etc.; facilitate a project-based learning experience in science; and understand and integrate multiple disciplines into the instructional design*.
- **Science teachers identified professional development needs focused on a number of science topics.** Respondents rated several items near moderate priority, which became the topics ranked as highest priority for professional development. Areas of greatest priority were Life Science - Structure and Function of Living Things, Physical Science - Matter, Physical Science - Force and Motion, The Nature of Science and Technology, and Physical Science - Energy.
- **Years of Teaching, AYP, and ESU Clusters shows no differences between groups on scale measures in mathematics and science.** Analysis on each of these factors showed no significant differences on any of the scale measures for mathematics and science.
- **Levels of preparedness for teaching mathematics and science varied by school size.** Statistically significant differences were found in a number of the mathematics and science 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 and medium schools had significantly lower levels of preparedness than teachers in large schools. For Student Readiness for Mathematics Processes, teachers in small and medium schools had significantly higher levels of student readiness than teachers in large schools. For Preparedness to Meet Student Needs in Science, teachers in small and medium schools had significantly lower levels of preparedness than teachers in large schools. Effect sizes were small (<.20).
- **Some scale measures for mathematics and science varied by schools with high versus low percentage of students qualifying for FRL.** Statistically significant differences were found in a number of the mathematics and science scales. For Preparedness to Teach Mathematics, teachers in schools with high FRL had significantly lower levels of preparedness than teachers in schools with low FRL. For Student Readiness for Mathematics Processes, teachers in schools with low FRL had significantly higher levels of student readiness than teachers in schools with large FRL. For Preparedness to Teach Science Content, Preparedness to Teach Science Concepts, and Student Readiness to Learn Science, teachers in schools with low FRL had significantly higher levels of

preparedness and students were more ready to learn science than teachers and students in schools with high FRL. Effect sizes were small (<.20).

- **Some scale measures for mathematics and science differed by ESU size.** Statistically significant differences were found in a number of the mathematics and science scales. For Preparedness to Meet Student Needs, teachers in large ESUs were significantly more prepared than teachers in small ESUs. For Preparedness to Teach Science Content, teachers in large ESUs indicated they were better prepared, and for Science Professional Development Needs, teachers in small ESUs showed significantly higher ratings than teachers in large ESUs. Effect sizes were small (<.20).
- **Some scale measures for mathematics and science differed by school grade composition.** Statistically significant differences were found in a number of the mathematics and science scales. For Preparedness for Teaching Mathematics, teachers in middle/high school ((MS/HS) indicated they were significantly more prepared than teachers in elementary schools. For Preparedness to Meet Student Needs in Mathematics, teachers in elementary schools indicated they were significantly more prepared than teachers in MS/HS. For Preparedness to Teach Science Content, Preparedness for Teaching Science Concepts, and Preparedness to Meet Student Needs, teachers in MS/HS indicated they were more prepared, and for Student Readiness to Learn Science, teachers in MS/HS showed significantly higher ratings than teachers in elementary schools. Effect sizes were small (<.20).
- **Nebraska State Assessment scores correlate positively with student readiness for both mathematics and science.** Mathematics scores were positively associated with student mathematical and scientific readiness. Science scores were associated positively with preparedness to teach science and mathematics and student mathematical and scientific readiness.

## RECOMMENDATIONS

1. **Use extended summer institutes and/or hybrids with some follow up for professional development experiences.**
2. **Ensure professional development experiences that are collaborative and help teachers develop content and pedagogical content knowledge.**
3. **Focus professional development experiences to help develop participant and student active learning.**
4. **Target specific professional development to mathematics and science teachers based on a variety of impacting variables, including school size, FRL, ESU size, and school configuration (elementary vs.MS/HS).**

## INTRODUCTION

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 (NE MSP) 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. These two projects are continuing to operate with re-competed proposals in their third iteration but operating from ESUCC and ESU #16 for NMPDS and KICKS, respectively. In winter 2015, NDE plans on releasing a new RFP, with projects to be selected and awards to be made beginning in 2016.

### NE MSP PROGRAM GOALS

The five 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 June 2015 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 findings 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 section presents a summary of findings and recommendations for consideration.

## METHODOLOGY

This report focuses on a statewide needs assessment in mathematics and science administered during the period September 8, 2015 through September 30, 2015. *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, adequate yearly progress (AYP), ESU clusters, school size, free and reduced price lunch (FRL), ESU size, and Nebraska State Assessments (NeSA) Math and Science?

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#### EXHIBIT 1. NDE BULLETIN NOTICE



#### **Nebraska Statewide Needs Assessment in Mathematics and Science**

**Open: September 8 – Closes: September 30**

Contact: **NDE** Helpdesk (888-285-0556 or [nde.helpdesk@nebraska.gov](mailto:nde.helpdesk@nebraska.gov)) or (John Sutton, RMC Research 800-922-3636 or [sutton@rmcres.com](mailto:sutton@rmcres.com))

RMC Research Corporation, in cooperation with the Nebraska Department of Education and in support of the Mathematics and Science Partnership (NE MSP) projects, is conducting a statewide mathematics and science 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 survey can be accessed by entering the url:

[https://www.surveymonkey.com/r/NE MSP Needs Assessment 2015](https://www.surveymonkey.com/r/NE_MSP_Needs_Assessment_2015). Please share this information with any of your educators who teach mathematics and/or science.

Primary teacher targets are identified in Exhibit 2.

### EXHIBIT 2. TARGETED SURVEY PARTICIPANTS

Nebraska Department of Education	Science KICKS	NMPDS
<ul style="list-style-type: none"> <li>Public and non-public school teachers of mathematics and science</li> <li>Public and non-public school administrators</li> </ul>	<ul style="list-style-type: none"> <li>NATS membership</li> <li>Science Matters</li> <li>Science KICKS3 Institute participants</li> <li>ESU Science Cadre</li> </ul>	<ul style="list-style-type: none"> <li>NATM membership</li> <li>NMPDS Middle School and High School Institute and Elementary Academy participants</li> <li>ESU Mathematics Cadre</li> </ul>

## METHODOLOGY

### QUANTITATIVE DATA

**Needs Assessment Survey.** A total of 1,456 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 beliefs scales, attitudes scales, mathematics and science preparedness,<sup>3</sup> and on the mathematics and science professional development priority scales. Reliability analysis with Cronbach’s alpha<sup>4</sup> was utilized for scaled items that were revealed in the factor analysis. The reliability results presented in Exhibit 3 reveal mathematics preparedness, mathematics professional development needs, science preparedness, and science professional development needs scales formed one to four highly reliable subscales. A single score for each subscale was calculated by calculating the mean<sup>5</sup> of all items on the subscale. Beliefs and attitudes scales had only moderate reliability, and thus were analyzed on the individual item level only.

<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> To create overall mathematics preparedness and overall science preparedness scores, subscale items were standardized using z-scores in order to combine items from multiple survey prompts. Standardizing values allows for the comparison of scores across surveys. A z score is a standardized score with a mean of zero and a standard deviation of 1. It is calculated for each score by subtracting the population average or mean from a score, and dividing that difference by the population standard deviation.

<sup>4</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.

<sup>5</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.

**EXHIBIT 3. RELIABILITY ANALYSIS**

Scale	Number of Items	Cronbach's Alpha
<b>Mathematics Preparedness</b>	32	.940
Preparedness for Teaching Mathematics	8	.885
Preparedness to Meet Student Needs	20	.954
Student Readiness for Mathematical Processes	4	.882
<b>Mathematics Professional Development Needs</b>	11	.918
<b>Science Preparedness</b>	44	.977
Preparedness for Teaching Science Content	8	.855
Preparedness for Teaching Science Concepts	7	.930
Preparedness to Meet Student Scientific Needs	21	.963
Student Readiness for Scientific Processes	8	.855
<b>Science Professional Development Needs</b>	12	.917
<b>Beliefs About Teaching</b>	12	.662
<b>Attitudes About Teaching</b>	13	.591

Based on these 2015 Needs Assessment data subscales, the teachers were divided into seven different groupings: years of teaching, school AYP status, ESU clusters, school size, percent of teachers in schools with high numbers of students qualifying for FRL, ESU size, and school grad span. The first grouping, years of teaching, was broken down into (a) teachers who have taught 6 years or less, (b) teachers who have taught 7 to 14 years, and (c) teachers who have taught 15 or more years. The second grouping, AYP status, was grouped by teachers in schools who met or did not meet AYP. The third group, ESU clusters, was broken down into four clusters based upon geographic region of the state. The fourth 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 501-1,500 students, and (c) teachers who taught at schools with 1,501 or more students. Exhibit 4 provides the number of teacher participants in each of these grouping categories. The fifth grouping, FRL status, used 40% as a cutoff score to indicate whether or not teachers worked in schools with high or low percentage of students qualifying for FRL. Sixth, ESU size was used for a proxy of urbanicity. Teachers in schools in larger ESU's were compared to those in smaller ESUs. Finally, the seventh group, school grades, was used to examine differences between teachers who taught in schools with elementary grades (any grade span from PK-6) and those who taught in schools with MS/HS grade levels. Almost all respondents were from public schools (97%).

#### EXHIBIT 4. TEACHER PARTICIPANTS BY GROUPING CATEGORY

	Number of Teachers in Grouping
<b>Years of Teaching</b>	
6 or less years	338
7 to 14 years	399
15 or more years	708
<b>Adequate Yearly Progress Status</b>	
Not Met	1,150
Met	132
<b>ESU Clusters</b>	
Cluster 1 (ESU 1, 2, 3, 4, 19)	378
Cluster 2 (ESU 5, 6, 7, 18)	270
Cluster 3 (ESU 8, 9, 10, 11)	327
Cluster 4 (ESU 13, 15, 16, 17)	183
<b>School Size</b>	
500 or fewer students	925
501-1,500 students	334
1,501 or more students	70
<b>Percent Qualifying for Free or Reduced Price Lunch (FRL)</b>	
Low FRL	579
High FRL	725
<b>ESU Size</b>	
Large	488
Small	968
<b>School Grades</b>	
Grades PK-6	750
Grades 7-12	415

One-way ANOVAs<sup>6</sup> were computed for each of the nine subscale 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 Bonferonni<sup>7</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>8</sup> test was used. Effect sizes,<sup>9</sup> using Cohen’s *d*,<sup>10</sup> are reported for any statistically significant grouping differences.

<sup>6</sup> Analysis of variance (ANOVA) is a statistical procedure that examines differences in outcomes for two or more groups.

<sup>7</sup> The Bonferonni 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. The Bonferonni correction is a multiple-comparison correction used when several dependent or independent [statistical tests](#) are being performed simultaneously (since while a given [alpha value](#)  $\alpha$  may be appropriate for each individual comparison, it is not for the set of *all* comparisons). In order to avoid a lot of spurious positives, the [alpha value](#) needs to be lowered to account for the number of comparisons being performed.

<sup>8</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>9</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>10</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.”

# FINDINGS

## PERCEPTIONS OF PREPAREDNESS AND NEEDS

### DEMOGRAPHIC DATA

Demographic data presented in Exhibit 5 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 mathematics and/or science in K-12 schools. More than 75% of all respondents indicated they had not previously participated in prior NE MSP activities. Those that have participated in NE MSP activities were fairly evenly distributed between NMPDS and KICKS, with almost 10% of respondents having participated in the NMPDS MS/HS Institute.

**EXHIBIT 5. SURVEY RESPONDENT CHARACTERISTICS**

Respondent Characteristics	<i>n</i> <sup>11</sup>	Percentage
<b>Gender</b>		
Female	1,067	73
Male	279	19
<b>Race and Ethnicity</b>		
White (not of Hispanic origin)	1,315	90
Hispanic	19	1
African-American (not of Hispanic origin)	3	<1
Other	8	<1
<b>Years of Experience Teaching at a K-12 School</b>		
3 or fewer years	160	11
4 to 6 years	178	12
7 to 9 years	165	11
10 to 14 years	234	16
15 or more years	708	49
<b>Years of Teaching Science Full Time at a K-12 School</b>		
3 or fewer years	213	19
4 to 6 years	166	15
7 to 9 years	150	13
10 to 14 years	184	16
15 or more years	429	38
<b>Years of Teaching Mathematics Full Time at a K-12 School</b>		
3 or fewer years	196	16
4 to 6 years	159	13
7 to 9 years	148	12
10 to 14 years	194	16
15 or more years	518	43

<sup>11</sup> *N* is the total number in a sample. *n* is the total number in a subsample.

Respondent Characteristics	<i>n</i> <sup>11</sup>	Percentage
<b>Participant in prior NE MSP Statewide Activities</b>		
Yes	371	26
No	1,080	74
<b>NE MSP Activities</b>		
NMPDS: Elementary Math Academy	81	6
NMPDS: Middle/High School Institute	119	9
KICKS: Elementary	67	5
KICKS: Secondary	73	6
KICKS: K-12	50	4

Demographic data in Exhibit 6 show that the majority of respondents are from schools that are making AYP. The majority of respondents indicated mathematics was a primary focus for the school improvement plans. Most respondents teach in districts with more than 5,000 students, though the majority of teachers came from schools with 501-1,500 students (64%). Additionally, nearly all respondents reported having at least one other teacher at their school teaching mathematics or science besides the respondent. Exhibit 7 illustrates, on average, respondents represent schools with 44% of students qualifying for FRL. On average, nearly 75% of students in respondents' schools scored proficient on the mathematics or science state assessments.

#### EXHIBIT 6. SCHOOL CHARACTERISTICS REPORTED BY RESPONDENTS

School Characteristics	<i>n</i>	Percentage
<b>School is NOT making Adequate Yearly Progress (AYP)</b>		
Yes	132	10
No	1,093	85
Not Sure	57	5
<b>Primary Focus for School Improvement Plan</b>		
Mathematics	820	58
Science	208	16
<b>Number of Students in District</b>		
Fewer than 200 students	102	8
201 to 500 students	236	18
501 to 1,000 students	184	14
1,001 to 1,500 students	76	6
1,501 to 2,000 students	38	3
2,001 to 2,500 students	30	2
2,501 to 3,000 students	15	1
3,001 to 5,000 students	149	11
More than 5,000 students	499	38

School Characteristics	<i>n</i>	Percentage
<b>Number of Teachers at School Employed to Teach Full-Time</b>		
<b>Math</b>		
Respondent only	10	1
1 to 2 teachers	186	13
3 to 5 teachers	174	13
6 to 10 teachers	271	20
11 to 15 teachers	253	18
More than 15 teachers	496	36
<b>Science</b>		
Respondent only	27	2
1 to 2 teachers	182	14
3 to 5 teachers	176	13
6 to 10 teachers	296	22
11 to 15 teachers	241	18
More than 15 teachers	424	32

**EXHIBIT 7. SCHOOL CHARACTERISTICS REPORTED BY STATE**

School Characteristics	<i>n</i>	Percentage
Public School	1,292	97
Percent of students with Free/Reduced Price Lunch	1,304	44
Percent of students with English Language Learner status	1,304	7
Percent of students with Special Education designation	1,304	15
Percent of students who are mobile	1,304	15
Percent of students scoring Proficient on Nebraska State Assessment (Mathematics)	1,263	72
Percent of students scoring Proficient on Nebraska State Assessment (Science)	1,197	72

Demographic data presented in Exhibit 8 shows that more than half of respondents hold advanced degrees. The majority of respondents currently hold a standard or professional teaching certificate and are teaching in an area for which they hold an endorsement. Three fourths 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 mathematics and science; respondents that were members of organizations were most likely to be a member of NATS, National Science Teachers Association (NSTA), NATM, and/or National Council of Teachers of Mathematics (NCTM). Most participants had not attended any professional conferences listed.

**EXHIBIT 8. RESPONDENT DEGREES, CERTIFICATION, ENDORSEMENTS, AND MEMBERSHIPS**

Respondent Characteristics	<i>n</i>	Percentage
<b>Degrees Held<sup>a</sup></b>		
BA or BS	1,411	97
MA, MS, or MEd	901	69
PhD or EdD	12	1
Other	121	8
<b>Type of Teaching Certificate<sup>b</sup></b>		
Initial	252	17
Standard	662	45
Professional	404	28
Provisional	2	<1
Administrative, Professional	58	4
Substitute	2	<1
<b>Type of Teaching Certification Program</b>		
Traditional (college or university program)	1,381	95
Nebraska Transition to Teaching Program	27	2
Alternative Pathway (e.g., Post-Baccalaureate program, online, Fast Track Teaching program, University of Nebraska-Omaha Teacher Academy Project)	39	3
<b>Teaching in an area for which an endorsement is held</b>		
Yes	1,317	91
No	128	9
<b>Currently teaching or will teach mathematics in next school year</b>		
Yes	998	74
No	342	26
<b>Currently teaching or will teach science in next school year</b>		
Yes	780	61
No	494	39
<b>Interested in earning an advanced degree in science or mathematics</b>		
Yes	455	32
No	987	68
<b>Interested in receiving college credit for professional development</b>		
Yes	903	63
No	540	37
<b>Membership in professional organizations<sup>c</sup></b>		
Nebraska Association of Teachers (NATS)	129	9
National Science Teachers Association (NSTA)	133	9
National Science Education Leadership Association (NSELA)	9	1
Nebraska Association of Teachers of Mathematics (NATM)	112	8
National Council of Teachers of Mathematics (NCTM)	137	9
No membership	862	59

Respondent Characteristics	<i>n</i>	Percentage
<b>Conference attendance<sup>d</sup></b>		
Nebraska Association of Teachers (NATS)	279	19
National Science Teachers Association (NSTA)	164	11
National Science Education Leadership Association (NSELA)	12	1
Nebraska Association of Teachers of Mathematics (NATM)	239	17
National Council of Teachers of Mathematics (NCTM)	207	14
National Council of Supervisors of Mathematics	16	1
None attended	862	59

<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 multiple certification types.

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

<sup>d</sup> Percentages do not total to 100 due to teachers reporting attendance at multiple conferences.

Respondents were asked to identify areas of certification or endorsements that they initially received, presently hold, and have interest in obtaining. Exhibit 9 presents the percentage of responses. The majority of participants held an elementary endorsement, with at least 10% of the sample holding an endorsement for mathematics, special education, and/or early childhood education (which includes early childhood inclusive education).

#### EXHIBIT 9. AREAS OF CERTIFICATION AND ENDORSEMENTS (*N* = 1346)

Respondent Characteristics <sup>a</sup>	<i>n</i>	Percentage
Elementary	810	56
Mathematics	260	18
Special Education	149	10
Early Childhood Education/Inclusive	147	10
Coaching	121	8
Middle Grades (Ag Education/Business Education/Family and Consumer Science/Language/Health and PE)	115	8
Science	105	7
ESL	86	6
Chemistry	81	6
Biology	78	5
English/English Language Arts/Reading/Reading and Writing	58	4
Principal	57	4
Health/Physical Education	53	4
Middle Grade Natural Sciences	52	4
Physics	46	3
Biology	45	3
Earth and Space Science	45	3
Middle Grade Mathematics	40	3
Middle Grades Social Science	32	2
Information Tech	27	2
Driver Education	16	1

Respondent Characteristics <sup>a</sup>	<i>n</i>	Percentage
Social Science	12	1
World Language	12	1
Assessment Leadership	11	1
Business	11	1
School Counselor	8	1

<sup>a</sup> Several categories had fewer than  $n = 7$  (<1%) of the sample. These included: curriculum supervisor, marketing, music, cooperative education/diversified occupations work-based learning, history, superintendent, geography, family/consumer science, high ability education, school librarian, bilingual education, political science, psychology, agriculture, and industrial tech education.

As demonstrated in Exhibit 10, over half the respondents indicated they would attend professional development during extended weeks during the summer; less than half of the respondents would attend professional development throughout the school year, evenings, or weekends. Face-to-face was the preferred mode for professional development delivery, followed by hybrid sessions involving both face-to-face and online activities.

#### EXHIBIT 10. PROFESSIONAL DEVELOPMENT PREFERENCES ( $N = 1,451$ )

Professional Development Characteristics	<i>n</i>	Percentage
<b>Timing<sup>a</sup></b>		
Extended weeks during summer	886	61
Throughout the school year	576	40
Evenings	286	20
Weekends	230	16
Other (e.g., school breaks, weekends)	32	2
<b>Mode<sup>b</sup></b>		
Face-to-face	584	41
Hybrid face-to-face and online	403	29
Asynchronous online	391	28
Synchronous online	36	3
<b>Barriers<sup>a</sup></b>		
Time to participate	1,114	77
Cost to participate	847	58
Personal responsibilities	66	46
Location of the activity	614	42
School extra-curricular responsibilities	351	24
Don't need additional college credit	341	24
Access to substitute teachers	327	23
Administrative support	103	7

<sup>a</sup> Percentages add up to more than 100% because participants were asked to select all answers that applied.

<sup>b</sup> For this item,  $N = 1,414$ .

The majority of respondents used printed textbooks, online resources, and/or websites as instructional tools in their mathematics/science classrooms. Data is presented in Exhibit 11.

### EXHIBIT 11. INSTRUCTIONAL TOOLS (N = 1,451)

Primary Instructional Tools	n	Percentage
Printed Textbooks <sup>a</sup>	1,284	89
Online Resources	1,002	69
Websites	826	57
Apps	462	32
Electronic Textbooks	448	31
Other (e.g., district curriculum, graphing calculators, hands on activities/ manipulatives, software)	115	8

<sup>a</sup> Percentages add up to more than 100% because participants were asked to select all answers that applied.

Demographic data presented in Exhibit 12 shows that the distribution of respondents across all ESUs was inconsistent, with respondents from four ESUs (3, 10, 18, and 19) representing nearly half of the total respondents.

### EXHIBIT 12. RESPONDENT DISTRIBUTION ACROSS ESUs (N = 1,329)

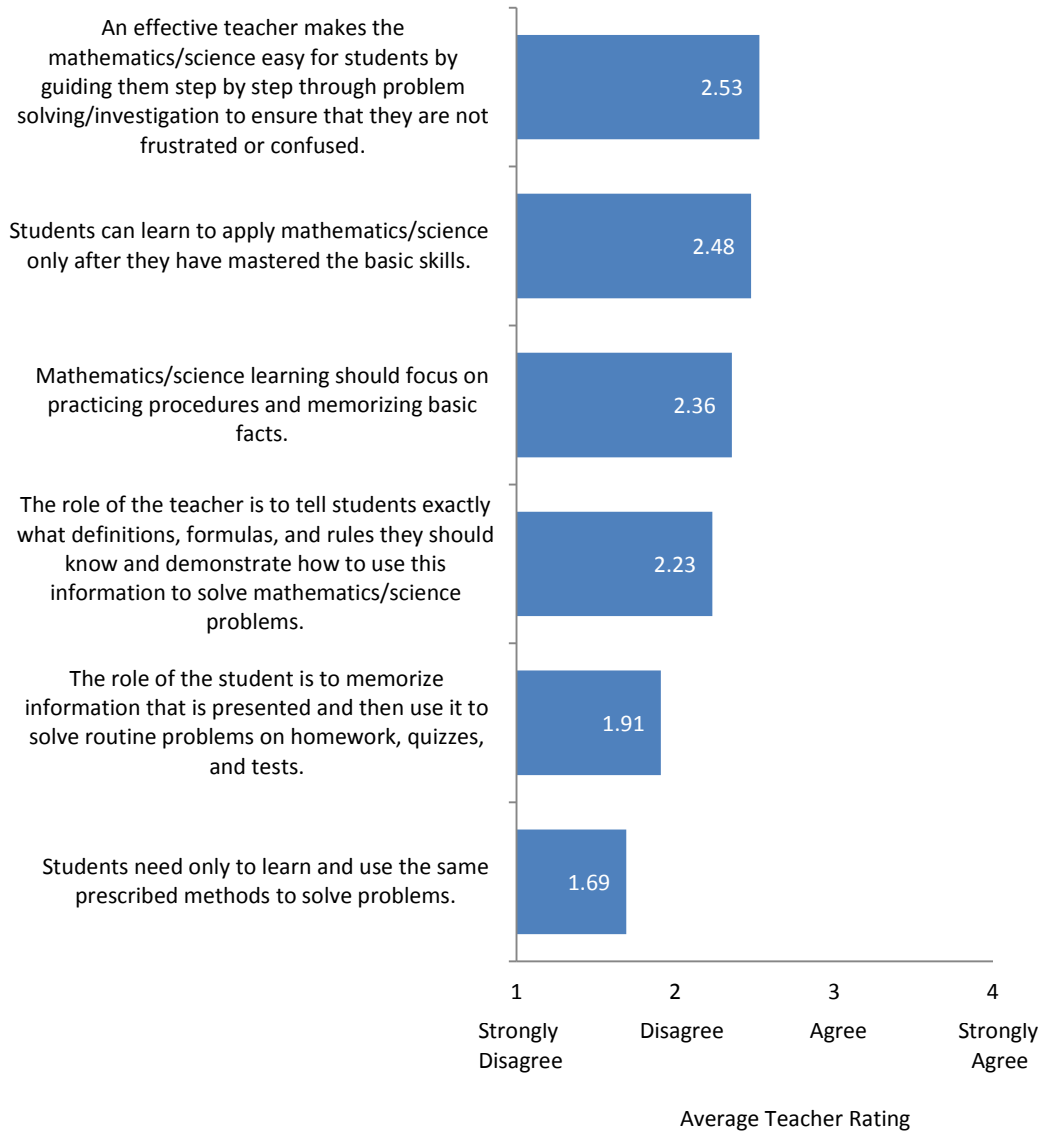
ESU	n	Percentage
ESU 1	67	5
ESU 2	60	4
ESU 3	217	15
ESU 4	34	2
ESU 5	42	3
ESU 6	61	4
ESU 7	59	4
ESU 8	58	4
ESU 9	42	3
ESU 10	193	13
ESU 11	34	2
ESU 13	90	6
ESU 15	23	2
ESU 16	54	4
ESU 17	16	1
ESU 18 (LPS)	108	7
ESU 19 (OPS)	163	11

## BELIEFS

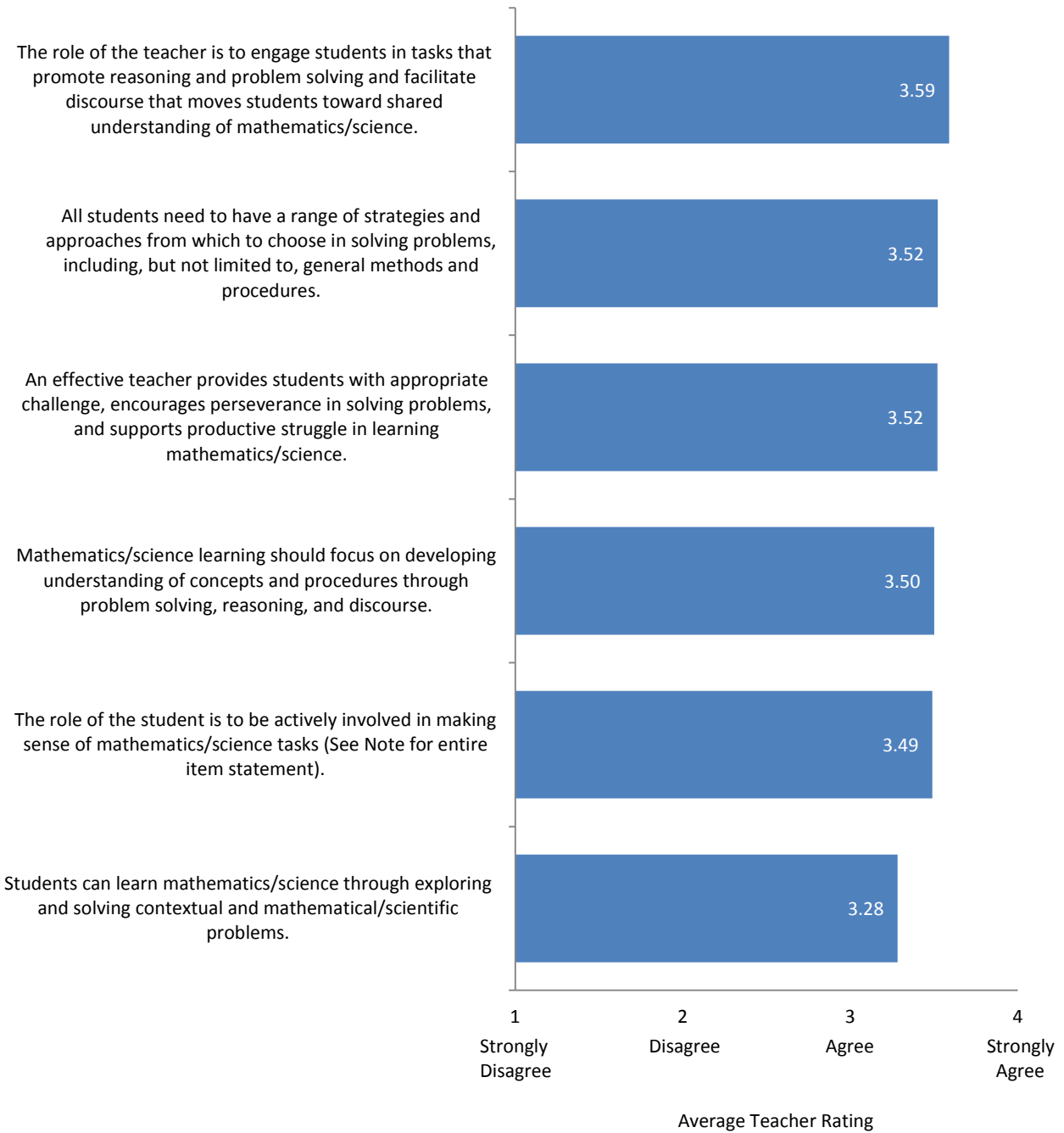
Respondents rated their beliefs about mathematics and science teaching and learning, using a 4-point agreement scale with 1 corresponding to strongly disagree and 4 corresponding to strongly agree. Exhibit 13 illustrates that respondents rated lowest agreement with statements that *students need only to learn and use the same prescribed methods to solve problems; the role of the student is to memorize problems and solutions to use on the tests; and the role of the teacher is to tell students exactly what to do on assignments and exams*. Exhibit 14 illustrates that respondents rated the highest agreement with statements about learning beliefs: *the role of the teacher is to engage students in tasks that promote reasoning and problem solving and facilitate discourse that moves students toward shared understanding of mathematics/science; all students need to have a range of strategies and approaches*

*from which to choose in solving problems; and an effective teacher provides students with appropriate challenge, encourages perseverance, and supports productive struggle in learning mathematics/science.*

**EXHIBIT 13. ITEMS OF DISAGREEMENT WITH BELIEFS ABOUT TEACHING AND LEARNING (N = 1,285)**



**EXHIBIT 14. ITEMS OF AGREEMENT WITH BELIEFS ABOUT TEACHING AND LEARNING (N = 1,285)**

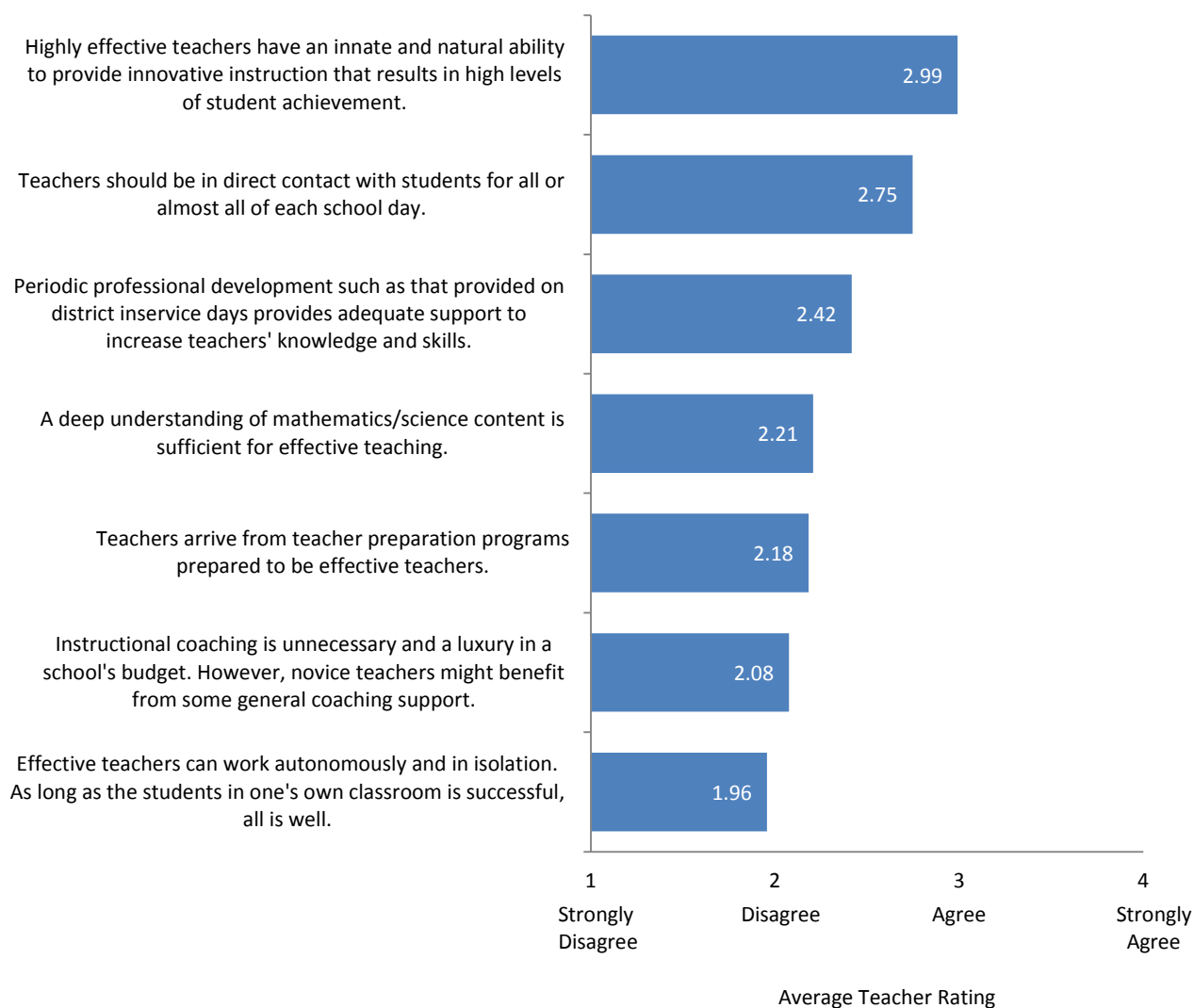


*Note.* The role of the student is to be actively involved in making sense of mathematics/science tasks by using varied strategies and representations, justifying solutions, making connections to prior knowledge or familiar contexts and experiences, and considering the reasoning of others.

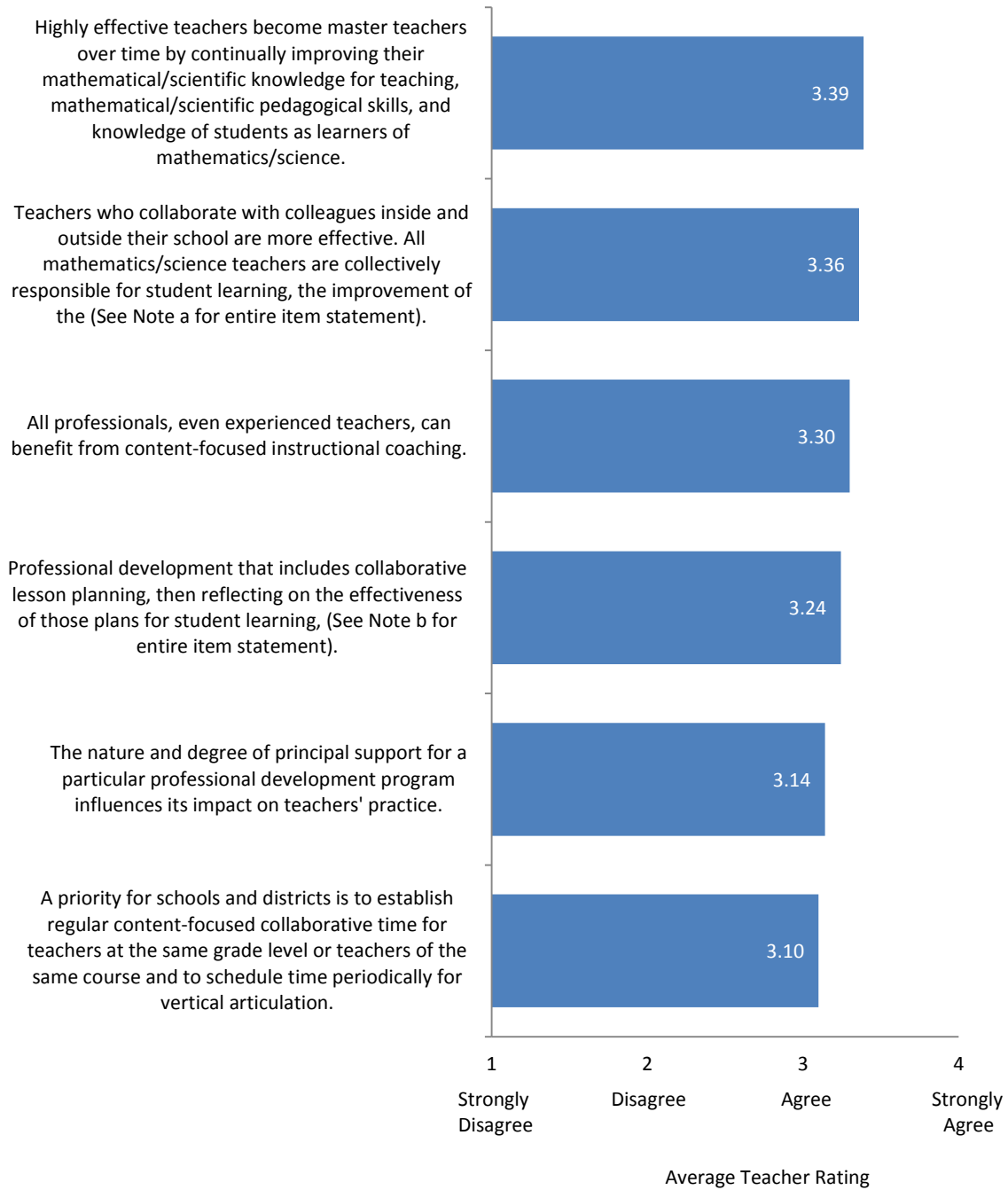
## ATTITUDES

Respondents rated their attitudes about mathematics and science teaching and learning, using a 4-point agreement scale with 1 corresponding to strongly disagree and 4 corresponding to strongly agree. Exhibit 15 illustrates that respondents rated lowest agreement with attitude statements that effective teachers can work autonomously and in isolation, instructional coaching is unnecessary and a luxury in a school's budget, and teachers arrive from teacher preparation programs prepared to be effective teachers. Exhibit 16 illustrates that respondents rated the highest agreement with statements about learning attitudes: *highly effective teachers become master teachers over time by continually improving their content knowledge for teaching/pedagogical skills/knowledge of students as learners; teachers who collaborate with colleagues inside and outside their school are more effective; and all professionals can benefit from content-focused instructional coaching.*

**EXHIBIT 15. ITEMS OF DISAGREEMENT WITH ATTITUDES ABOUT TEACHING AND LEARNING (N = 1,254)**



**EXHIBIT 16. ITEMS OF AGREEMENT WITH ATTITUDES ABOUT TEACHING AND LEARNING (N = 1,254)**



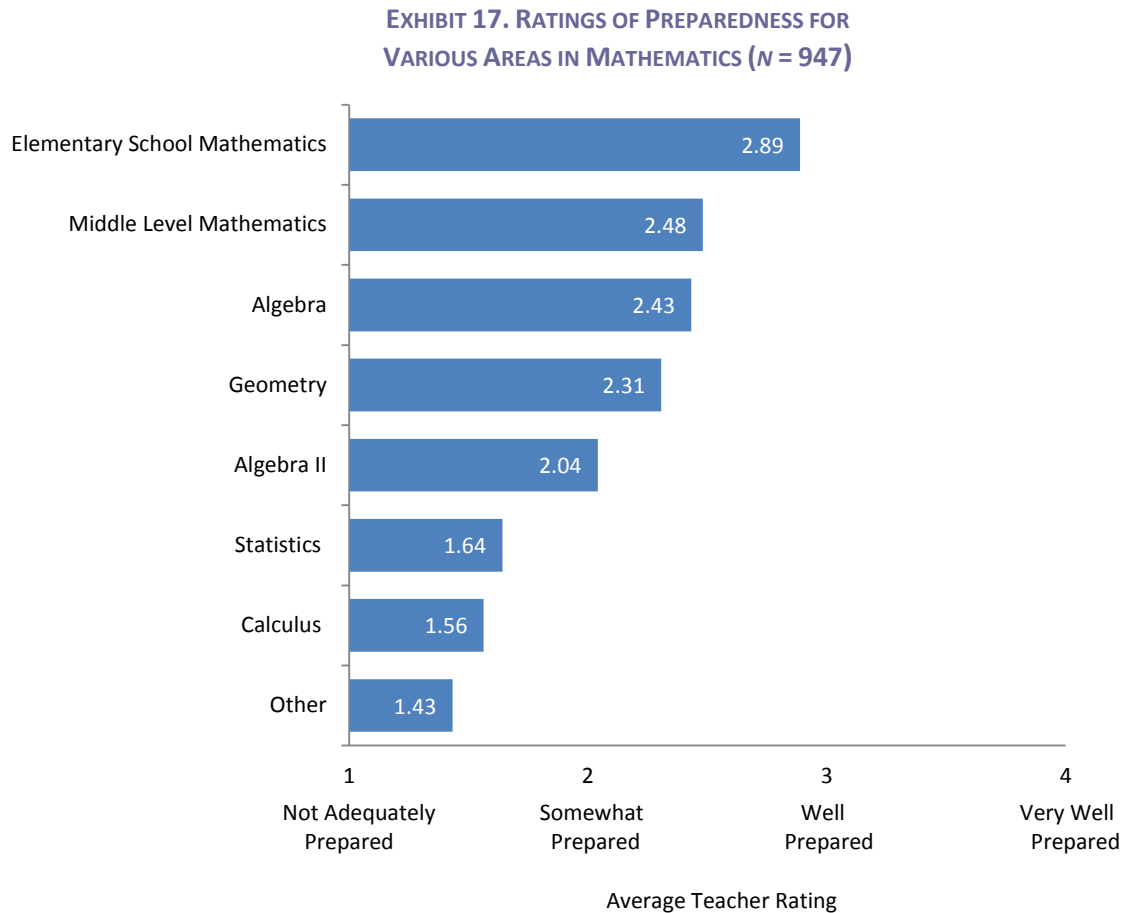
<sup>a</sup> Teachers who collaborate with colleagues inside and outside their school are more effective. All mathematics/science teachers are collectively responsible for student learning, the improvement of the professional knowledge base, and everyone's effectiveness.

<sup>b</sup> Professional development that includes collaborative lesson planning, then reflecting on the effectiveness of those plans for student learning, observing other teachers and being observed and reviewing students' work increases teachers' knowledge and skills.

## 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 17 illustrates that respondents rated their preparation level the lowest for teaching calculus while rating the highest level of preparation for teaching elementary school mathematics.



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 18 presents the average response ratings for survey items for which respondents felt least prepared in mathematics. For mathematics, respondents gave lowest ratings to *develop authentic learning experiences for students in partnership with community partners, local businesses, etc.*; *facilitate a project-based learning experience in mathematics*; and *understand and integrate multiple disciplines into the instructional design*.

**EXHIBIT 18. ITEMS FOR WHICH RESPONDENTS FELT LEAST PREPARED IN MATHEMATICS (N = 841)**

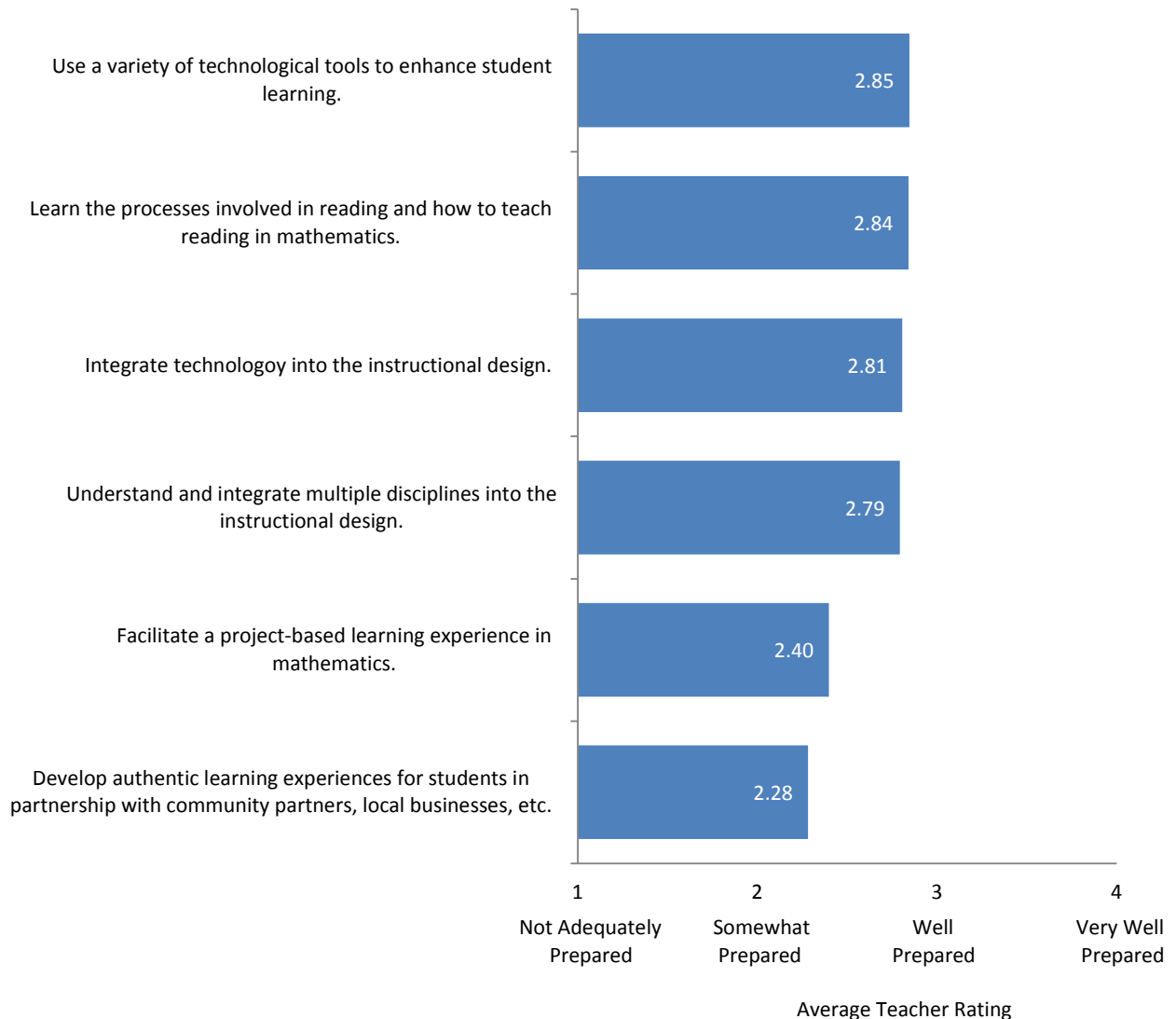
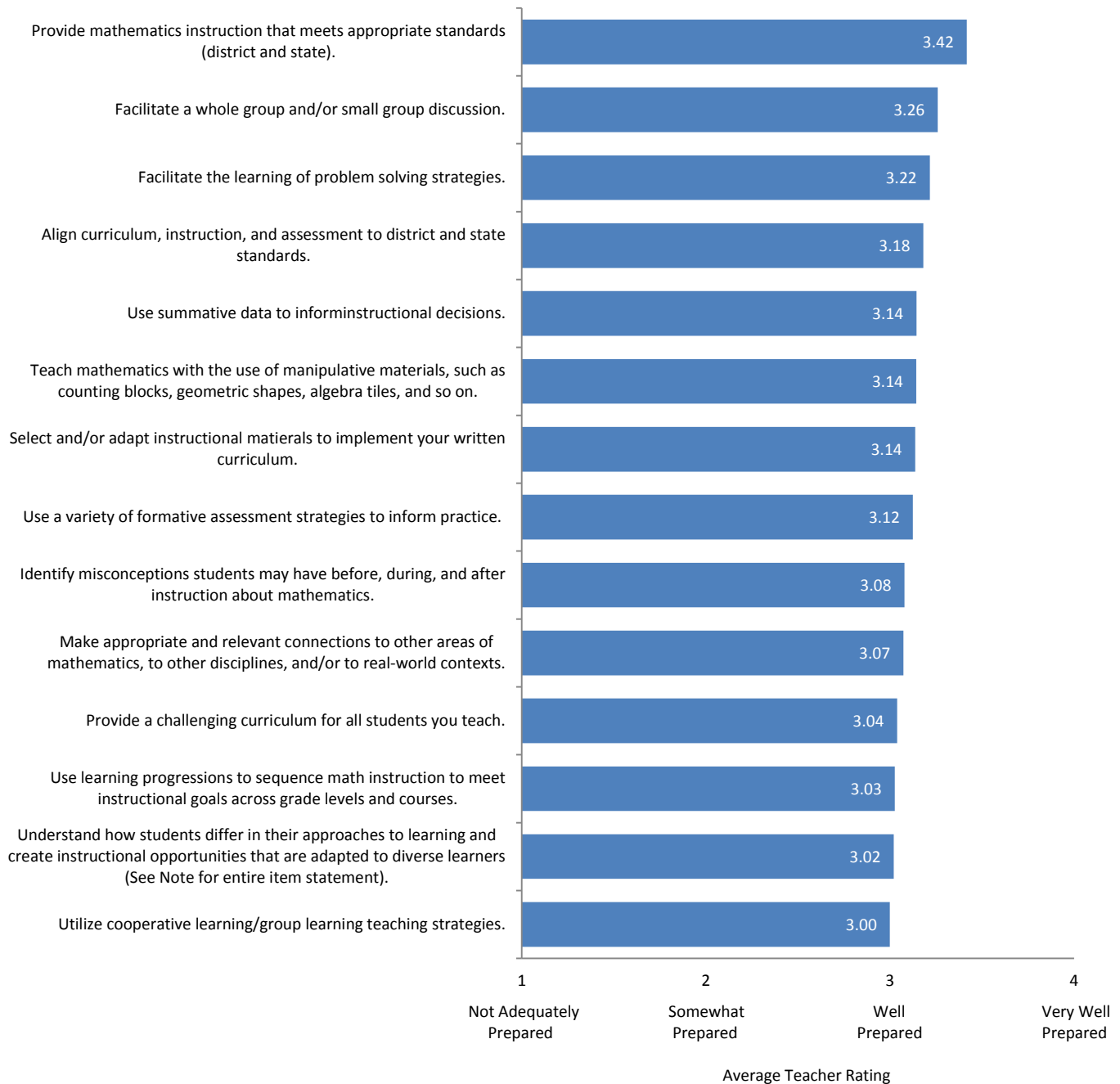


Exhibit 19 presents the average response ratings for survey items for which respondents felt best prepared in mathematics. For mathematics, respondents gave the highest ratings to *provide mathematics instruction that meets appropriate standards; facilitate a whole group and/or small group discussion; and facilitate the learning of problem solving strategies.*

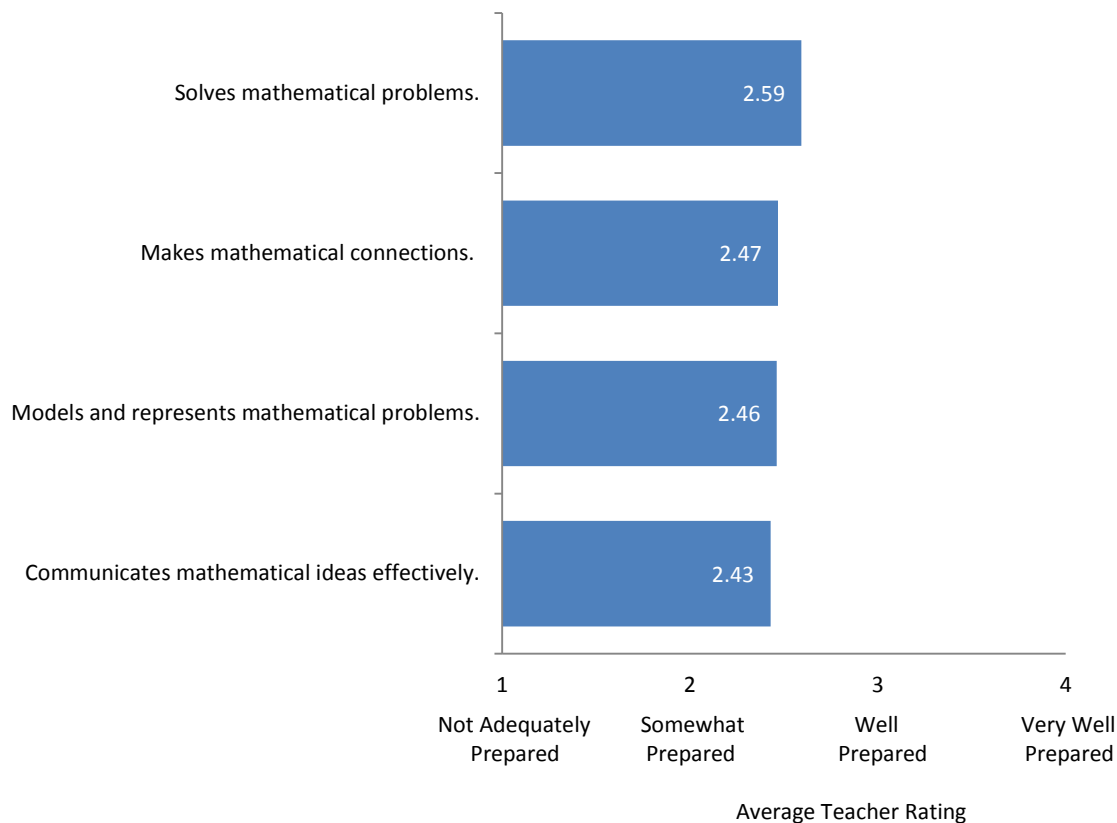
**EXHIBIT 19. ITEMS FOR WHICH RESPONDENTS FELT BEST PREPARED IN MATHEMATICS (N = 841)**



*Note.* Understand how students differ in their approaches to learning and create instructional opportunities that are adapted to diverse learners (e.g., cultural backgrounds, limited English proficiency, learning disability that impacts math learning, etc.).

Respondents rated the degree to which they felt their students were prepared to demonstrate the Nebraska Mathematical Processes, using a 4-point scale with 1 corresponding to not adequately prepared and 4 corresponding to very well prepared. Exhibit 20 presents the average response ratings for survey items. On average, respondents rated their students between somewhat prepared and well prepared to demonstrate all four mathematical processes.

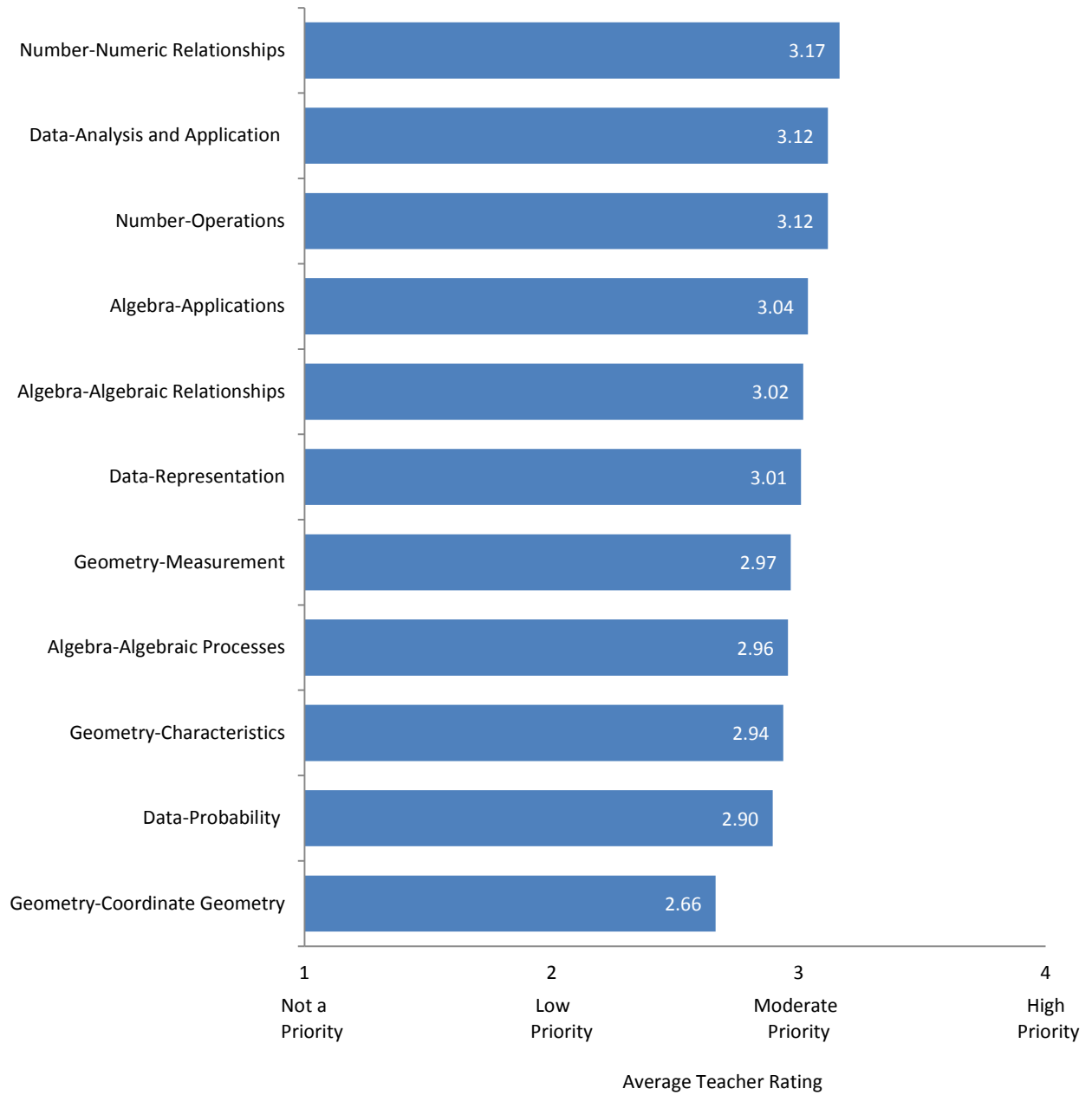
**EXHIBIT 20. STUDENT READINESS FOR MATHEMATICAL PROCESSES (N = 841)**



### 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 21 presents the average response ratings for survey items on topics respondents rated a low priority. For mathematics, the highest priority for professional development was identified as *number-numeric relationships, data analysis and application, number-operations, algebra-applications, algebra-algebraic relationships, and data-representation*.

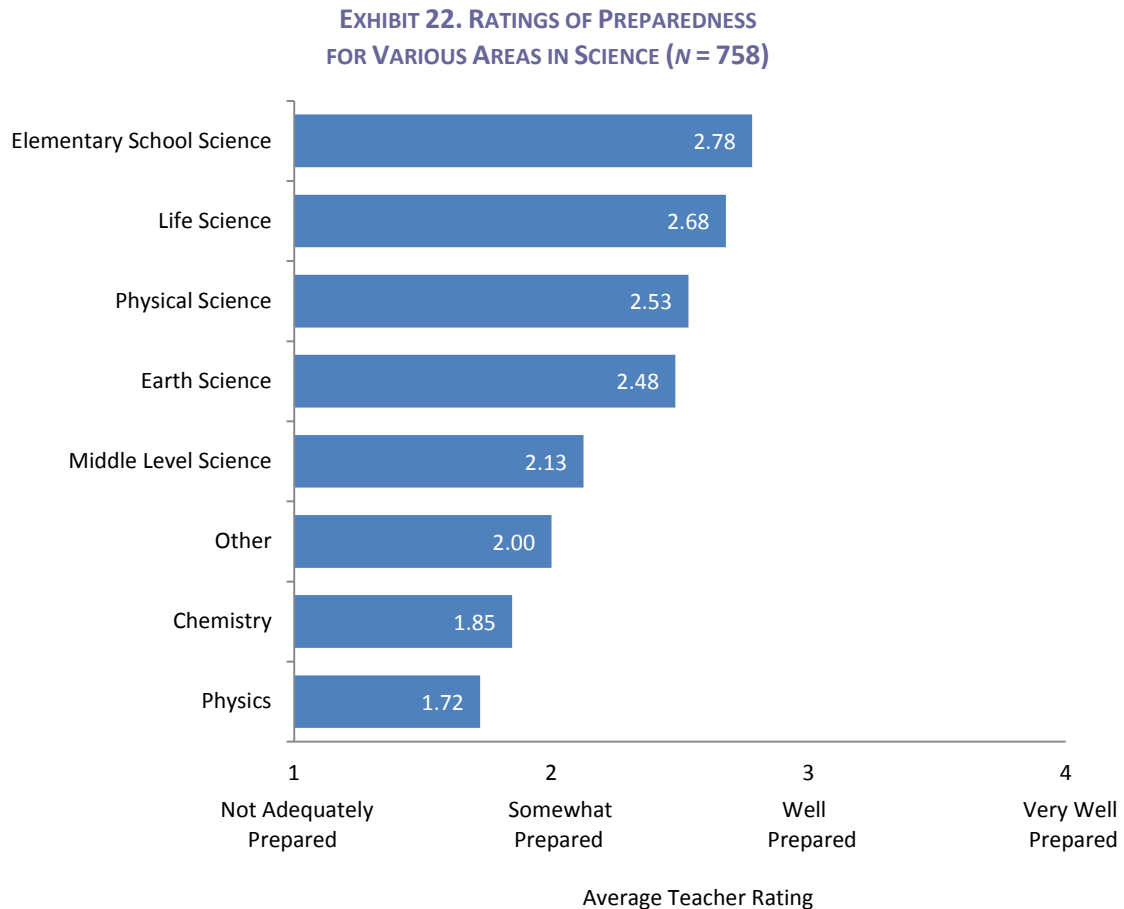
**EXHIBIT 21. RATINGS OF PRIORITY FOR PROFESSIONAL DEVELOPMENT IN MATHEMATICS (N = 868)**



## SCIENCE

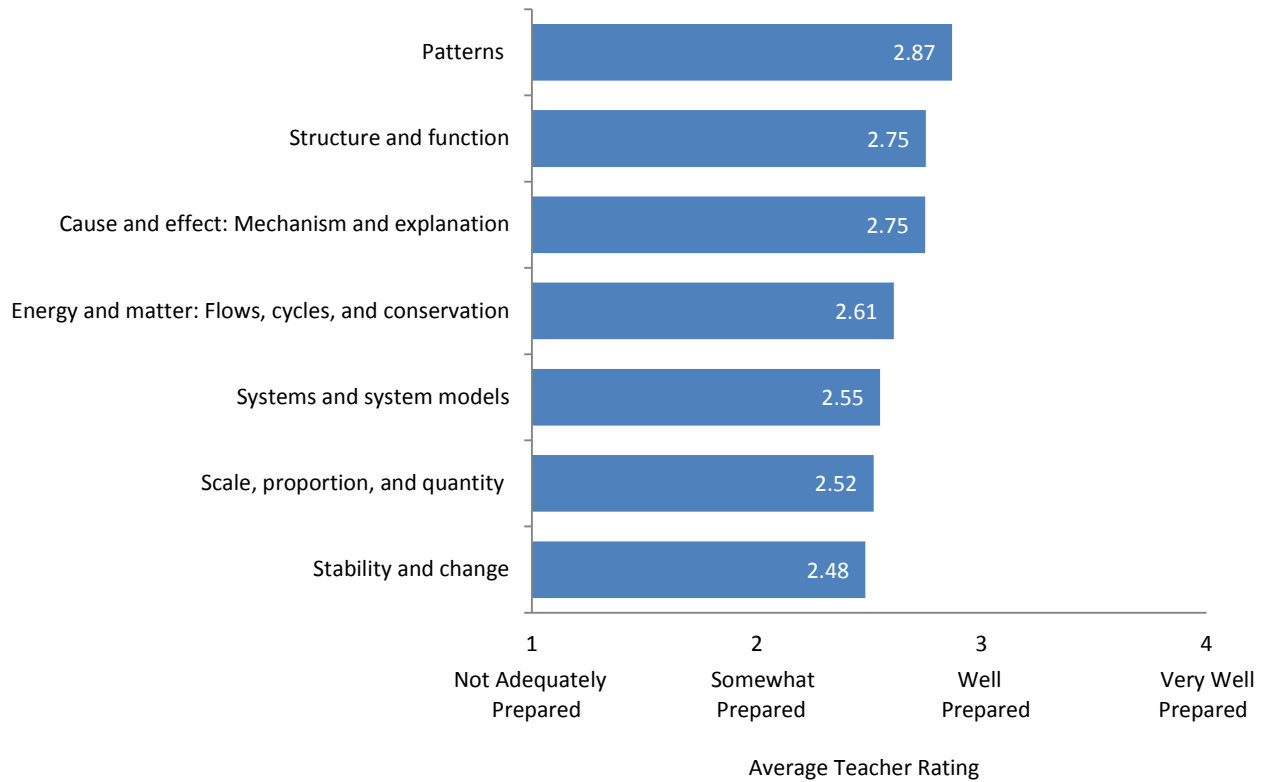
### LEVELS OF PREPAREDNESS

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 22 illustrates that respondents rated their preparation level the lowest for teaching physics while rating the highest level of preparation for teaching elementary school science.



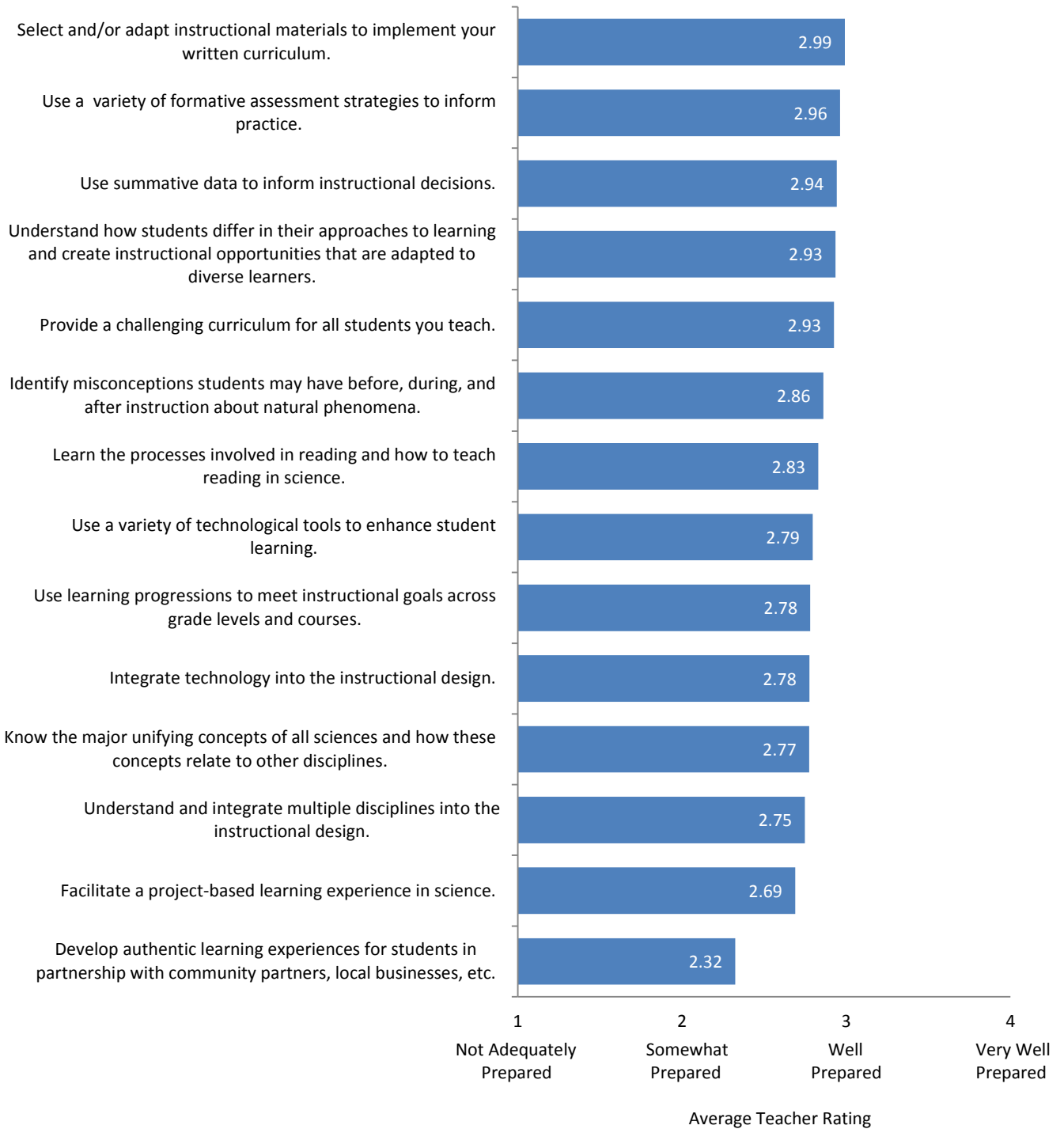
Respondents rated preparedness to teaching various science content, using a 4-point scale with 1 corresponding to not adequately prepared and 4 corresponding to very well prepared. Exhibit 23 presents the average response ratings for survey items. For science, respondents gave highest ratings to patterns, structure and function, and cause and effect: mechanisms and explanation; they gave the lowest ratings to stability and change, scale, proportion, and quantity, and systems and system models. However, all ratings fell, on average, between somewhat prepared and well prepared.

**EXHIBIT 23. PREPAREDNESS TO TEACH SCIENCE CONCEPTS (N = 701)**



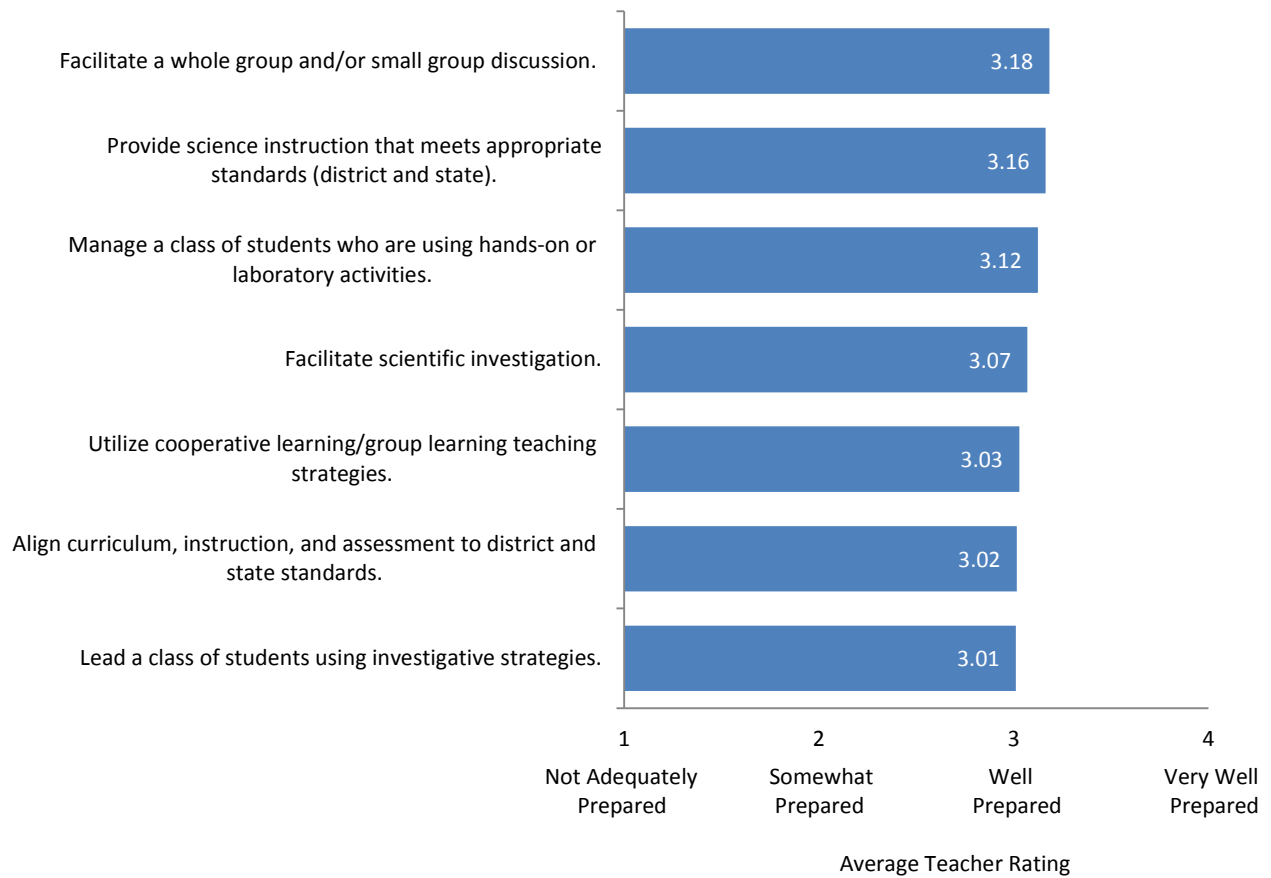
For science, respondents rated how prepared they were to meet student needs, using a 4-point scale where 1 corresponded to not adequately prepared, and 4 corresponded to very well prepared. Exhibit 24 illustrates participants gave lowest ratings to: *develop authentic learning experiences for students in partnership with community partners, local businesses, etc.*; *facilitate a project-based learning experience in science*; and *understand and integrate multiple disciplines into the instructional design*.

**EXHIBIT 24. PREPARATION TO MEET STUDENT NEEDS IN SCIENCE: ITEM OF LOW PREPAREDNESS (N = 679)**



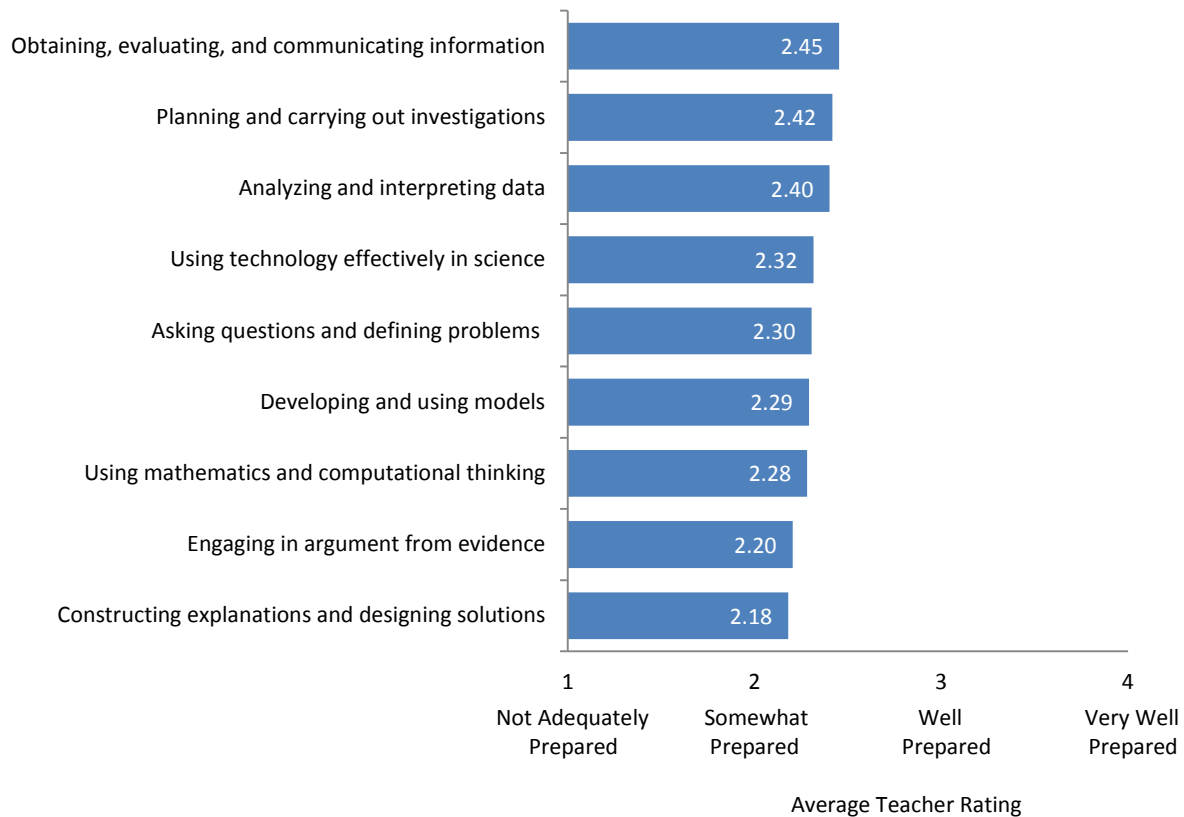
As demonstrated in Exhibit 25, respondents gave highest ratings to *facilitate a whole group and/or small group discussion; provide science instruction that meets appropriate standards; and manage a class of students who are using hands-on or laboratory activities.*

**EXHIBIT 25. PREPARATION TO MEET STUDENT NEEDS IN SCIENCE: ITEMS OF HIGH PREPAREDNESS (N = 679)**



Respondents rated the degree to which they felt their students are prepared to demonstrate scientific processes using a 4-point scale where 1 indicated not adequately prepared and 4 indicated very well prepared. As demonstrated in Exhibit 26, participants felt students were most ready for *obtaining, evaluating, and communicating information; planning and carrying out investigations; and analyzing and interpreting data*. Participants felt students were least ready for *constructing explanations and designing solutions; and engaging in argument from evidence*.

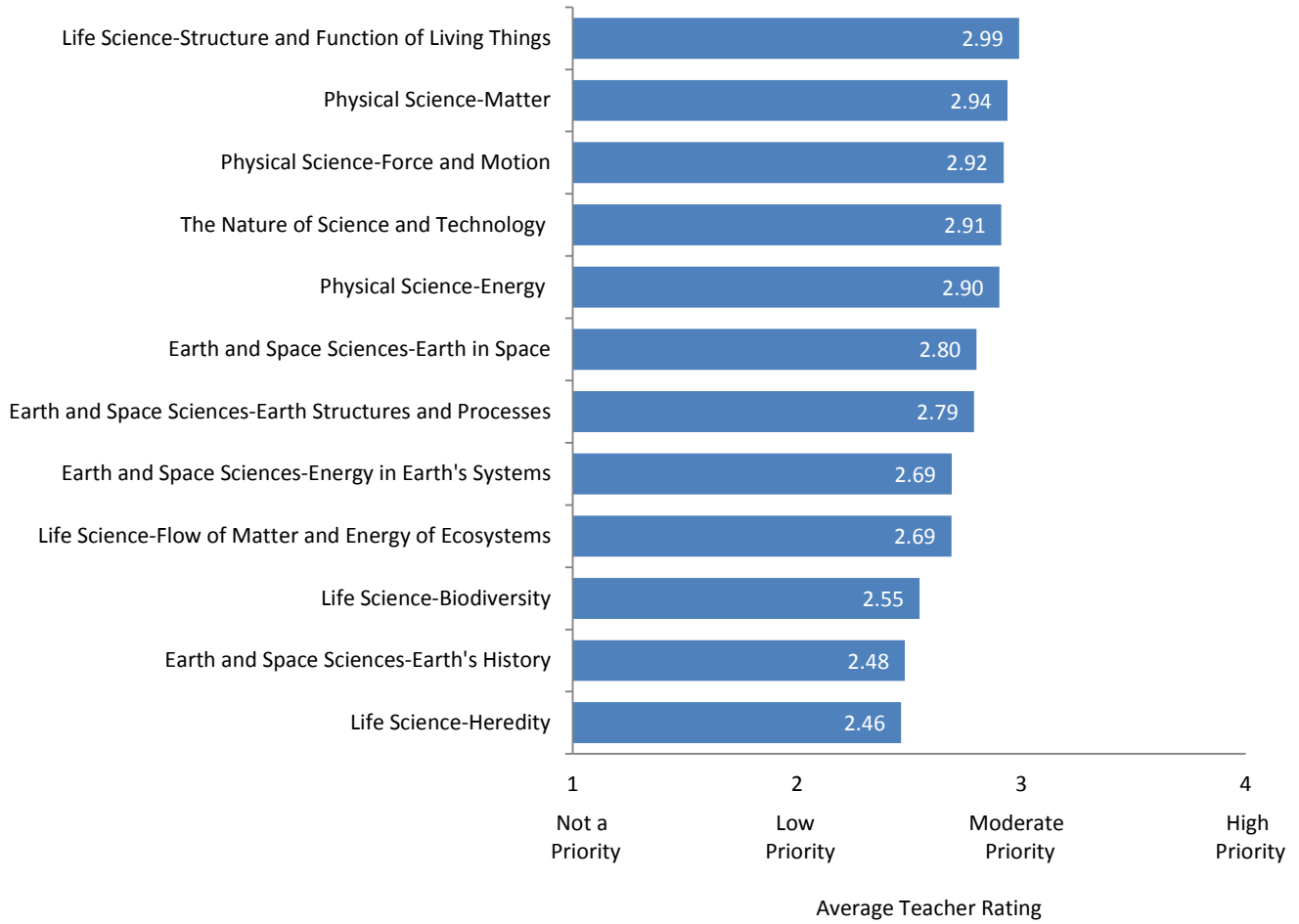
### EXHIBIT 26. STUDENT READINESS FOR SCIENTIFIC PROCESSES (N = 694)



### 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 27 presents the average response ratings for survey items on topics respondents rated a low priority. For science, of the choices contained in the survey, the lowest priority for professional development was identified as *Life Science-Heredity* and *Earth and Space Sciences-Earth's History*. Areas of greatest priority were *Life Science-Structure and Function of Living Things*; *Physical Science-Matter*; and *Physical Science-Force and Motion*.

**EXHIBIT 27. PRIORITIES FOR PROFESSIONAL DEVELOPMENT IN SCIENCE (N = 656)**



## FINDINGS

### TEACHER COMPARISON FOR PREPAREDNESS AND NEEDS

*This section presents an analysis of data based on a number of independent variables.*

Analyses were conducted on data based on 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. Following the brief description of the different groupings are tables that present any significant differences found, based on that grouping.

#### YEARS OF TEACHING

Teacher participants were grouped according to years of teaching experience: (a) teachers who have taught 6 years or less, (b) teachers who have taught 7 to 14 years, and (c) teachers who have taught 15 or more years. No significant differences were discovered for levels of preparedness for teaching mathematics and science or for levels of needs for professional development in mathematics and science for these teacher groupings.

#### ADEQUATE YEARLY PROGRESS

Teacher participants were grouped according to whether or not their school met AYP requirements. No significant differences were found in ratings from teachers who worked in schools that met AYP compared to those in schools that did not meet AYP in mathematics or science needs.

#### ESU CLUSTERS

Teacher participants were grouped according to ESU clusters by geographic region of the state as follows: Cluster 1 (ESU 1, 2, 3, 4, 19); Cluster 2 (ESU 5, 6, 7, 18); Cluster 3 (ESU 8, 9, 10, 11); and Cluster 4 (ESU 13, 15, 16, 17). 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: (a) teachers who taught at schools with 500 or fewer students, (b) teachers who taught at schools with 501-1,500 students, and (c) teachers who taught at schools with 1,501 or more students. As shown in Exhibit 28, significant differences were found in two of the mathematics scales: *preparedness for teaching mathematics* and *student readiness for mathematics processes*. For Preparedness to Teach Mathematics, teachers in large schools had significantly higher levels of preparedness than teachers in small or medium schools. For Student Readiness for Mathematics Processes, teachers in small and medium schools had significantly higher levels of student readiness than teachers in large schools. Effect sizes are considered small (<.20).

**EXHIBIT 28. SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY SCHOOL SIZE FOR  
MATHEMATICS PREPAREDNESS AND PROFESSIONAL DEVELOPMENT NEEDS**

	<i>n</i>	Mean	<i>SD</i> <sup>12</sup>	<i>p</i> <sup>13</sup>	Effect Size ( <i>d</i> )
<b>Preparedness for Teaching Mathematics<sup>a</sup></b>	865	2.25	.81	<b>&lt;.001</b>	.036
<b>Grouping 1</b>				<b>&lt;.001</b>	
500 or fewer students	637	2.24	.03		
1,501 or more students	24	3.16	.16		
<b>Grouping 2</b>				<b>&lt;.001</b>	
501 to 1,500 students	204	2.20	.06		
1,501 or more students	24	3.16	.16		
<b>Student Readiness for Mathematical Processes<sup>b</sup></b>	843	2.49	.63	<b>.009</b>	.011
<b>Grouping 1</b>				<b>.013</b>	
500 or fewer students	620	2.49	.62		
1,501 or more students	200	2.11	.66		
<b>Grouping 2</b>				<b>.007</b>	
501 to 1,500 students	200	2.53	.64		
1,501 or more students	23	2.11	.66		

<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.

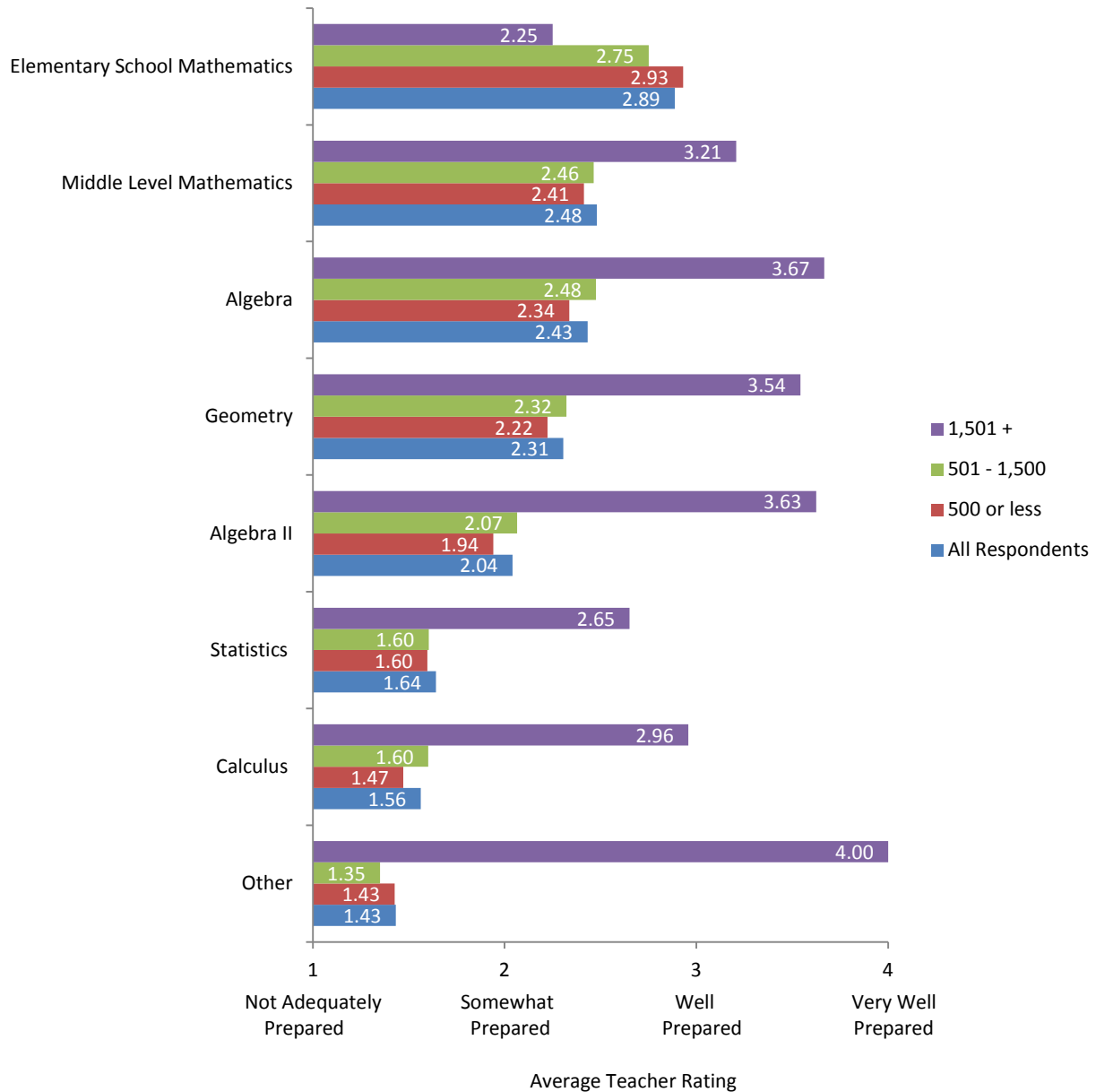
<sup>b</sup> Ratings are on a 4-point scale where 1 = Not a Priority, 2 = Low Priority, 3 = Moderate Priority, and 4 = High Priority.

Exhibit 29 illustrates that respondents from schools with size of 500 or fewer students and 501-1,500 students rated their preparation levels the lowest for teaching calculus, statistics and algebra II while the respondents from schools with size of 1,501 or more students rated the lowest level of preparation for teaching elementary school mathematics, statistics, and calculus.

<sup>12</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.

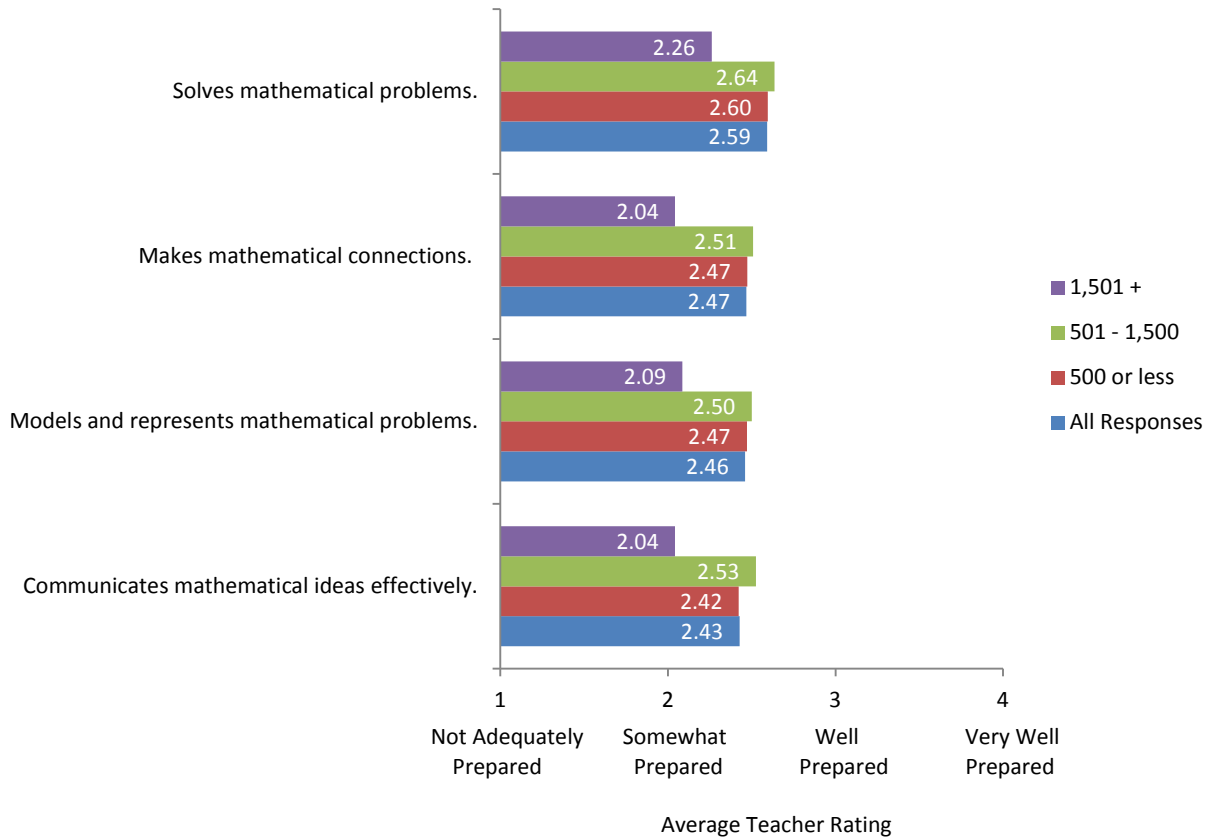
<sup>13</sup> The *p*-value is an indicator that represents the likelihood that observed results occurred by chance. In education research, values of *p* < .05 (i.e., values indicating that observed results had a less than 5% chance of occurring by chance) are typically used to identify results that 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 29. RATINGS OF PREPAREDNESS FOR TEACHING MATHEMATICS  
WITH RESPONSES FOR SCHOOL SIZE BASED ON NUMBER OF STUDENTS**



Respondents rated the degree to which they felt their students were prepared to demonstrate the Nebraska Mathematical Processes, using a 4-point scale with 1 corresponding to not adequately prepared and 4 corresponding to very well prepared. Exhibit 30 presents the average response ratings based on school size. On average, respondents rated their students between somewhat prepared and well prepared to demonstrate all four mathematical processes with ratings from respondents for schools with 1,501 or more students consistently rated lower, much closer to somewhat prepared, than other school size responses.

**EXHIBIT 30. STUDENT READINESS FOR MATHEMATICAL PROCESSES  
WITH RESPONSES FOR SCHOOL SIZE BASED ON NUMBER OF STUDENTS**



As shown in Exhibit 31, significant differences were found in one of the five science scales. For Preparedness to Meet Student Needs in Science, teachers in small and medium schools had significantly lower levels of preparedness than teachers in large schools. The effect size is considered small (<.20).

**EXHIBIT 31. SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY SCHOOL SIZE  
FOR SCIENCE PREPAREDNESS AND PROFESSIONAL DEVELOPMENT NEEDS**

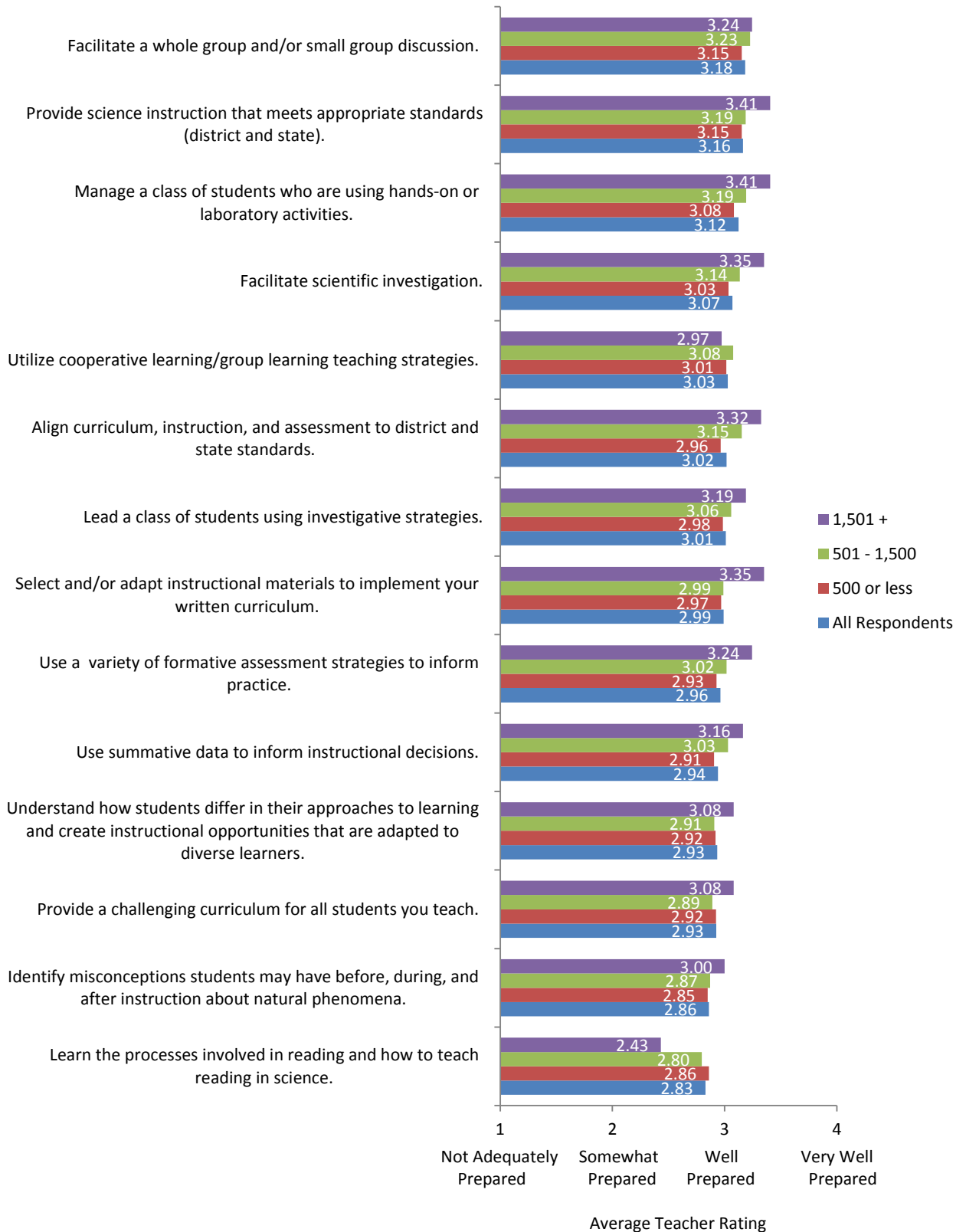
	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>p</i>	<i>Effect Size (d)</i>
<b>Preparedness to Meet Student Needs<sup>a</sup></b>	712	2.33	.74	<b>.009</b>	.013
<b>Grouping 1</b>				<b>.014</b>	
501 to 1,500 students	174	2.31	.74		
1,501 or more students	38	2.69	.62		
<b>Grouping 2</b>				<b>.007</b>	
500 or fewer students	500	2.31	.74		
1,501 or more students	38	2.69	.62		

<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.

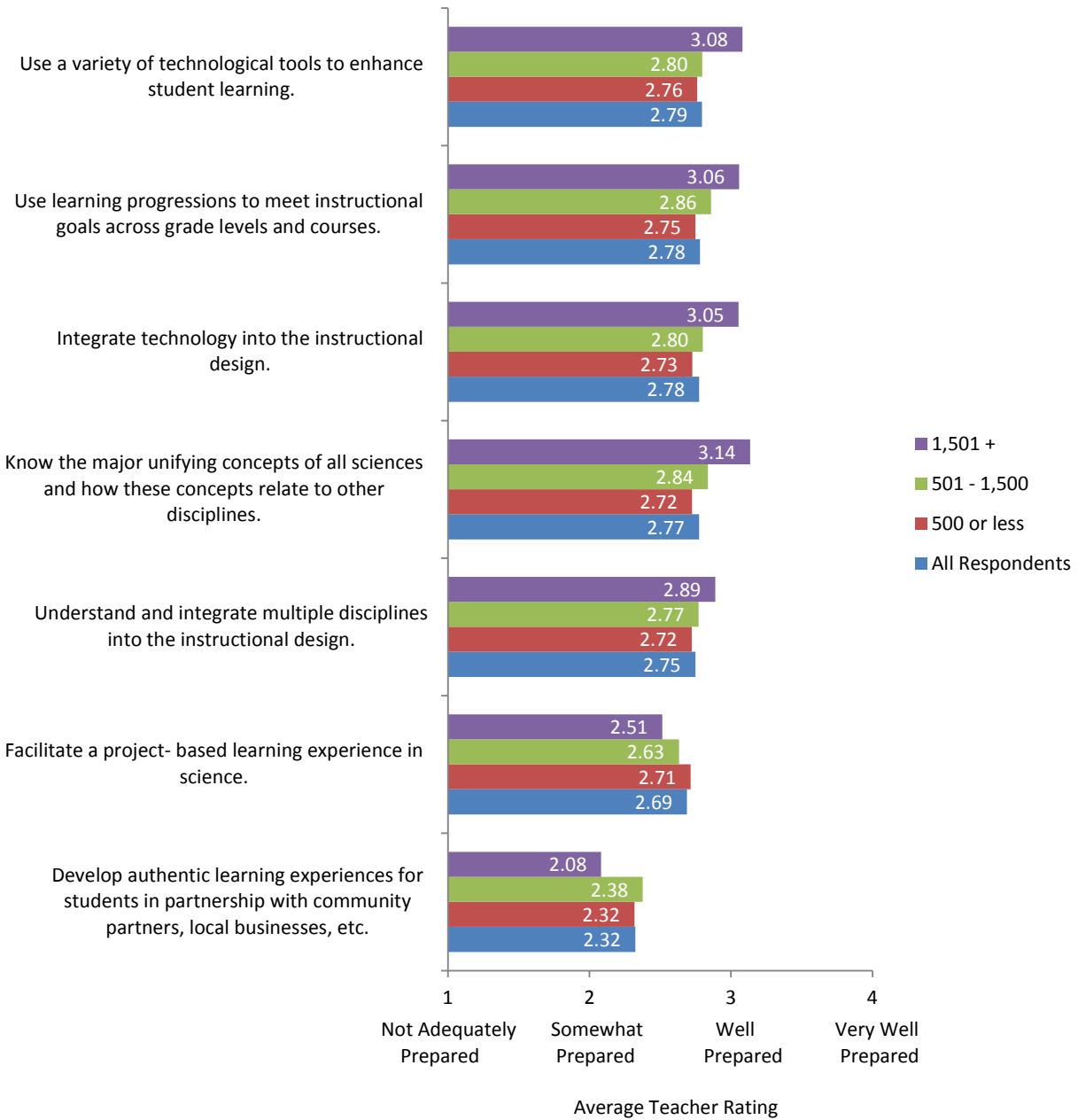
Exhibit 32 illustrates that respondents from schools with 500 or less and 501-1,500 students rated their preparedness to meet student needs the highest for facilitating a whole group and/or small group discussion and providing science instruction that meets appropriate standards, while respondents from schools with 1,501+ students rated highest providing instruction for meeting standards, managing a class using hands-on or laboratory activities, and facilitating scientific investigation.

Exhibit 33 illustrates that respondents from all school sizes rated their preparedness to meet student needs the lowest for developing authentic learning experiences, facilitating a project-based learning experience, and understanding and integrating multiple disciplines into the instructional design.

**EXHIBIT 32. HIGHEST RATINGS OF READINESS TO MEET STUDENT NEEDS IN SCIENCE  
WITH RESPONSES FOR SCHOOL SIZE BASED ON NUMBER OF STUDENTS**



**EXHIBIT 33. LOWEST RATINGS OF READINESS TO MEET STUDENT NEEDS IN SCIENCE  
WITH RESPONSES FOR SCHOOL SIZE BASED ON NUMBER OF STUDENTS**



## FREE AND REDUCED PRICE LUNCH

School percentage of students qualifying for FRL was used to examine the association between school poverty and teacher needs. Schools composed of 40% or greater students who qualified for FRL were classified as high FRL, and schools with fewer than 40% of students qualifying for FRL were classified as low FRL. Effect sizes are considered small (<.20). As shown in Exhibit 34, significant differences were found in two of the mathematics scales: *preparedness for teaching mathematics* and *student readiness for mathematics processes*.

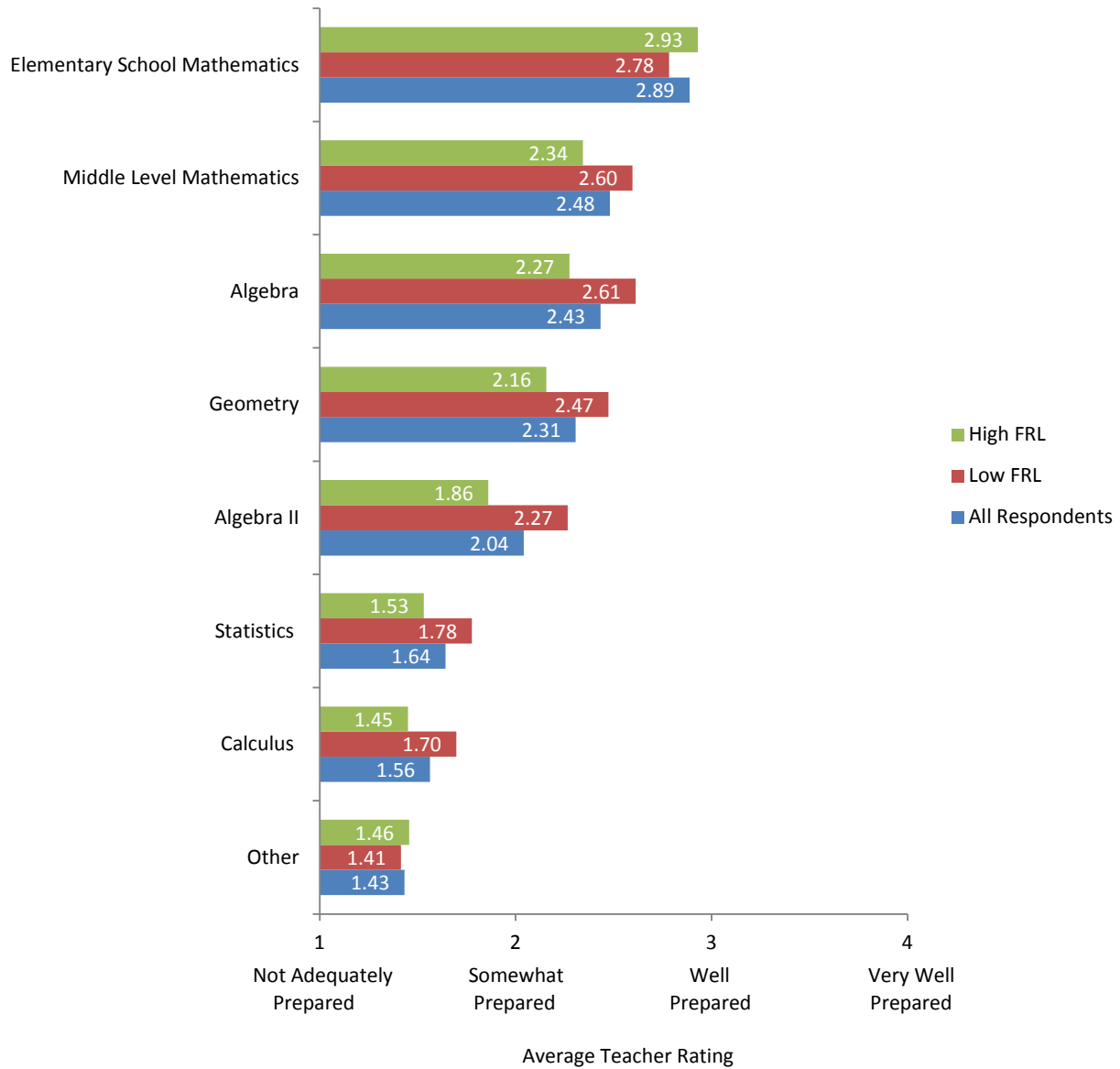
**EXHIBIT 34. SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY FRL COMPOSITION FOR MATHEMATICS PREPAREDNESS AND STUDENT READINESS**

	<i>n</i>	Mean	<i>SD</i>	<i>p</i>	Effect Size ( <i>d</i> )
<b>Preparedness for Teaching Mathematics<sup>a</sup></b>	851			<b>&lt;.001</b>	.012
High FRL	505	2.18	.78		
Low FRL	347	2.36	.83		
<b>Student Readiness for Mathematical Processes<sup>a</sup></b>	830			<b>&lt;.001</b>	.017
High FRL	495	2.42	.66		
Low FRL	335	2.59	.59		

<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.

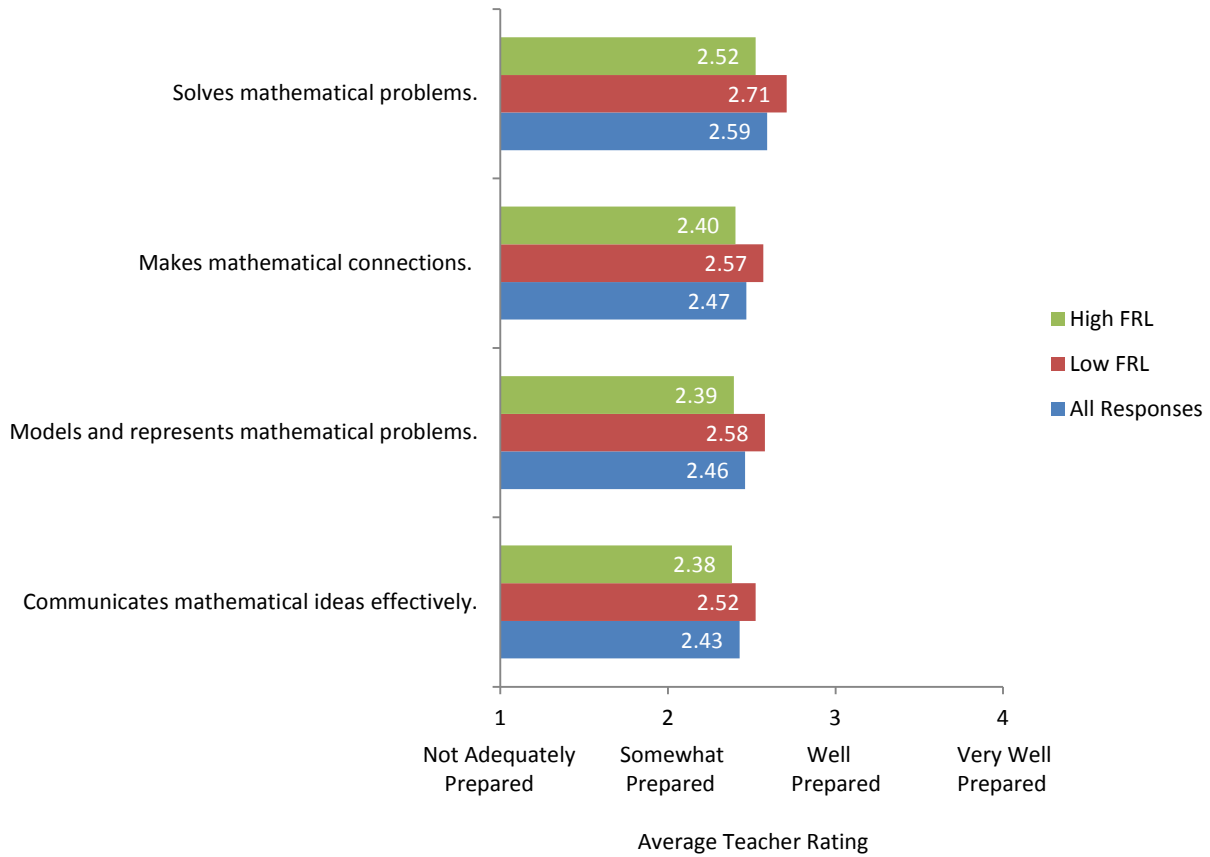
Exhibit 35 illustrates that respondents from schools rated as high and low FRL rated their preparation levels the lowest for teaching calculus, statistics and algebra II while the respondents from both high and low FRL rated the highest level of preparation for teaching elementary school mathematics, middle school mathematics, and algebra.

**EXHIBIT 35. RATINGS OF PREPAREDNESS FOR TEACHING MATHEMATICS  
WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH**



Respondents rated the degree to which they felt their students were prepared to demonstrate the Nebraska Mathematical Processes, using a 4-point scale with 1 corresponding to not adequately prepared and 4 corresponding to very well prepared. Exhibit 36 presents the average response ratings for survey items related to the degree to which respondents felt their students were prepared to demonstrate the Nebraska Mathematical Processes, including ratings from respondents in high and low FRL schools. On average, respondents rated their students between somewhat prepared and well prepared to demonstrate all four mathematical processes.

**EXHIBIT 36. STUDENT READINESS FOR MATHEMATICAL PROCESSES  
WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH**



As shown in Exhibit 37, significant differences were found in three of the five science scales. For Preparedness to Teach Science Content, teachers in schools with high FRL percentages had statistically significant differences than teachers with low FRL percentages of students. Similar findings regarding percentages of high FRL were found for Preparedness to Teach Science Concepts and for Student Readiness to Learn Science. The effect size is considered small (<.20).

**EXHIBIT 37. SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY FRL  
COMPOSITION FOR SCIENCE PREPAREDNESS AND STUDENT READINESS**

	<i>N</i>	Mean	<i>SD</i>	<i>p</i>	Effect Size ( <i>d</i> )
<b>Preparedness to Teach Science Content<sup>a</sup></b>	<b>699</b>			<b>.018</b>	<b>.008</b>
High FRL	399	2.27	.72		
Low FRL	300	2.40	.74		
<b>Preparedness to Teach Science Concepts<sup>a</sup></b>	<b>687</b>			<b>&lt;.001</b>	<b>.022</b>
High FRL	395	2.55	.69		
Low FRL	292	2.75	.66		
<b>Student Readiness to Learn Science<sup>a</sup></b>	<b>1,108</b>			<b>&lt;.001</b>	<b>.019</b>
High FRL	616	2.35	.62		
Low FRL	492	2.53	.62		

<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.

Exhibit 38 illustrates that respondents from schools rated as high and low FRL rated their preparation levels the lowest for teaching physics, as well as chemistry and middle level science. Additionally, respondents from both high and low FRL schools rated preparation highest in elementary science and life science.

**EXHIBIT 38. RATINGS OF PREPAREDNESS FOR TEACHING SCIENCE WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH**

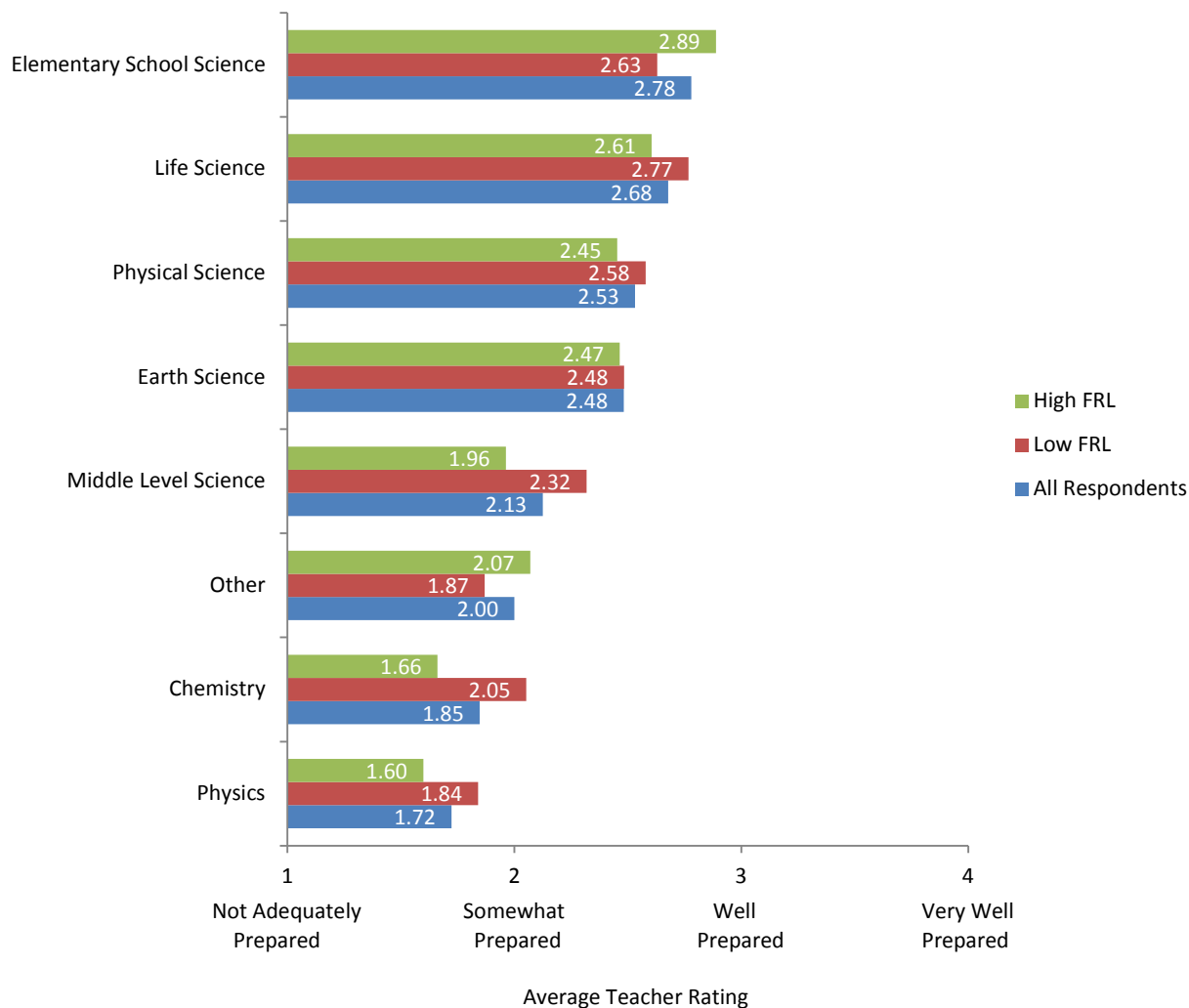


Exhibit 39 illustrates how respondents from schools rated as high and low FRL rated their preparedness to teach science concepts. Respondents from both high and low FRL schools rated levels of preparedness the lowest stability and change; scale, proportion, and quantity; and systems and systems models. Additionally, respondents from both high and low FRL schools rated preparedness highest patterns, structure and function; and cause and effect: mechanisms and explanation. However, all ratings fell, on average, between somewhat prepared and well prepared.

**EXHIBIT 39. PREPAREDNESS TO TEACH SCIENCE CONCEPTS  
WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH**

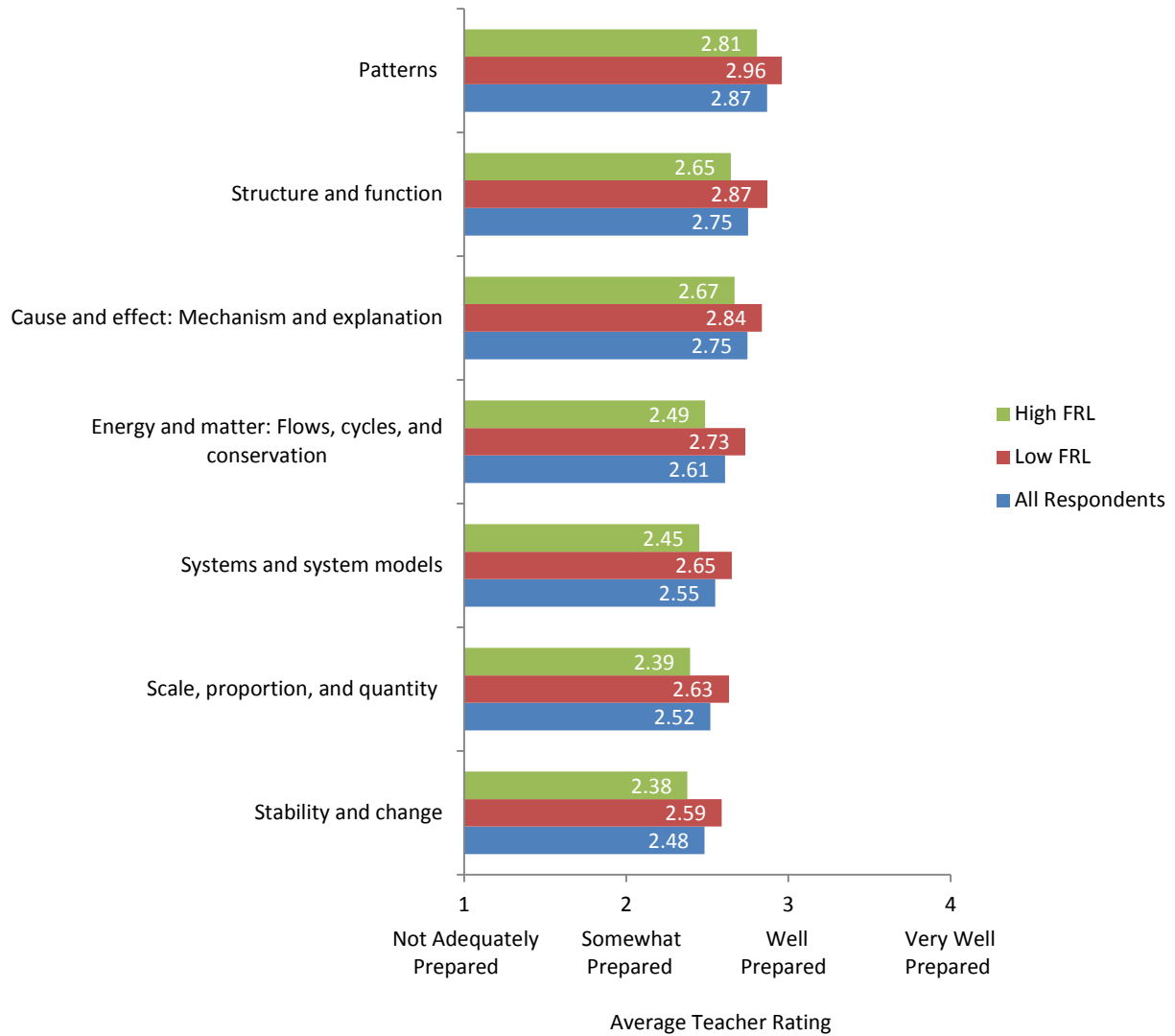
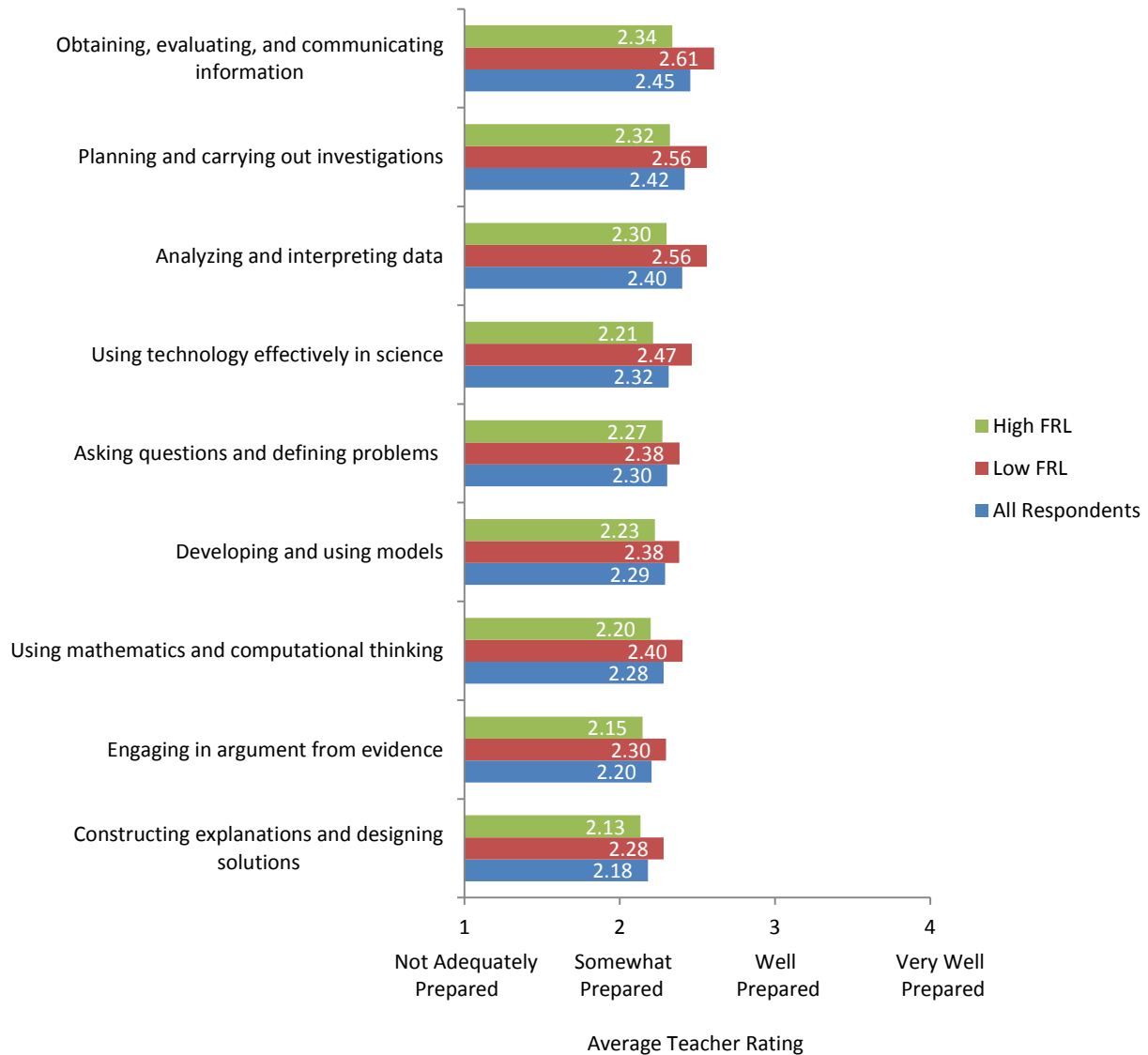


Exhibit 40 illustrates how respondents from high and low FRL schools rated the degree to which they felt their students were prepared to demonstrate scientific processes. As conveyed in the Exhibit, respondents from both high and low FRL schools felt students were most ready for *obtaining, evaluating, and communicating information*; *planning and carrying out investigations*; and *analyzing and interpreting data*. Participants from both high and low FRL schools felt students were least ready for *constructing explanations and designing solutions* and *engaging in argument from evidence*.

**EXHIBIT 40. STUDENT READINESS FOR SCIENTIFIC PROCESSES  
WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH**



## ESU Size

ESU size was used to test differences in teacher mathematics and science needs for large ESUs (3, 18, and 19) compared to smaller ESUs (all others). As shown in Exhibit 41, significant differences were found in one of the mathematics scales: *readiness to meet student needs*. For Readiness to Meet Student Needs, teachers in smaller ESUs had significantly higher levels of readiness than teachers in larger ESUs. The effect size is considered small (<.20).

**EXHIBIT 41. SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY ESU SIZE FOR READINESS TO MEET STUDENT NEEDS IN MATHEMATICS**

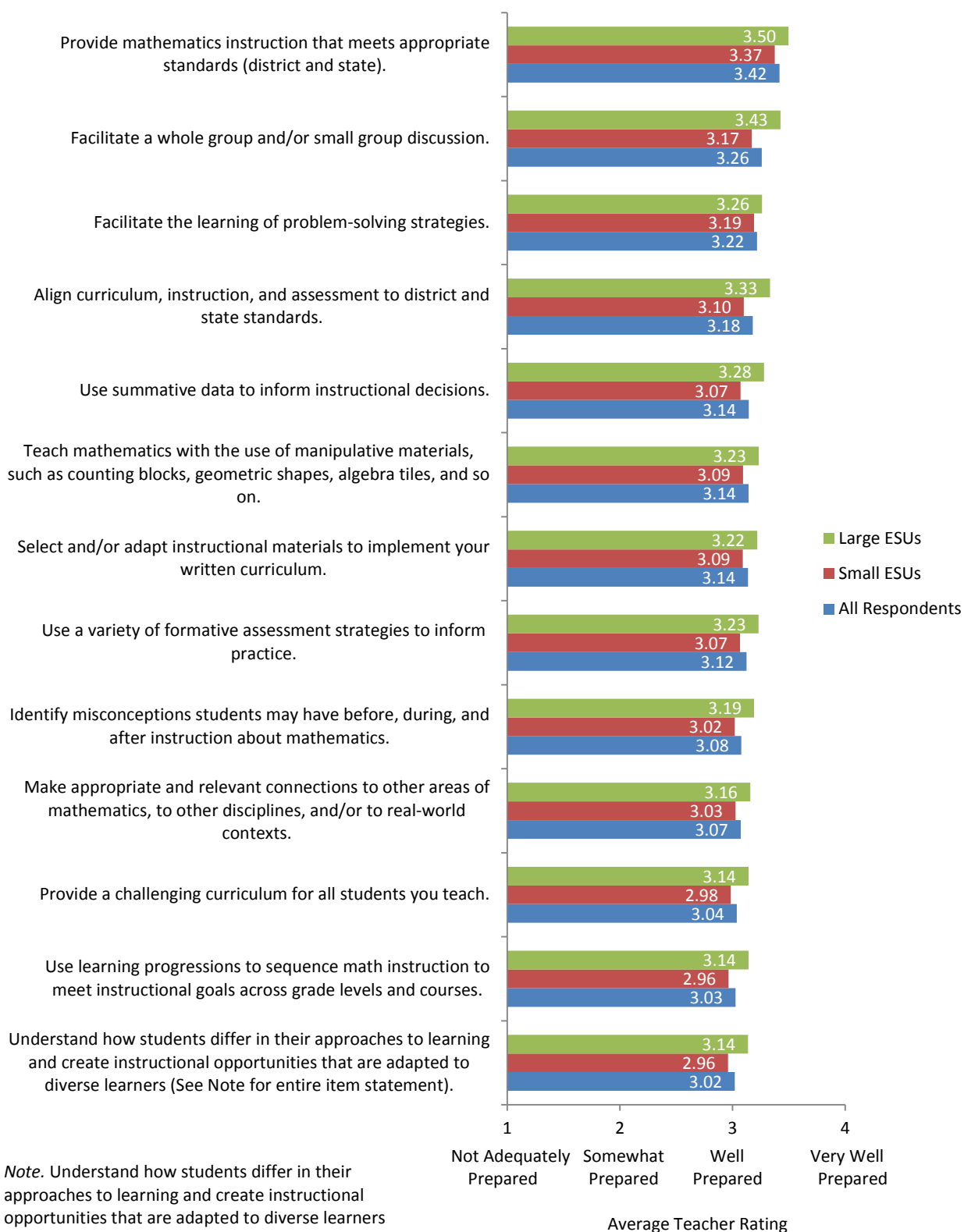
	<i>n</i>	Mean	<i>SD</i>	<i>p</i>	Effect Size ( <i>d</i> )
<b>Preparedness to Meet Student Needs<sup>a</sup></b>	945			<b>&lt;.001</b>	.014
Small ESU	617	2.94	.58		
Large ESU	328	3.09	.55		

<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.

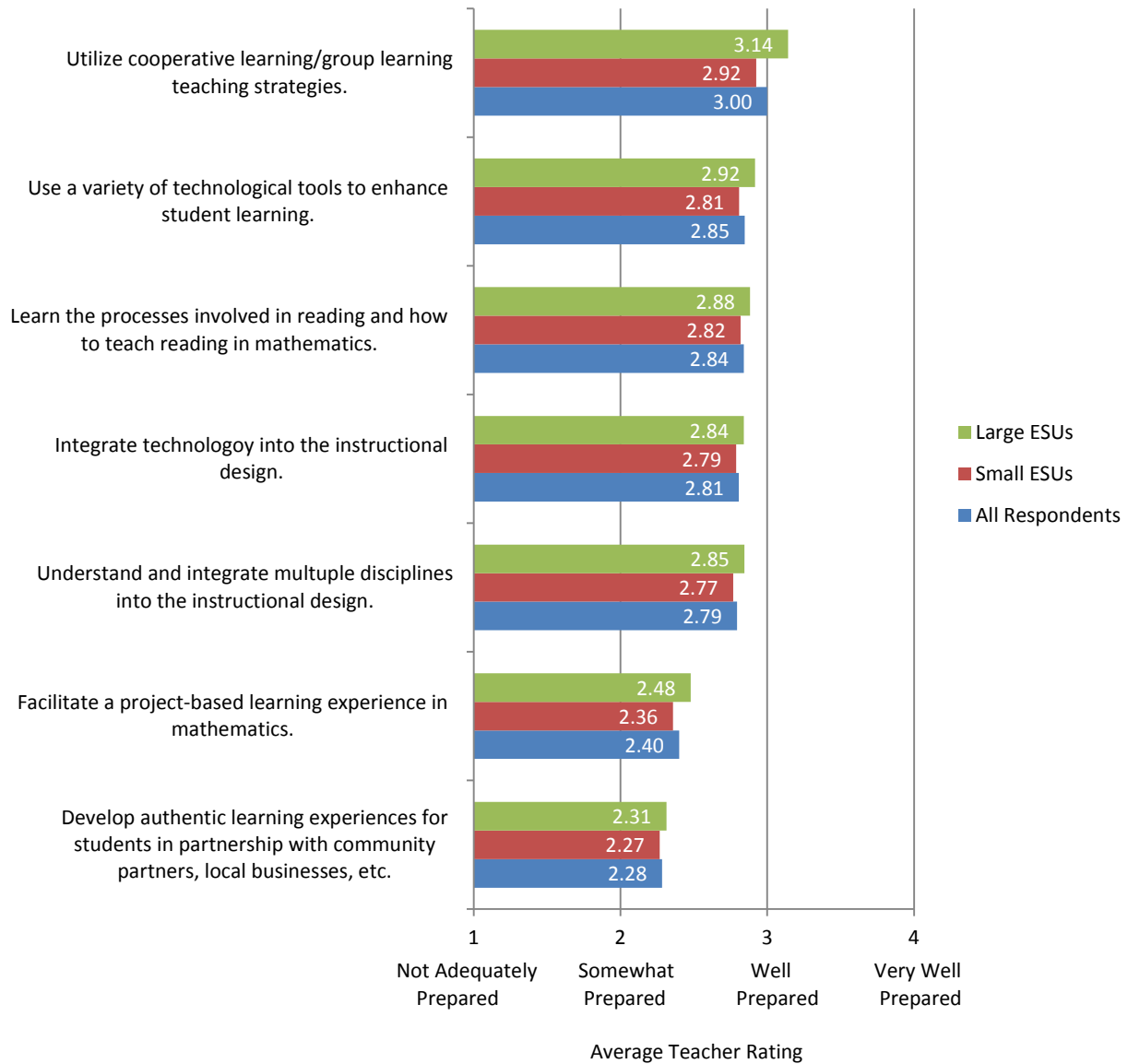
Exhibit 42 illustrates that respondents from schools in both small and large ESUs rated their preparedness to meet student needs the highest for providing instruction for meeting standards, facilitating discussion groups, and facilitating the learning of problem-solving strategies.

Exhibit 43 illustrates that respondents from schools in both small and large ESUs rated their preparedness to meet student needs the lowest for developing authentic learning experiences, facilitating project-based learning, and understanding and integrating multiple disciplines into the instructional design.

**EXHIBIT 42. HIGHEST RATINGS OF READINESS TO MEET STUDENT NEEDS WITH RESPONSES FOR SMALL AND LARGE ESUs**



**EXHIBIT 43. LOWEST RATINGS OF READINESS TO MEET STUDENT NEEDS WITH RESPONSES FOR SMALL AND LARGE ESUs**



As shown in Exhibit 44, significant differences were found in two of the five science scales. For Preparedness to Teach Science Content, teachers in smaller ESUs had statistically significant higher ratings of preparedness to teach science content than did teachers in larger ESUs. Similarly, teachers in smaller ESUs showed statistically significant greater needs for Science professional development than did teachers in large ESUs. The effect size is considered small (<.20).

**EXHIBIT 44. SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY ESU SIZE FOR SCIENCE PREPAREDNESS AND STUDENT READINESS**

	<i>N</i>	Mean	<i>SD</i>	<i>p</i>	Effect Size ( <i>d</i> )
<b>Preparedness to Teach Science Content<sup>a</sup></b>	758			<b>.006</b>	.010
Small ESU	476	2.40	.45		
Large ESU	282	2.25	.71		
<b>Science Professional Development Needs<sup>b</sup></b>	739			<b>.040</b>	.006
Small ESU	265	2.81	.69		
Large ESU	274	2.70	.69		

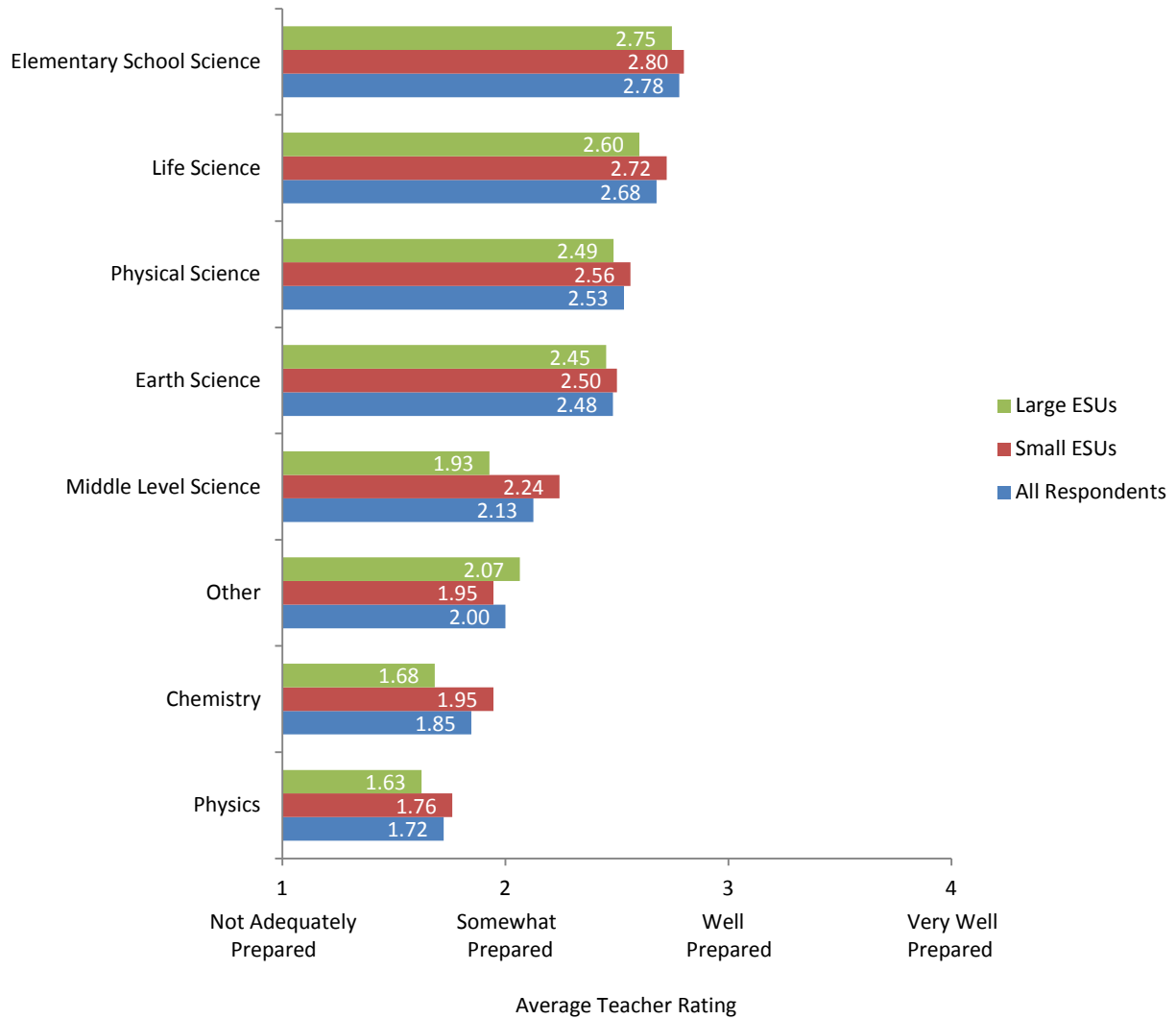
<sup>a</sup> Ratings are on a 4-point scale where 1 = Not Adequately Prepared, 2 = Somewhat Prepared, 3 = Well Prepared, and 4 = Very Well Prepared.

<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.

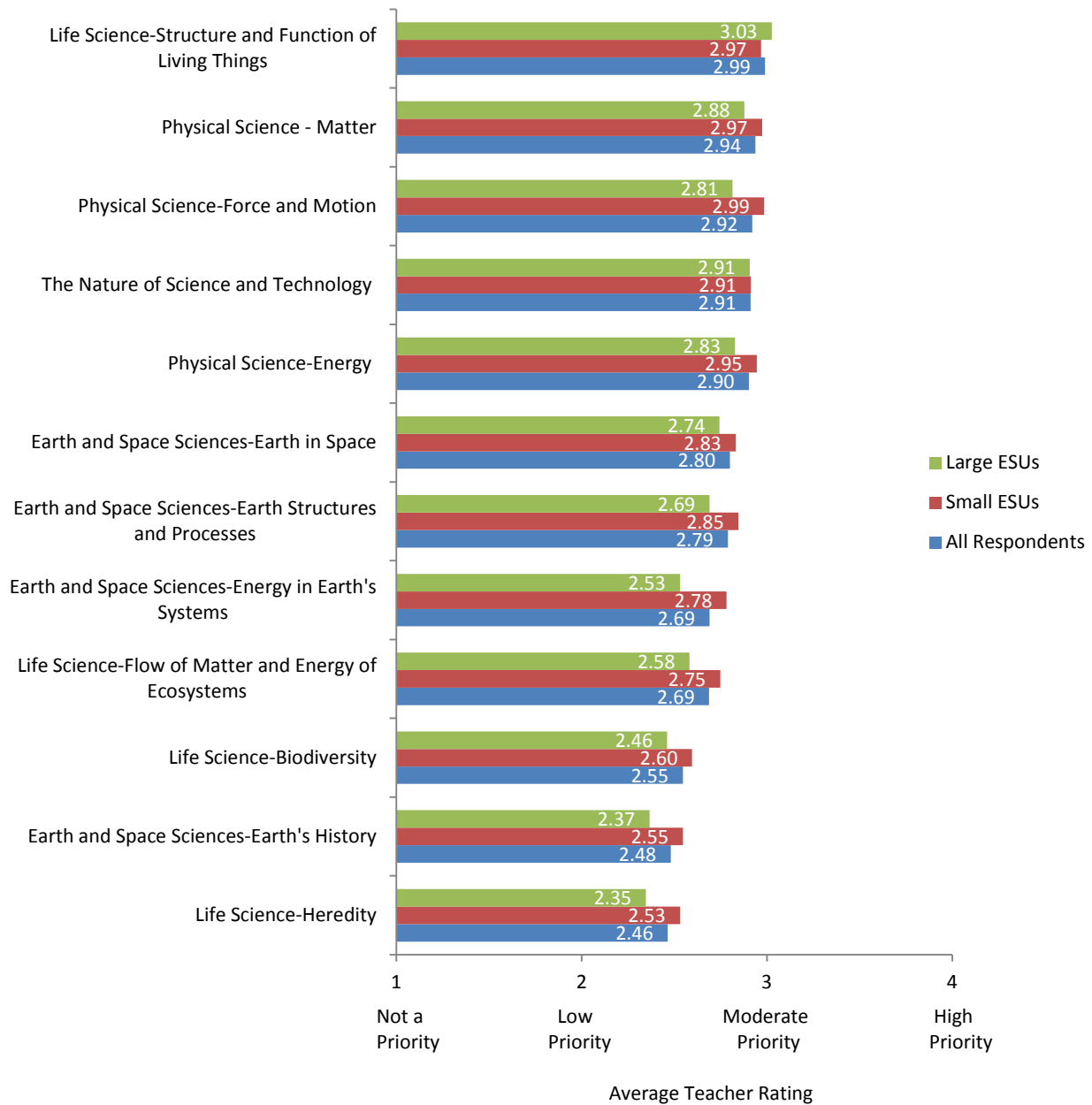
Exhibit 45 illustrates that respondents from small and large ESUs rated their preparation levels the lowest for teaching physics, as well as chemistry and middle level science. Additionally, respondents from both high and low FRL schools rated preparation highest in elementary science and life science.

Exhibit 46 presents the average response ratings for survey items on topics respondents rated a low priority. For science, of the choices contained in the survey, the lowest priority for professional development for both small and large ESUs was identified as *Life Science-Heredity* and *Earth and Space Sciences-Earth's History*. Areas of greatest priority for both small and large ESUs were *Life Science-Structure and Function of Living Things*, *Physical Science-Matter*, and *Physical Science-Force and Motion*.

**EXHIBIT 45. RATINGS OF PREPAREDNESS FOR TEACHING SCIENCE  
WITH RESPONSES FOR SMALL AND LARGE ESUs**



**EXHIBIT 46. PRIORITIES FOR PROFESSIONAL DEVELOPMENT IN SCIENCE WITH RESPONSES FOR SMALL AND LARGE ESUS**



## SCHOOL GRADES

School grade span groupings were used to examine the association between grade levels and teacher needs. Schools composed of any grades between PK-6 were considered elementary, and schools composed of any Grades 7-12 were MS/HS. Effect sizes are considered medium to small (.007-.232). As shown in Exhibit 47, significant differences were found in two of the mathematics scales: *preparedness for teaching mathematics* and *preparedness to meet student needs*.

**EXHIBIT 47. SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY SCHOOL GRADE COMPOSITION FOR MATHEMATICS PREPAREDNESS AND READINESS TO MEET STUDENT NEEDS**

	<i>n</i>	Mean	<i>SD</i>	<i>p</i>	Effect Size ( <i>d</i> )
<b>Preparedness for Teaching Mathematics<sup>a</sup></b>	779			<b>&lt;.001</b>	.232
Elementary	573	2.01	.73		
MS/HS	206	2.88	.64		
<b>Preparedness to Meet Student Needs<sup>a</sup></b>	777			<b>.018</b>	.007
Elementary	572	3.01	.58		
MS/HS	205	2.99	.57		

<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.

Exhibit 48 illustrates that respondents from school Grades PK-6 rated their preparation levels the lowest for teaching calculus, statistics and algebra II while the respondents from school Grades 7-12 rated their preparation levels the lowest for teaching elementary school mathematics, statistics, and calculus. Additionally, respondents from school Grades PK-6 rated their preparation levels the highest for elementary school mathematics, middle level mathematics, algebra, and geometry, while respondents from school Grades 7-12 rated their preparation levels the highest for algebra, middle level mathematics, algebra II, and geometry.

**EXHIBIT 48. RATINGS OF PREPAREDNESS FOR TEACHING MATHEMATICS WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)**

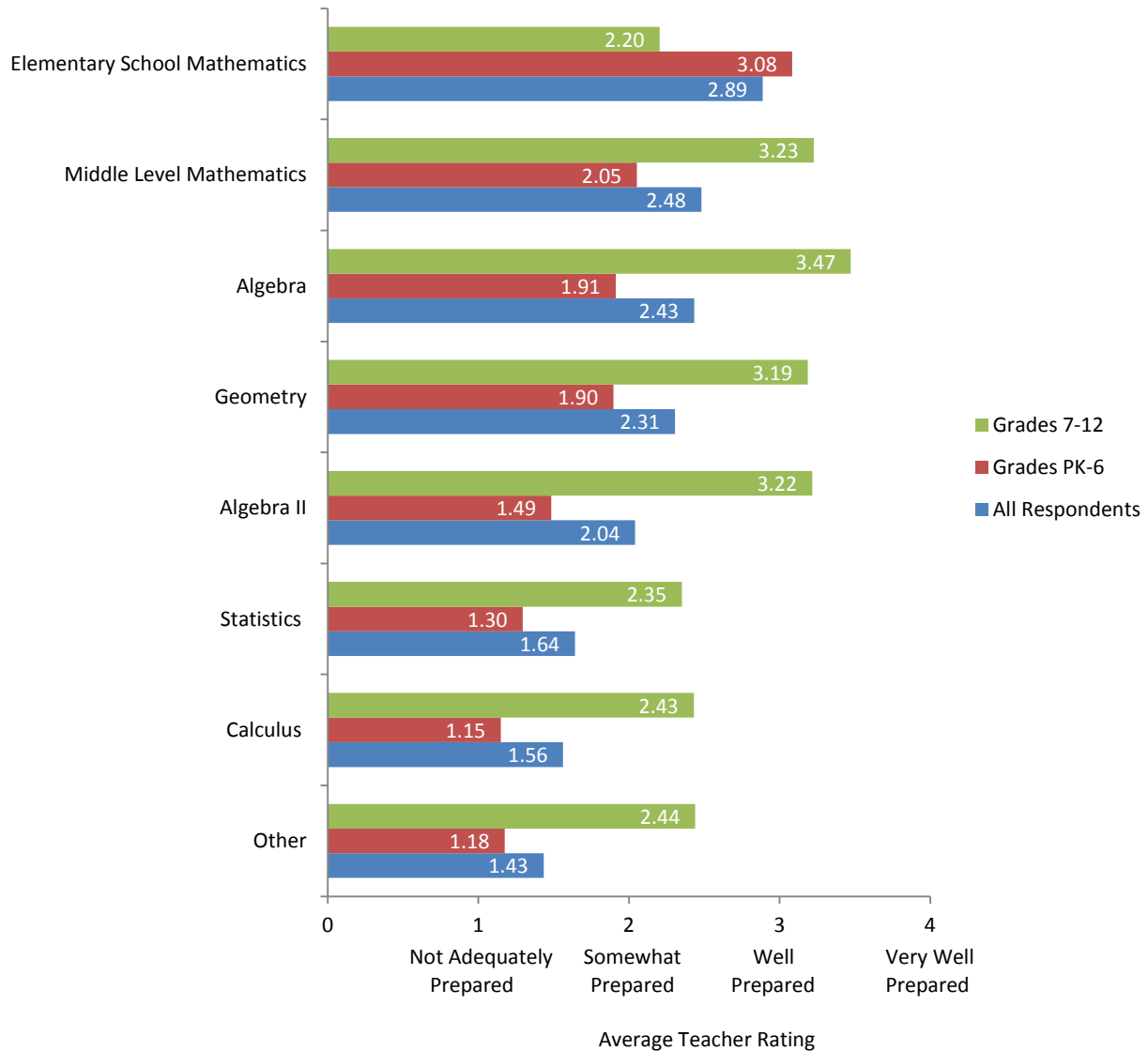
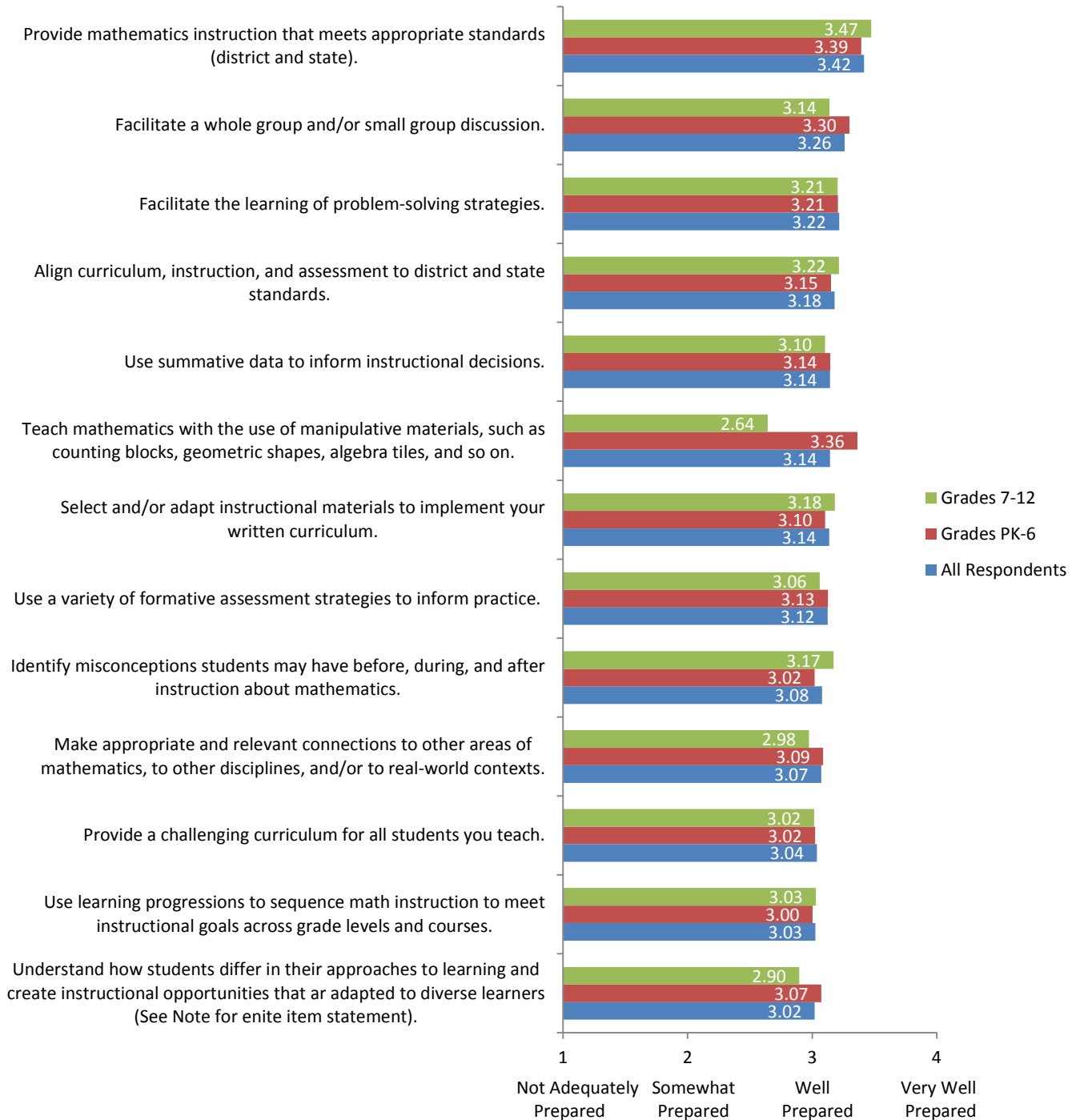


Exhibit 49 illustrates that respondents from schools in both small and large ESUs rated their preparedness to meet student needs the highest for providing instruction for meeting standards, facilitating discussion groups, and facilitating the learning of problem-solving strategies.

Exhibit 50 illustrates that respondents from schools in both small and large ESUs rated their preparedness to meet student needs the lowest for developing authentic learning experiences, facilitating project-based learning, and understanding and integrating multiple disciplines into the instructional design.

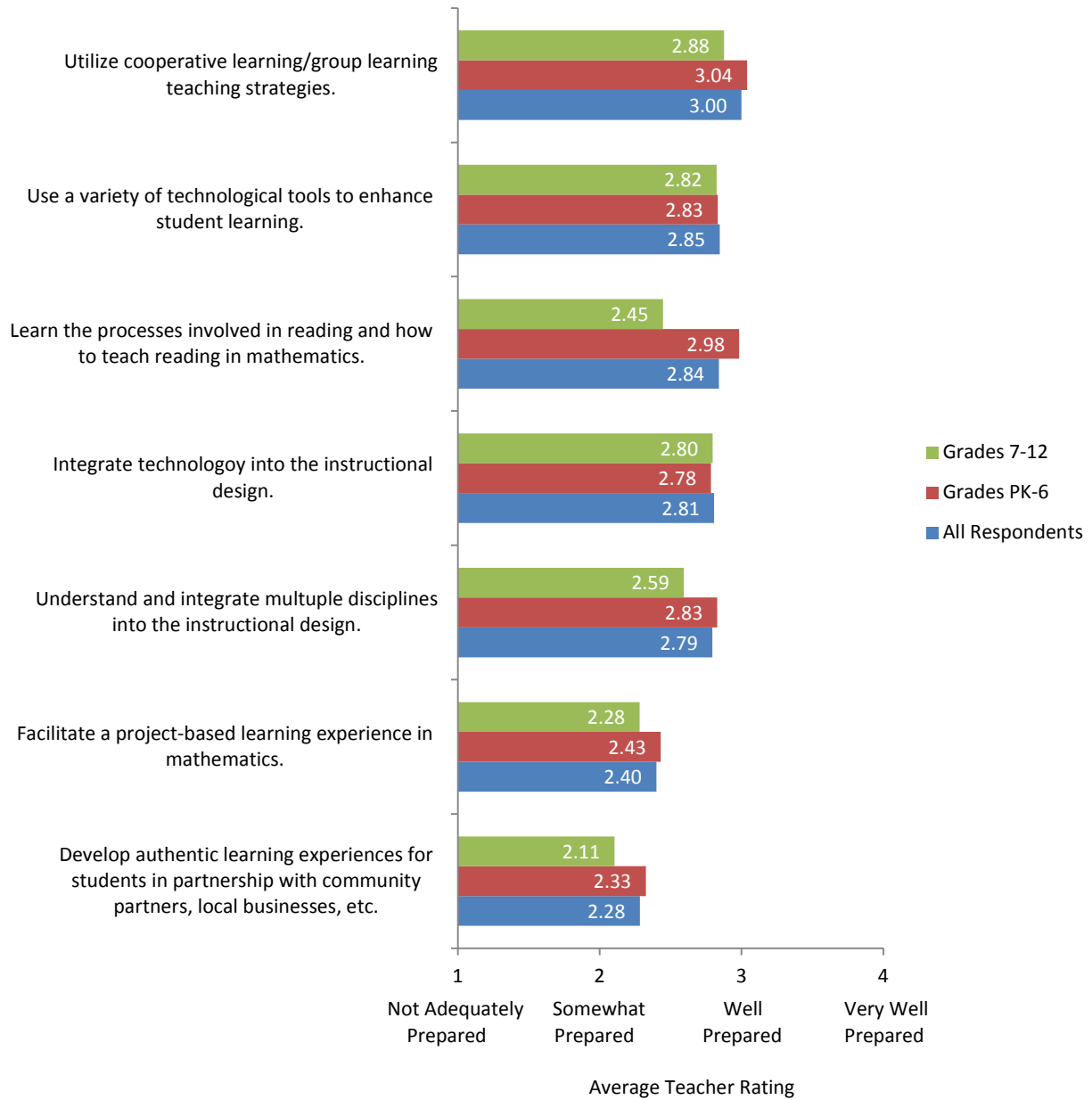
**EXHIBIT 49. HIGHEST RATINGS OF READINESS TO MEET STUDENT NEEDS WITH  
RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)**



*Note.* Understand how students differ in their approaches to learning and create instructional opportunities that are adapted to diverse learners (e.g., cultural backgrounds, limited English proficiency, learning disability that impacts math learning, etc.).

Average Teacher Rating

**EXHIBIT 50. LOWEST RATINGS OF READINESS TO MEET STUDENT NEEDS WITH  
RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)**



As shown in Exhibit 51, significant differences were found in four of the science scales: *preparedness for teaching science content*; *preparedness for teaching science concepts*; *preparedness to meet student needs*; and *student readiness to learn science*. Effect sizes were considered small (<.20).

**EXHIBIT 51. SIGNIFICANT DIFFERENCES IN TEACHER GROUPINGS BY SCHOOL GRADE COMPOSITION FOR SCIENCE PREPAREDNESS AND STUDENT READINESS**

	<i>n</i>	Mean	<i>SD</i>	<i>p</i>	Effect Size ( <i>d</i> )
<b>Preparedness for Teaching Science Content<sup>a</sup></b>	630			<b>&lt;.001</b>	.141
Elementary	451	2.13	.69		
MS/HS	179	2.73	.62		
<b>Preparedness for Teaching Science Concepts<sup>a</sup></b>	617			<b>&lt;.001</b>	.129
Elementary	442	2.45	.65		
MS/HS	175	2.99	.57		
<b>Preparedness to Meet Student Needs<sup>a</sup></b>	452			<b>&lt;.001</b>	.029
Elementary	177	2.18	.61		
MS/HS	629	3.04	.55		
<b>Student Readiness to Learn Science<sup>a</sup></b>	984			<b>&lt;.001</b>	.052
Elementary	612	2.30	.59		
MS/HS	372	2.59	.62		

<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.

Exhibit 52 illustrates that respondents from elementary grades (PK-6) rated their preparation levels the lowest for teaching physics, chemistry, and middle level science; while respondents from MS/HS grades (7-12) rated their preparation levels the lowest for teaching elementary science and physics. Additionally, respondents from elementary grades rated their preparation levels the highest for elementary school science and life science while respondents from 7-12 rated life science and middle level science the highest.

**EXHIBIT 52. RATINGS OF PREPAREDNESS FOR TEACHING SCIENCE WITH  
RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)**

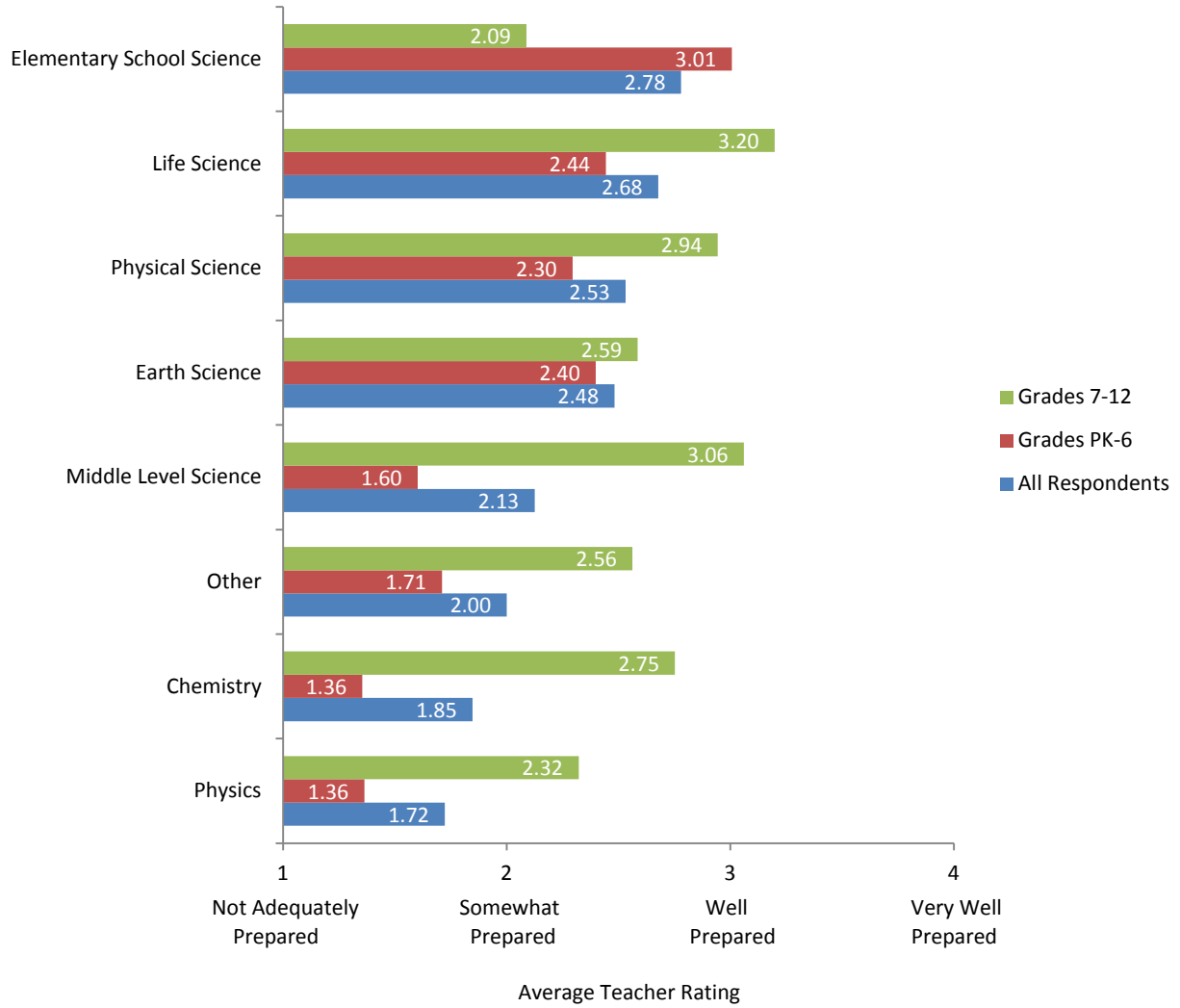


Exhibit 53 illustrates how respondents from elementary grades (PK-6) and MS/HS grades (7-12) rated their preparedness to teach science concepts. Respondents from both PK-6 and 7-12 rated levels of preparedness the lowest for stability and change; scale, proportion, and quantity; and systems and systems models, although not in the same order or at the same level. Levels of preparedness for PK-6 respondents were rated highest for patterns; cause and effect; and structure and function, while 7-12 respondents rated the highest levels of preparedness for structure and function; energy and matter; and cause and effect. However, all ratings fell, on average, between somewhat prepared and well prepared.

**EXHIBIT 53. PREPAREDNESS TO TEACH SCIENCE CONCEPTS WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)**

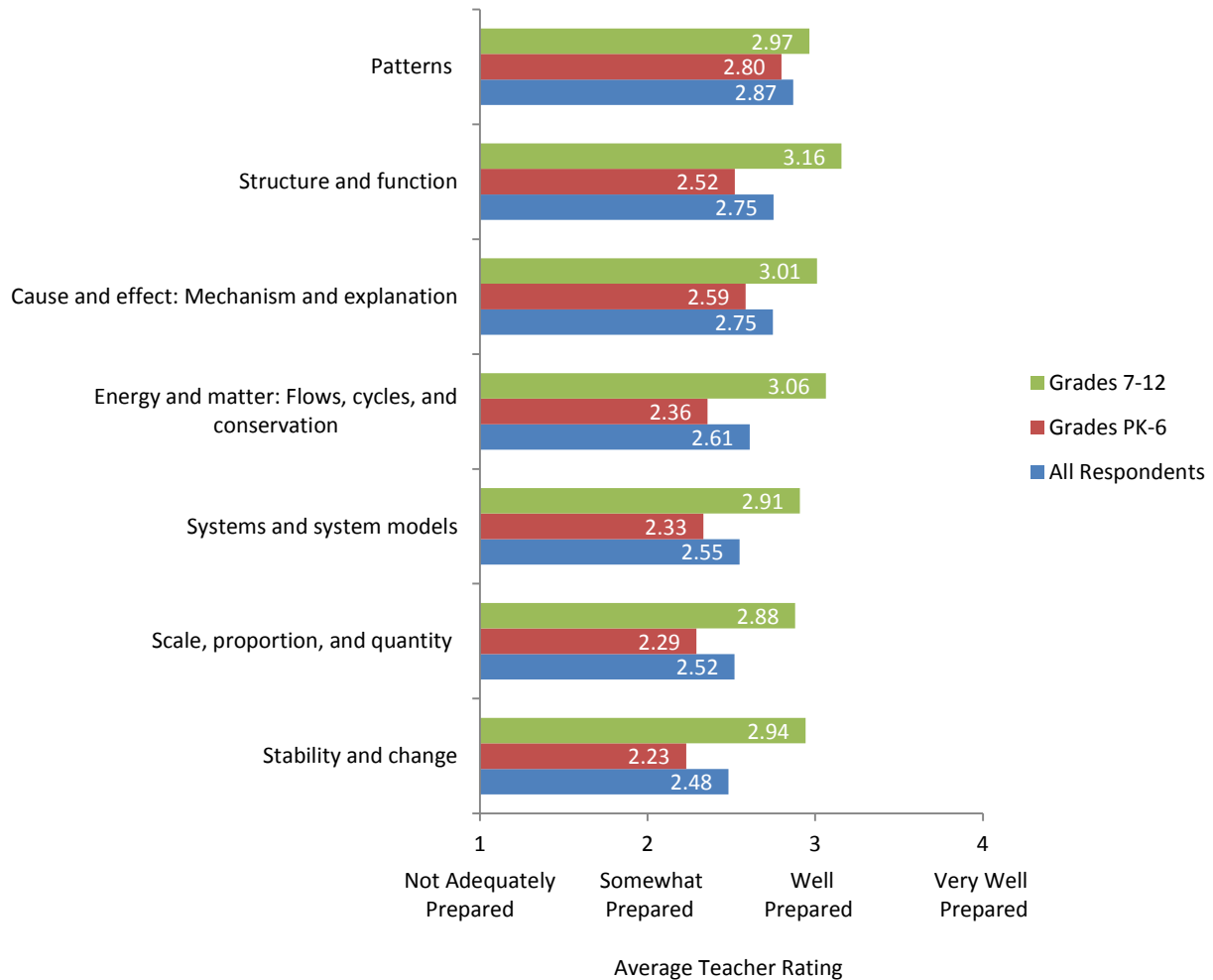
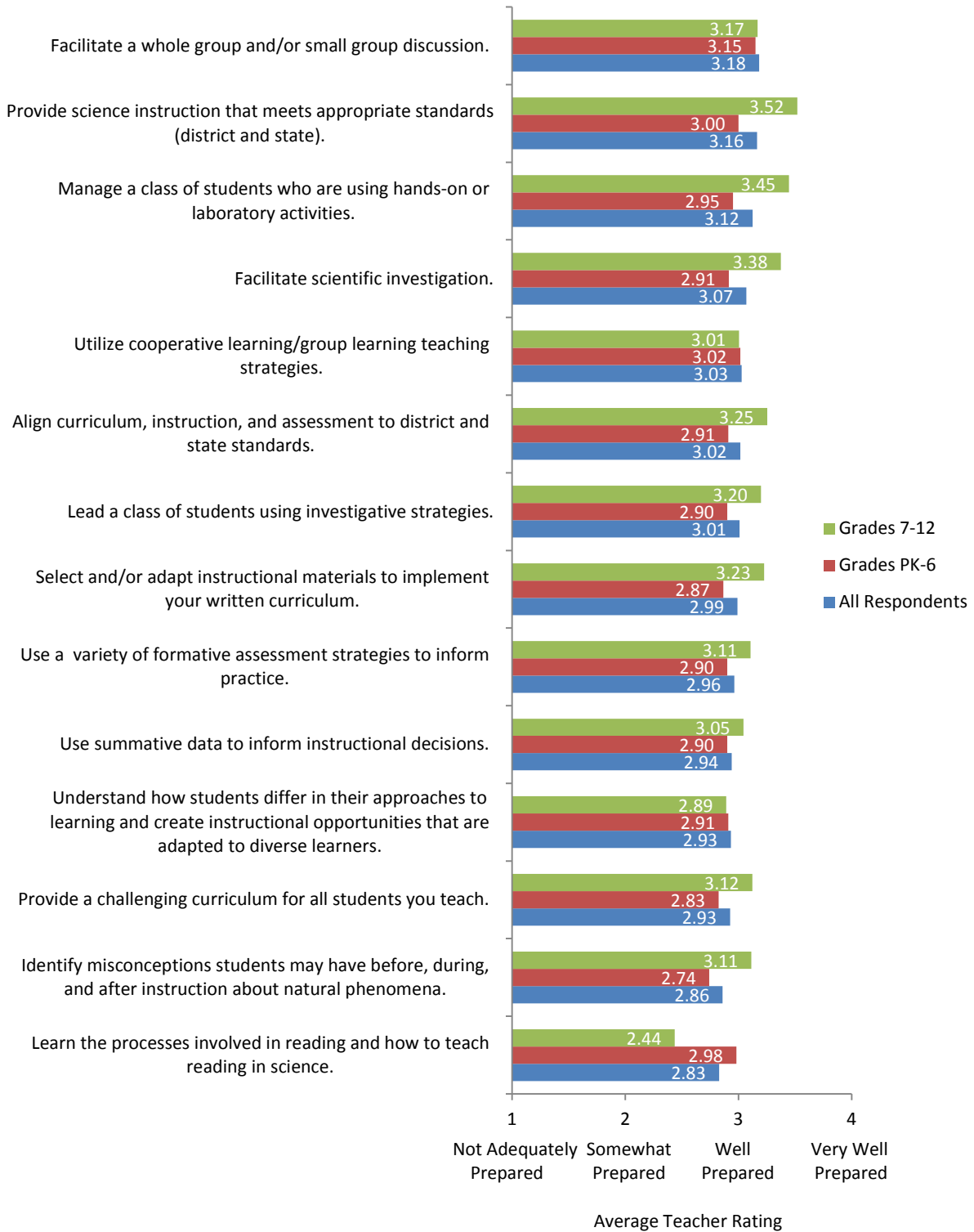


Exhibit 54 illustrates that respondents from elementary grades (PK-6) rated their preparedness to meet student needs the highest for facilitating a whole group and/or small group discussion, while respondents from MS/HS grades (7-12) rated highest providing instruction for meeting standards, managing a class using hands-on or laboratory activities, and facilitating scientific investigation.

Exhibit 55 illustrates that respondents from elementary grades (PK-6) and MS/HS grades (7-12) rated their preparedness to meet student needs the lowest for developing authentic learning experiences. PK-6 respondents then rated the next lowest as knowing the major unifying concepts of all sciences while Grades 7-12 rated facilitating a project-based learning experience, and both rated understanding and integrating multiple disciplines into the instructional design as the next lowest.

**EXHIBIT 54. HIGHEST RATINGS OF READINESS TO MEET STUDENT NEEDS IN SCIENCE WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)**



**EXHIBIT 55. LOWEST RATINGS OF READINESS TO MEET STUDENT NEEDS IN SCIENCE WITH  
RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)**

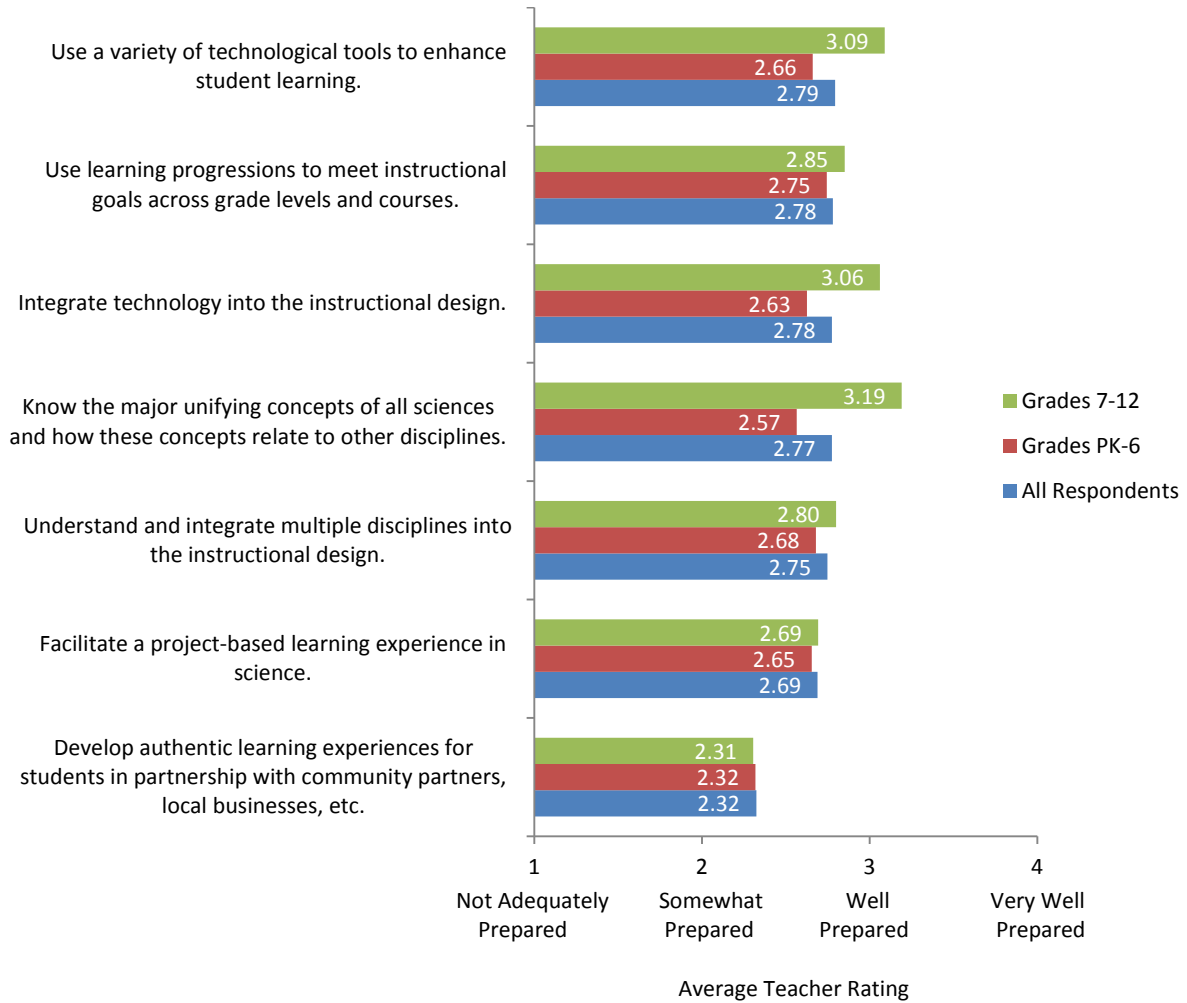
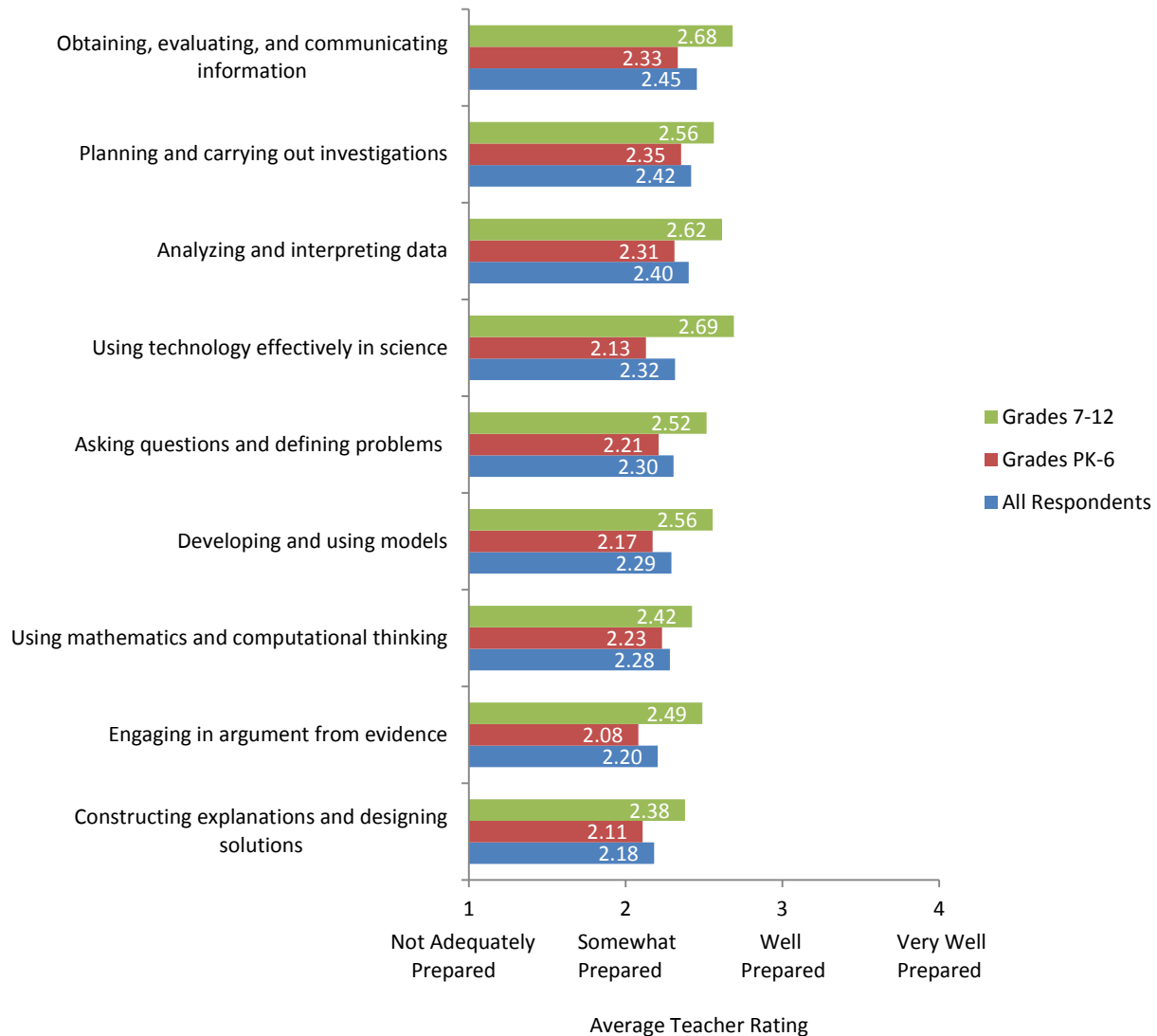


Exhibit 56 illustrates how respondents from elementary grades (PK-6) and MS/HS grades (7-12) rated the degree to which they felt their students were prepared to demonstrate scientific processes. As conveyed in the Exhibit, respondents from both high and low FRL schools felt students were most ready for *obtaining, evaluating, and communicating information*; *planning and carrying out investigations*; and *analyzing and interpreting data*. Participants from both high and low FRL schools felt students were least ready for *constructing explanations and designing solutions* and *engaging in argument from evidence*.

**EXHIBIT 56. STUDENT READINESS FOR SCIENTIFIC PROCESSES WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)**



## NEBRASKA STATE ASSESSMENT (NE-SA) MATH AND SCIENCE

Correlations demonstrated the extent to which Nebraska State Assessment scores in teachers' schools were associated with teacher ratings on mathematics and science scales. Mathematics scores were positively associated with student mathematical readiness ( $r^{14} = .22, p < .001$ ), suggesting higher scores were related to student mathematical readiness. Similarly, mathematics scores were positively associated with student scientific readiness ( $r = .086, p < .01$ ).

Science scores were associated positively with preparedness to teach mathematics ( $r = .10, p < .01$ ) and student mathematical readiness ( $r = .20, p < .001$ ); higher scores were related to greater teacher preparedness to teach mathematics and higher levels of student mathematical readiness. Similarly, science scores were positively related to preparedness to teach science content ( $r = .11, p < .01$ ), preparedness to teach science concepts ( $r = .12, p < .01$ ), teacher feelings that they are able to meet student needs ( $r = .12, p < .01$ ), and student science readiness ( $r = .18, p < .001$ ). As teacher confidence in their ability to teach science content and concepts, and meet student needs increase, student scores on science assessments also increase. Similarly, student readiness to engage in science is related to higher student NeSA scores.

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<sup>14</sup> The Pearson product-moment correlation coefficient ( $r$ ) is a measure of the relationship between two variables; in other words, a measure of the tendency of the variables to increase or decrease together. Values range from -1 to +1. A correlation of +1 indicates perfect positive correlation (i.e., that the two variables increase or decrease together). A correlation of -1 indicates perfect negative correlation (i.e., that one variable decreases as the other increases, or vice versa).

## CONCLUSIONS AND RECOMMENDATIONS

### FINDINGS

According to survey respondents,

- **The majority of respondents did not participate in previous NE MSP activities.** Those that have participated in NE MSP activities were fairly evenly distributed between NMPDS and KICKS. Almost 10% of respondents participated in the NMPDS Middle/High School Institute.
- **More than half of respondents hold advanced degrees.** The majority of respondents held a standard or professional teaching certificate and are teaching in an area for which they hold an endorsement.
- **The majority of participants held an elementary endorsement.** Almost 40% of the sample held an endorsement for mathematics, special education, and/or early childhood education (which includes early childhood inclusive education).
- **More than half the respondents indicated they preferred attending professional development for extended weeks during the summer.** Face-to-face was the preferred mode for professional development delivery, followed by hybrid sessions involving both face-to-face and online activities.
- **Respondents rated engaging students, supporting a range of strategies and productive struggle highly.** Respondents most strongly believe the role of the teacher is to engage students in tasks that promote reasoning and problem solving and facilitate discourse that moves students toward shared understanding of mathematics/science; all students need to have a range of strategies and approaches from which to choose in solving problems; and an effective teacher provides students with appropriate challenge, encourages perseverance, and supports productive struggle in learning mathematics/science.
- **Respondents rated continuous improvement, collaboration, and content-focused instructional coaching highly.** Respondents rated the highest agreement with statements about learning attitudes: *highly effective teachers become master teachers over time by continually improving their content knowledge for teaching/pedagogical skills/knowledge of students as learners; teachers who collaborate with colleagues inside and outside their school are more effective; and all professionals can benefit from content-focused instructional coaching.*
- **Mathematics teachers felt well prepared to teach elementary and middle school mathematics and algebra.** Respondents rated their level for teaching elementary, middle school mathematics, and algebra highest, while rating preparation for teaching calculus lowest.
- **Mathematics teachers felt well prepared to teach mathematics using a variety of strategies, approaches, and instructional support activities.** Respondents gave the highest ratings to *provide mathematics instruction that meets appropriate standards; facilitate a whole group and/or small*

*group discussion; and facilitate the learning of problem-solving strategies.* The respondents felt only somewhat prepared to *develop authentic learning experiences for students in partnership with community partners, local businesses, etc.; facilitate a project-based learning experience in mathematics; and understand and integrate multiple disciplines into the instructional design.*

- **Mathematics teachers identified professional development needs focusing on a number of mathematics topics.** Respondents rated several items near moderate priority, which became the topics ranked as highest priority for professional development needs. These specific mathematics topics are *number-numeric relationships, data analysis and application, number-operations, algebra applications, algebra-algebraic relationships, and data-representation.*
- **Science teachers felt better prepared to teach the elementary school and life science.** Respondents rated their level of preparation 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 concepts.** Respondents rated their preparation level between well prepared and very well prepared to teach all science concepts. Highest rating were provided for patterns, structure and function; cause and effect mechanisms; and explanation, 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. Respondents gave highest ratings to: *facilitate a whole group and/or small group discussion; provide science instruction that meets appropriate standards; and manage a class of students who are using hands-on or laboratory activities.* Respondents gave lowest ratings to: *develop authentic learning experiences for students in partnership with community partners, local businesses, etc.; facilitate a project-based learning experience in science; and understand and integrate multiple disciplines into the instructional design.*
- **Science teachers identified professional development needs focused on a number of science topics.** Respondents rated several items near moderate priority, which became the topics ranked as highest priority for professional development. Areas of greatest priority were Life Science - Structure and Function of Living Things, Physical Science - Matter, Physical Science - Force and Motion, The Nature of Science and Technology, and Physical Science - Energy.
- **Years of Teaching, AYP, and ESU Clusters shows no differences between groups on scale measures in mathematics and science.** Analysis on each of these factors showed no significant differences on any of the scale measures for mathematics and science.
- **Levels of preparedness for teaching mathematics and science varied by school size.** Statistically significant differences were found in a number of the mathematics and science 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 and medium schools had significantly lower levels of preparedness than teachers in large schools. For Student Readiness for Mathematics Processes,

teachers in small and medium schools had significantly higher levels of student readiness than teachers in large schools. For Preparedness to Meet Student Needs in Science, teachers in small and medium schools had significantly lower levels of preparedness than teachers in large schools. Effect sizes were small (<.20).

- **Some scale measures for mathematics and science varied by schools with high versus low percentage of students qualifying for FRL.** Statistically significant differences were found in a number of the mathematics and science scales. For Preparedness to Teach Mathematics, teachers in schools with high FRL had significantly lower levels of preparedness than teachers in schools with low FRL. For Student Readiness for Mathematics Processes, teachers in schools with low FRL had significantly higher levels of student readiness than teachers in schools with large FRL. For Preparedness to Teach Science Content, Preparedness to Teach Science Concepts, and Student Readiness to Learn Science, teachers in schools with low FRL had significantly higher levels of preparedness and students were more ready to learn science than teachers and students in schools with high FRL. Effect sizes were small (<.20).
- **Some scale measures for mathematics and science differed by ESU size.** Statistically significant differences were found in a number of the mathematics and science scales. For Preparedness to Meet Student Needs, teachers in large ESUs were significantly more prepared than teachers in small ESUs. For Preparedness to Teach Science Content, teachers in large ESUs indicated they were better prepared, and for Science Professional Development Needs, teachers in small ESUs showed significantly higher ratings than teachers in large ESUs. Effect sizes were small (<.20).
- **Some scale measures for mathematics and science differed by school grade composition.** Statistically significant differences were found in a number of the mathematics and science scales. For Preparedness for Teaching Mathematics, teachers in MS/HS indicated they were significantly more prepared than teachers in elementary schools. For Preparedness to Meet Student Needs in Mathematics, teachers in elementary schools indicated they were significantly more prepared than teachers in MS/HS. For Preparedness to Teach Science Content, Preparedness for Teaching Science Concepts, and Preparedness to Meet Student Needs, teachers in MS/HS indicated they were more prepared, and for Student Readiness to Learn Science, teachers in MS/HS showed significantly higher ratings than teachers in elementary schools. Effect sizes were small (<.20).
- **Nebraska State Assessment scores correlate positively with student readiness for both mathematics and science.** Mathematics scores were positively associated with student mathematical and scientific readiness. Science scores were associated positively with preparedness to teach science and mathematics and student mathematical and scientific readiness.

## 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.

1. **Use extended summer institutes and/or hybrids with some follow up for professional development experiences.** To the extent possible, consider offering participants the opportunity for university credit to apply to advanced degrees.

2. **Ensure professional development experiences that are collaborative and help teachers develop content and pedagogical content knowledge.** In many instances, what gets modeled gets learned. Respondents believe all professionals can benefit from content-focused instructional coaching, so consider that as support for transferring knowledge and skills into classroom practice.
3. **Focus professional development experiences to help develop participant and student active learning.** In both mathematics and science, outcomes of the professional development experience rated most highly were to *develop authentic learning experiences for students in partnership with community partners, local businesses, etc.; facilitate project-based learning; and understand and integrate multiple disciplines into the instructional design.*
4. **Target specific professional development to mathematics and science teachers based on a variety of impacting variables, including school size, FRL, ESU size, and school configuration (elementary vs. MS/HS).** In both mathematics and science, teachers in small schools need professional development to better meet student needs. Teachers in larger districts need professional development to be better prepared to teach mathematics. Specific topics in science should focus on life science, physical science, and the nature of science and technology. Specific topics in mathematics should focus on relationships: number-numeric and algebra-algebraic; applications: data analysis and algebra; and data-representation. Professional development should be targeted at grade levels (elementary vs. MS/HS) and for teachers in smaller ESUs and who teach in schools with higher percentages of students meeting FRL criteria.

## APPENDIX

SURVEY INVITATION LETTER  
SURVEYMONKEY.COM SURVEY

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Dear Nebraska Educator:

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. We are asking that all mathematics and science teachers from schools throughout Nebraska complete the Online Nebraska Mathematics and Science Partnership Needs Assessment.

**Please plan to complete the online needs assessment by September 30, 2015.** 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. The address is:  
[https://www.surveymonkey.com/r/NE\\_MSP\\_Needs\\_Assessment\\_2015](https://www.surveymonkey.com/r/NE_MSP_Needs_Assessment_2015).
3. 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.
4. Since one set of questions deals with specific content topics, you may wish to have access to the NDE Mathematics Standards (2015) or Science Standards (2010) document(s) accessible at <http://nde.ne.gov/AcademicStandards/index.html>.

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,

A handwritten signature in black ink that reads "John T. Sutton".

John T. Sutton, Ph.D.  
NE MSP Statewide Needs Assessment Coordinator  
RMC Research Corporation



# NE Mathematics and Science Partnership Needs Assessment 2015

## 1. Opening Page

Fall 2015

Dear Nebraska Mathematics and/or Science Teacher:

RMC Research Corporation, in cooperation with the Nebraska Department of Education and in support of the Mathematics and Science Partnership (NE MSP) projects, is conducting a statewide mathematics and science 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.

The following needs assessment contains questions about professional development, instructional practice, meeting various student needs, and other topics related to mathematics and science teaching and learning. Completion of this survey is voluntary; however, the information you provide will be essential to meeting existing and future professional development needs and inform the professional development offerings of the NE MSP statewide projects.

There are no right or wrong answers to the questions on this needs assessment survey and you may skip a question if you do not want to answer it. We will make every effort to keep the information we collect confidential, and you will not be identified in any report. The survey should take about 15 minutes to complete.

If at any time before, during, or after taking the needs assessment survey you have questions about this effort, please contact us at RMC Research Corporation at (800) 922-3636. I will be happy to answer any questions you may have.

Thank you for your help,  
John T. Sutton  
Project Coordinator

## 2. Identifier

**1. Please enter your current school email address in the space provided. This information is requested for identification purposes to minimize duplication of entries and to provide access to additional demographic information from the NDE school database. By entering your current school email address in the space provided you acknowledge that you are voluntarily agreeing to take this survey.**

# NE Mathematics and Science Partnership Needs Assessment 2015

## 3. Demographic Information

Please provide the following information so that we can align specific professional development needs in mathematics and science to the context of education in Nebraska.

### 2. 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
How many years have you taught at a K-12 school?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How many years have you taught mathematics in a K-12 school?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How many years have you taught science in a K-12 school?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 3. At your school, besides you, how many other teachers are employed to teach... (Choose only one response per question)

	Just Me	1-2	3-5	6-10	11-15	More than 15
a. Mathematics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 4. Please identify any degree(s) that you have earned. (Check all that apply.)

	Yes	No
BA or BS	<input type="radio"/>	<input type="radio"/>
MA, MS, or MEd	<input type="radio"/>	<input type="radio"/>
PhD or EdD	<input type="radio"/>	<input type="radio"/>
Other (please specify)	<input type="text"/>	

### 5. What type of program did you participate in to earn your teaching certification? (Choose one response.) If you choose Alternative Pathway, please specify in the text box.)

Traditional (college or university program)       Nebraska Transition to Teaching Program

Alternative Pathway (please specify)

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

Yes       No

## NE Mathematics and Science Partnership Needs Assessment 2015

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

Yes

No

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

Yes

No

**9. Please indicate your preferred timing for participating in professional development. (Check all that apply.)**

Extended weeks during the summer.

Throughout the school year.

Evenings.

Weekends.

Other (please specify)

**10. Please indicate your preferred mode for participating in professional development. (Check only one mode.)**

Face-to-Face (Participants meet in a specified location at same time).

Asynchronous online (Participants access prepared materials electronically and progress at their own pace.)

Synchronous online (Participants and presenters meet electronically at same time.)

Hybrid (combination of face-to-face with online).

Other (please specify)

## NE Mathematics and Science Partnership Needs Assessment 2015

**11. Please indicate what barriers currently limit your ability to participate in sponsored professional development activities? (Check all that apply.)**

- Time to participate.
- Cost to participate.
- Location of the activity.
- Administrative support.
- Access to substitute teachers.
- Personal responsibilities.
- School extra-curricular responsibilities.
- Don't need additional college credit.

Other (please specify)

# NE Mathematics and Science Partnership Needs Assessment 2015

**12. Please indicate the primary instructional tools the you currently use in your mathematics/science classroom. (Check all that apply.)**

- Printed Textbooks.
- Electronic Textbooks.
- Online resources.
- Websites.
- Apps.

Other (please specify)

**13. For any of the above instructional tools you checked, please provide specific information regarding source url, publisher, series, copyright year, or other information about the tool in the text box below. For multiple pieces of information pertaining to the same tool, please use commas as separators. For multiple tools, use a return to separate items.**

**14. Please indicate whether you are/were a participant in any of the NE MSP workshops. (Choose all that apply)**

	Yes	No
NMPDS: Elementary Math Academy	<input type="radio"/>	<input type="radio"/>
NMPDS: Middle/High School Institute	<input type="radio"/>	<input type="radio"/>
KICKS: Elementary	<input type="radio"/>	<input type="radio"/>
KICKS: Secondary	<input type="radio"/>	<input type="radio"/>
KICKS: K-12	<input type="radio"/>	<input type="radio"/>

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

- Nebraska Association of Teachers of Science (NATS)
- National Science Teachers Association (NSTA)
- National Science Education Leadership Association (NSELA)
- Nebraska Association of Teachers of Mathematics (NATM)
- National Council of Teachers of Mathematics (NCTM)
- National Council of Supervisors of Mathematics (NCSM)

# NE Mathematics and Science Partnership Needs Assessment 2015

**16. Place a check in the box next to any of the professional organizations for which you have ever attended their conference(s). (Choose all that apply)**

- Nebraska Association of Teachers of Science (NATS)
- National Science Teachers Association (NSTA)
- National Science Education Leadership Association (NSELA)
- Nebraska Association of Teachers of Mathematics (NATM)
- National Council of Teachers of Mathematics (NCTM)
- National Council of Supervisors of Mathematics (NCSM)

**17. Please indicate a primary focus for your school's improvement plan. (Check all that apply.)**

	Yes	No	Don't Know
Mathematics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# NE Mathematics and Science Partnership Needs Assessment 2015

## 4. Mathematics and Science Beliefs About Teaching and Learning

The questions that follow are designed to gauge teachers beliefs about the teaching and learning of mathematics and science.

**18. Please indicate the degree to which you agree or disagree with each of the following statements. (Choose only one response per statement)**

	Strongly Disagree	Disagree	Agree	Strongly Agree
a. Mathematics / science learning should focus on practicing procedures and memorizing basic facts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. The role of the teacher is to tell students exactly what definitions, formulas, and rules they should know and demonstrate how to use this information to solve mathematics / science problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. All students need to have a range of strategies and approaches from which to choose in solving problems, including, but not limited to, general methods and procedures.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. The role of the teacher is to engage students in tasks that promote reasoning and problem solving and facilitate discourse that moves students toward shared understanding of mathematics / science.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Mathematics / science learning should focus on developing understanding of concepts and procedures through problem solving, reasoning, and discourse.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. An effective teacher makes the mathematics /science easy for students by guiding them step by step through problem solving / investigation to ensure that they are not frustrated or confused.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Students can learn to apply mathematics / science only after they have mastered the basic skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Students can learn mathematics / science through exploring and solving contextual and mathematical /scientific problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. An effective teacher provides students with appropriate challenge, encourages perseverance in solving problems, and supports productive struggle in learning mathematics / science.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. The role of the student is to memorize information that is presented and then use it to solve routine problems on homework, quizzes, and tests.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. The role of the student is to be actively involved in making sense of mathematics / science tasks by using varied strategies and representations, justifying solutions, making connections to prior knowledge or familiar contexts and experiences, and considering the reasoning of others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Students need only to learn and use the same prescribed methods to solve problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# NE Mathematics and Science Partnership Needs Assessment 2015

**19. Please indicate the degree to which you agree or disagree with each of the following statements. (Choose only one response per statement)**

	Strongly Disagree	Disagree	Agree	Strongly Agree
a. Highly effective teachers have an innate and natural ability to provide innovative instruction that results in high levels of student achievement.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Teachers who collaborate with colleagues inside and outside their school are more effective. All mathematics / science teachers are collectively responsible for student learning, the improvement of the professional knowledge base, and everyone's effectiveness.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Teachers arrive from teacher preparation programs prepared to be effective teachers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Professional development that includes collaborative lesson planning, then reflecting on the effectiveness of those plans for student learning, observing other teachers and being observed and reviewing students' work increases teachers' knowledge and skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. A deep understanding of mathematics / science content is sufficient for effective teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Effective teachers can work autonomously and in isolation. As long as the students in one's own classroom are successful, all is well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Highly effective teachers become master teachers over time by continually improving their mathematical / scientific knowledge for teaching, mathematical / scientific pedagogical skills, and knowledge of students as learners of mathematics / science.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Instructional coaching is unnecessary and a luxury in a school's budget. However, novice teachers might benefit from some general coaching support.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Teachers should be in direct contact with students for all or almost all of each school day.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. A priority for schools and districts is to establish regular content-focused collaborative time for teachers at the same grade level or teachers of the same course and to schedule time periodically for vertical articulation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. All professionals, even experienced teachers, can benefit from content-focused instructional coaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Periodic professional development such as that provided on district inservice days provides adequate support to increase teachers' knowledge and skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. The nature and degree of principal support for a particular professional development program influences its impact on teachers' practice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# NE Mathematics and Science Partnership Needs Assessment 2015

Strongly Disagree

Disagree

Agree

Strongly Agree

## 5. Mathematics and Science Professional Development

The question that follows will help direct you to the correct section of the survey.

**20. Answering the following question will direct you to the next section of the survey. Do you currently teach mathematics, or will you teach mathematics in the next school year? (Choose one)**

Yes

No

## 6. Mathematics Preparation and Professional Development

The following questions are designed to identify the degree to which you feel prepared to teach certain topics in mathematics and will help to identify specific mathematics professional development needs.

**21. 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
a. Elementary School Mathematics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Middle Level Mathematics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Algebra	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Geometry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Algebra II	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Statistics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Calculus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If Other (please specify)

# NE Mathematics and Science Partnership Needs Assessment 2015

**22. 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
a. Provide mathematics instruction that meets appropriate standards (district and state).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Facilitate the learning of problem solving strategies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Teach mathematics with the use of manipulative materials, such as counting blocks, geometric shapes, algebra tiles, and so on.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Align curriculum, instruction, and assessment to district and state standards.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Use learning progressions to sequence math instruction to meet instructional goals across grade levels and courses.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Select and/or adapt instructional materials to implement your written curriculum.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Make appropriate and relevant connections to other areas of mathematics, to other disciplines, and/or to real-world contexts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Understand how students differ in their approaches to learning and create instructional opportunities that are adapted to diverse learners (e.g., cultural backgrounds, limited English proficiency, learning disability that impacts math learning, etc.).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Provide a challenging curriculum for all students you teach.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Identify misconceptions students may have before during, and after instruction about mathematics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Learn the processes involved in reading and how to teach reading in mathematics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Use a variety of formative assessment strategies to inform practice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Use summative data to inform instructional decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n. Use a variety of technological tools to enhance student learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o. Integrate technology into the instructional design.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p. Understand and integrate multiple disciplines into the instructional design.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q. Facilitate a project-based learning experience in mathematics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
r. Utilize cooperative learning/group learning teaching strategies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
s. Facilitate a whole group and/or small group discussion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
t. Develop authentic learning experiences for students in partnership with community partners, local businesses, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# NE Mathematics and Science Partnership Needs Assessment 2015

Not Adequately Prepared      Somewhat Prepared      Well Prepared      Very Well Prepared      Not Sure

**23. Please indicate the degree to which you feel your STUDENTS are prepared to demonstrate the Nebraska Mathematical Processes. (Choose only one response per statement)**

Not Adequately Prepared      Somewhat Prepared      Well Prepared      Very Well Prepared      Not Sure

**a. Solves mathematical problems.** Through the use of appropriate academic and technical tools, students will make sense of mathematical problems and persevere in solving them. Students will draw upon their prior knowledge in order to employ critical thinking skills, reasoning skills, creativity, and innovative ability. Additionally, students will compute accurately and determine the reasonableness of solutions.

**b. Models and represents mathematical problems.** Students will analyze relationships in order to create mathematical models given a real-world situation or scenario. Conversely, students will describe situations or scenarios given a mathematical model.

**c. Communicates mathematical ideas effectively.** Students will communicate mathematical ideas effectively and precisely. Students will critique the reasoning of others as well as provide mathematical justifications. Students will utilize appropriate communication approaches individually and collectively and through multiple methods, including writing, speaking, and listening.

**d. Makes mathematical connections.** Students will connect mathematical knowledge, ideas, and skills beyond the math classroom. This includes the connection of mathematical ideas to other topics within mathematics and to other content areas. Additionally, students will be able to describe the connection of mathematical knowledge and skills to their career interest as well as within authentic/real-world contexts.

# NE Mathematics and Science Partnership Needs Assessment 2015

24. 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 mathematics topics represent professional development needs that 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
a. <b>Number</b> - Numeric Relationships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. <b>Number</b> - Operations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. <b>Algebra</b> - Algebraic Relationships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. <b>Algebra</b> - Algebraic Processes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. <b>Algebra</b> - Applications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. <b>Geometry</b> - Characteristics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. <b>Geometry</b> - Coordinate Geometry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. <b>Geometry</b> - Measurement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. <b>Data</b> - Representation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. <b>Data</b> - Analysis and Application	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. <b>Data</b> - Probability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# NE Mathematics and Science Partnership Needs Assessment 2015

Not a Priority    Low Priority    Moderate Priority    High Priority    Not Sure

## 7. Mathematics and Science Professional Development

Answering the following question will direct you to the next section of the survey.

**25. Do you currently teach science, or will you teach science in the next school year?**

**(Choose one)**

Yes

No

## 8. Science Preparation and Professional Development

The following questions are designed to identify the degree to which you feel prepared to teach certain topics in science and will help to identify specific science professional development needs.

**26. 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
a. Chemistry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Physics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Life Science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Earth Science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Physical Science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Middle Level Science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Elementary School Science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If Other (please specify)

# NE Mathematics and Science Partnership Needs Assessment 2015

**27. 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
a. Provide science instruction that meets appropriate standards (district and state).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Facilitate scientific investigation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Manage a class of students who are using hands-on or laboratory activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Lead a class of students using investigative strategies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Align curriculum, instruction, and assessment to district and state standards.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Use learning progressions to meet instructional goals across grade levels and courses.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Select and/or adapt instructional materials to implement your written curriculum.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Know the major unifying concepts of all sciences and how these concepts relate to other disciplines.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Understand how students differ in their approaches to learning and create instructional opportunities that are adapted to diverse learners (e.g., cultural backgrounds, limited English proficiency, learning disability that impacts science learning, etc.).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Provide a challenging curriculum for all students you teach.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Identify misconceptions students may have before during, and after instruction about natural phenomena.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Learn the processes involved in reading and how to teach reading in science.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Use a variety of formative assessment strategies to inform practice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n. Use summative data to inform instructional decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o. Use a variety of technological tools to enhance student learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p. Integrate technology into the instructional design.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q. Understand and integrate multiple disciplines into the instructional design.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
r. Facilitate a project-based learning experience in science.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
s. Utilize cooperative learning/group learning teaching strategies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
t. Facilitate a whole group and/or small group discussion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
u. Develop authentic learning experiences for students in partnership with community partners, local businesses, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# NE Mathematics and Science Partnership Needs Assessment 2015

Not Adequately Prepared    Somewhat Prepared    Well Prepared    Very Well Prepared    Not Sure

**28. Please indicate the degree to which you feel your STUDENTS are prepared to demonstrate the following Scientific Processes. (Choose only one response per statement)**

Not Adequately Prepared    Somewhat Prepared    Well Prepared    Very Well Prepared    Not Sure

<p><b>a. Asking questions and defining problems.</b> Formulate and refine questions that can be answered empirically in a science classroom and use them to design an inquiry or construct a pragmatic solution. For engineering, ask questions about the need or desire to be met in order to define constraints and specifications for a solution.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>b. Developing and using models.</b> Represent and explain phenomena with multiple types of models – for example, represent molecules with 3-D model or with bond diagrams – and move flexibly between model types when different ones are most useful for different purposes.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>c. Planning and carrying out investigations.</b> Formulate a question that can be investigated within the scope of the classroom school laboratory, or field with available resources, formulate an hypothesis, determine data to be gathered, apply appropriate analysis techniques, identifying independent and dependent variables and consider confounding variables.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>d. Analyzing and interpreting data.</b> Analyze data systematically, either to look for salient patterns or to test whether data are consistent with an initial hypothesis, using appropriate disciplines, tools, and technology.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>e. Using mathematics and computational thinking.</b> Express relationships and quantities in appropriate mathematical or algorithmic forms for scientific modeling and investigations.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>f. Constructing explanations and designing solutions.</b> Use primary or secondary scientific evidence and models to support or refute an explanatory account of a phenomenon. Undertake design projects, engaging in all steps of the design cycle and producing a plan that meets specific design criteria.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>g. Engaging in argument from evidence.</b> Recognize that the major features of scientific arguments are claims, data, and reasons and distinguish these elements in examples.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>h. Obtaining, evaluating, and communicating information.</b> Use, words, tables, diagrams, and graphs (whether in hard copy or electronically), as well as mathematical expressions, to communicate their understanding or to ask questions about a system under study.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p><b>i. Using technology effectively in science.</b> Use appropriate technology tools to construct science knowledge, gather and evaluate digital information, and collaborate and communicate to multiple audiences using multiple media formats.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# NE Mathematics and Science Partnership Needs Assessment 2015

**29. Please indicate how well prepared you feel to teach each of the following to help improve students' conceptual understanding of and application to science. (Choose only one response per statement)**

	Not Adequately Prepared	Somewhat Prepared	Well Prepared	Very Well Prepared	Not Sure
a. <b>Patterns.</b> Observed patterns of forms and events that guide organization and classification, and prompt questions about relationships and the factors that influence them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. <b>Cause and effect: Mechanism and explanation.</b> A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. <b>Scale, proportion, and quantity.</b> In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. <b>Systems and system models.</b> Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. <b>Energy and matter: Flows, cycles, and conservation.</b> Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. <b>Structure and function.</b> The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. <b>Stability and change.</b> For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# NE Mathematics and Science Partnership Needs Assessment 2015

30. 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 science topics represent professional development needs that 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
a. <b>The Nature of Science and Technology</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. <b>Physical Science</b> - Matter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. <b>Physical Science</b> - Force and Motion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. <b>Physical Science</b> - Energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. <b>Life Science</b> - Structure and Function of Living Things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. <b>Life Science</b> - Heredity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. <b>Life Science</b> - Flow of Matter and Energy of Ecosystems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. <b>Life Science</b> - Biodiversity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. <b>Earth and Space Sciences</b> - Earth in Space	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. <b>Earth and Space Sciences</b> - Earth Structures and Processes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. <b>Earth and Space Sciences</b> - Energy in Earth's Systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. <b>Earth and Space Sciences</b> - Earth's History	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# NE Mathematics and Science Partnership Needs Assessment 2015

Not a Priority    Low Priority    Moderate  
Priority    High Priority    Not Sure

**9. End of Survey**

Thank you for taking the time to complete this needs assessment survey.

# NEBRASKA STATEWIDE MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM – NEEDS ASSESSMENT

John Sutton  
sutton@rmcres.com

NDE MSP Advisory Board Meeting  
Lincoln, NE  
December 11, 2015



# NEBRASKA STATEWIDE MATHEMATICS AND SCIENCE PARTNERSHIP PROGRAM – NEEDS ASSESSMENT REPORT CONTRIBUTORS

## **RMC Research Staff**

Arlene Mitchell, Senior Research Associate, Project Director

John Sutton, Senior Research Associate, Project Co-Director

Emma Espel, Research Associate, Data Collection, Analysis, and Report Author

Kris Bryson, Administrative Assistant, Document Development

## **NDE Staff**

Jan Handa, Grants Manager; Sharon Katt; Cory Epler

Deb Romanek, Mathematics Director; Sara Cooper, Science Director

Pam Tagart and Max Reiner, Data, Research, and Evaluation



This report was prepared for the Nebraska Department of Education under NDE Admin. Memo 110, Appendix B: Standard Contract Form Dated April 2015. Any opinions expressed herein are those of the authors/presenter and do not necessarily represent the views of the Nebraska Department of Education.



# Presentation Objectives

This presentation is intended to:

- \* Provide insight into levels of confidence, preparedness, and needs related to mathematics and science teaching and learning in Nebraska schools.
- \* Increase understanding of the results of the needs assessment and their influence on priorities.
- \* Provide information to inform the decision-making process regarding the priorities of future Mathematics and Science Partnership (MSP) program design.
- \* Influence ideas regarding the identification of next steps in MSP program and proposal development process.

# Presentation Sections



Methodology



Results



Comparisons



Summary



Recommendations

# Presentation Sections



Methodology



Results



Comparisons



Summary



Recommendations



# Methodology

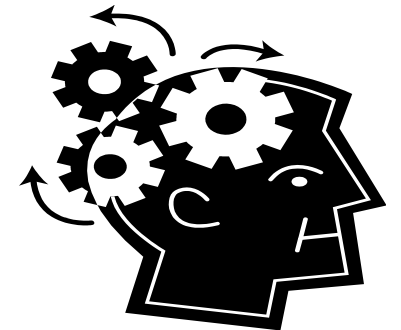
- What are the areas of mathematics and science for which teachers presently feel least adequately prepared to teach?
- What areas in mathematics and science are rated as the highest priority for professional development?
- Are there significant differences on levels of preparedness to teach and needs for professional development in mathematics and science between teachers for the independent variables of years of teaching, adequate yearly progress (AYP), ESU clusters, school size, free and reduced price lunch (FRL), ESU size, and Nebraska State Assessments (NeSA) Math and Science?





# Methodology

- Initial Discussion with RMC Research and NDE – included conversation with UNL regarding their needs sensing efforts
- RMC Research developed first draft that incorporated ideas and items from NCTM, NGSS, and other Needs Assessment documents.
- NDE Reviewed and provided specific feedback
- RMC Research prepared SurveyMonkey.com document
- Final Review by NDE and Survey administered





# Methodology

Information piece regarding the survey and a url link was included in the September 2015 issues (3, 10, 17, and 24) of the NDE Bulletin for four consecutive weeks.



## Nebraska Statewide Needs Assessment in Mathematics and Science

**Open: September 8 – Closes: September 30**

Contact: **NDE** Helpdesk (888-285-0556 or [nde.helpdesk@nebraska.gov](mailto:nde.helpdesk@nebraska.gov)) or (John Sutton, RMC Research 800-922-3636 or [sutton@rmcres.com](mailto:sutton@rmcres.com))

RMC Research Corporation, in cooperation with the Nebraska Department of Education and in support of the Mathematics and Science Partnership (NE MSP) projects, is conducting a statewide mathematics and science 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 survey can be accessed by entering the url:

[https://www.surveymonkey.com/r/NE MSP Needs Assessment 2015](https://www.surveymonkey.com/r/NE_MSP_Needs_Assessment_2015). Please share this information with any of your educators who teach mathematics and/or science.



## Primary Target Audiences

Nebraska Department of Education	Science KICKS	NMPDS
<ul style="list-style-type: none"><li>• Public and non-public school teachers of mathematics and science</li><li>• Public and non-public school administrators</li></ul>	<ul style="list-style-type: none"><li>• NATS membership</li><li>• Science Matters</li><li>• Science KICKS<sub>3</sub> Institute participants</li><li>• ESU Science Cadre</li></ul>	<ul style="list-style-type: none"><li>• NATM membership</li><li>• NMPDS Middle School and High School Institute and Elementary Academy participants</li><li>• ESU Mathematics Cadre</li></ul>

# Presentation Sections



Methodology



Results



Comparisons



Summary



Recommendations



# Results

- 1,456 K-12 teachers completed the survey (representing all ESUs across the state).
- 73% of respondents were female/19% of respondents were male.
- 90% of respondents were white.
- 65% of respondents indicated teaching in K-12 school for 10 or more years.



# Results

- 64% of respondents indicated teaching Science full time in K-12 school for 10 or more years.
- 59% of respondents indicated teaching Mathematics full time in K-12 school for 10 or more years.
- 26% of respondents indicated they had previously participated in NE MSP statewide activities (approx. equally split between math and science).
- 85% of respondents indicated their school is making adequate yearly progress.



# Results

- 97% of respondents indicated they earned a BS or BA degree.
- 69% of respondents indicated they have earned a MS or MA degree.
- 90% of respondents indicated they currently hold a teaching certificate (Initial – 17%; Standard – 45%; Professional – 28%).
- 95% of respondents indicated a traditional certification program (3% indicated alternative pathway; 2% NE transition to teaching program)



# Results

- 91% of respondents indicated they are teaching in an area in which they hold an endorsement.
- 74% of respondents indicated they currently teach or will be teaching mathematics.
- 61% of respondents indicated they currently teach or will be teaching science.



# Results

- 32% of respondents indicated they are interested in earning an advanced degree.
- 63% of respondents indicated they are interested in receiving college credit for professional development.
- 36% of respondents indicated they are members of state or national professional organizations.
- 46% of respondents were from 4 ESUs (ESU3 – 15%; ESU10 – 13%; ESU18 – 7%; ESU19 – 11%)



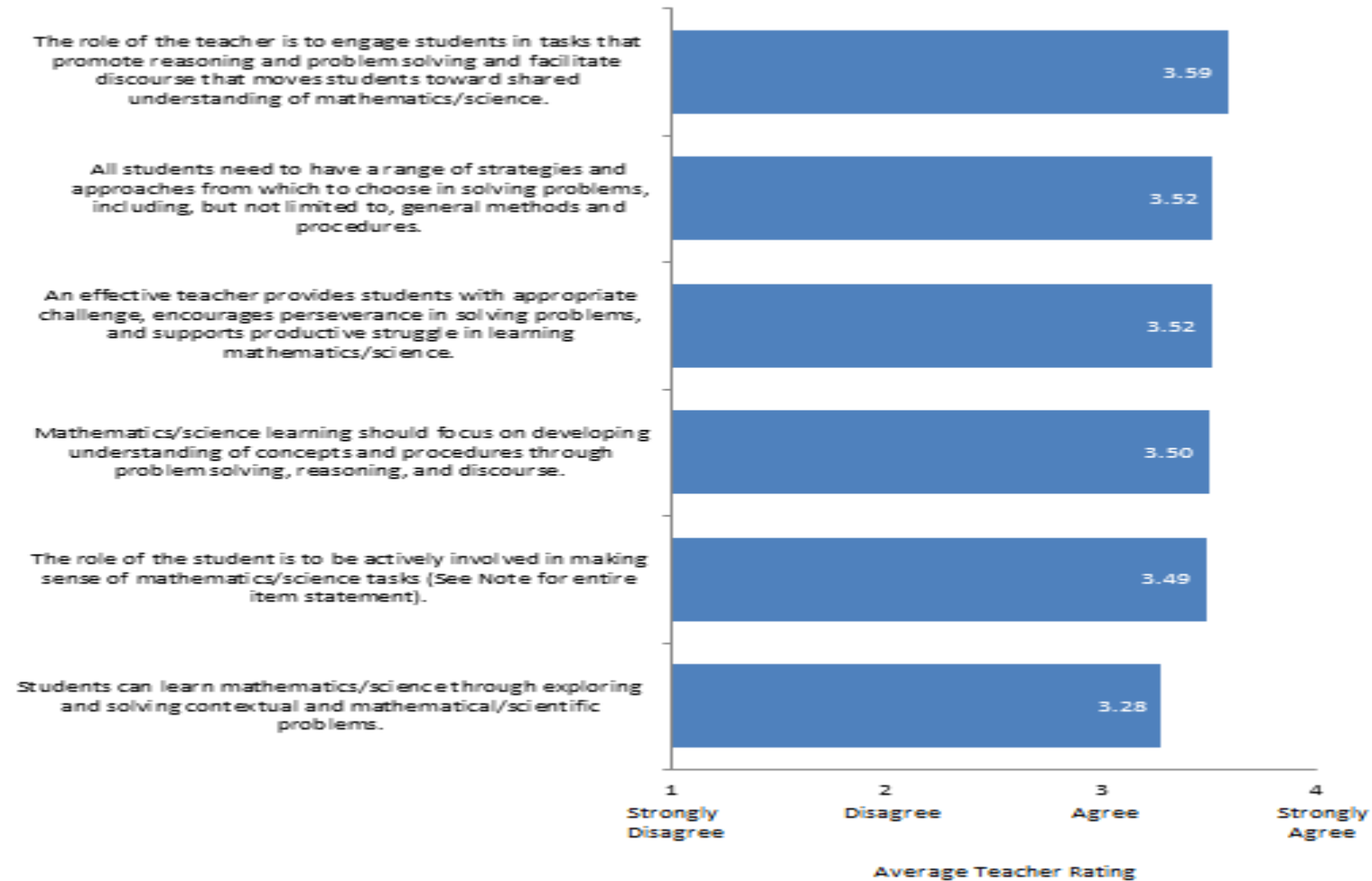
# Results

- 61% of respondents indicated they preferred professional development offered as extended weeks during the summer (40% indicated throughout the school year).
- 41% of respondents indicated they preferred face-to-face professional development (29% indicated an hybrid of face-to-face and online; 28% indicated asynchronous online).
- 77% of respondents indicated time to participate is their biggest barrier (58% indicated cost; 46% indicated personal responsibilities; 42% indicated location).



# Results

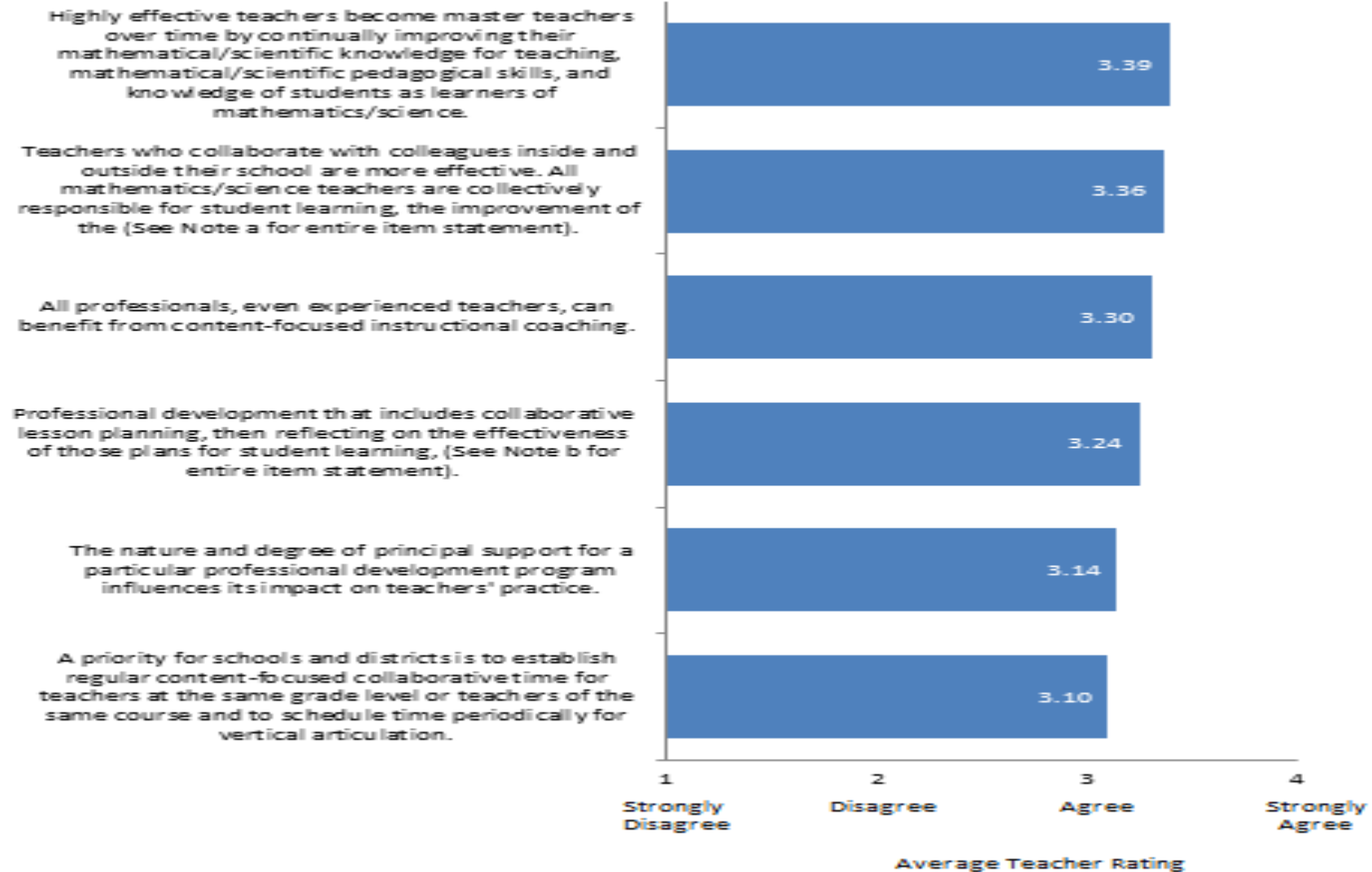
EXHIBIT 14. ITEMS OF AGREEMENT WITH BELIEFS ABOUT TEACHING AND LEARNING (N = 1,285)





# Results

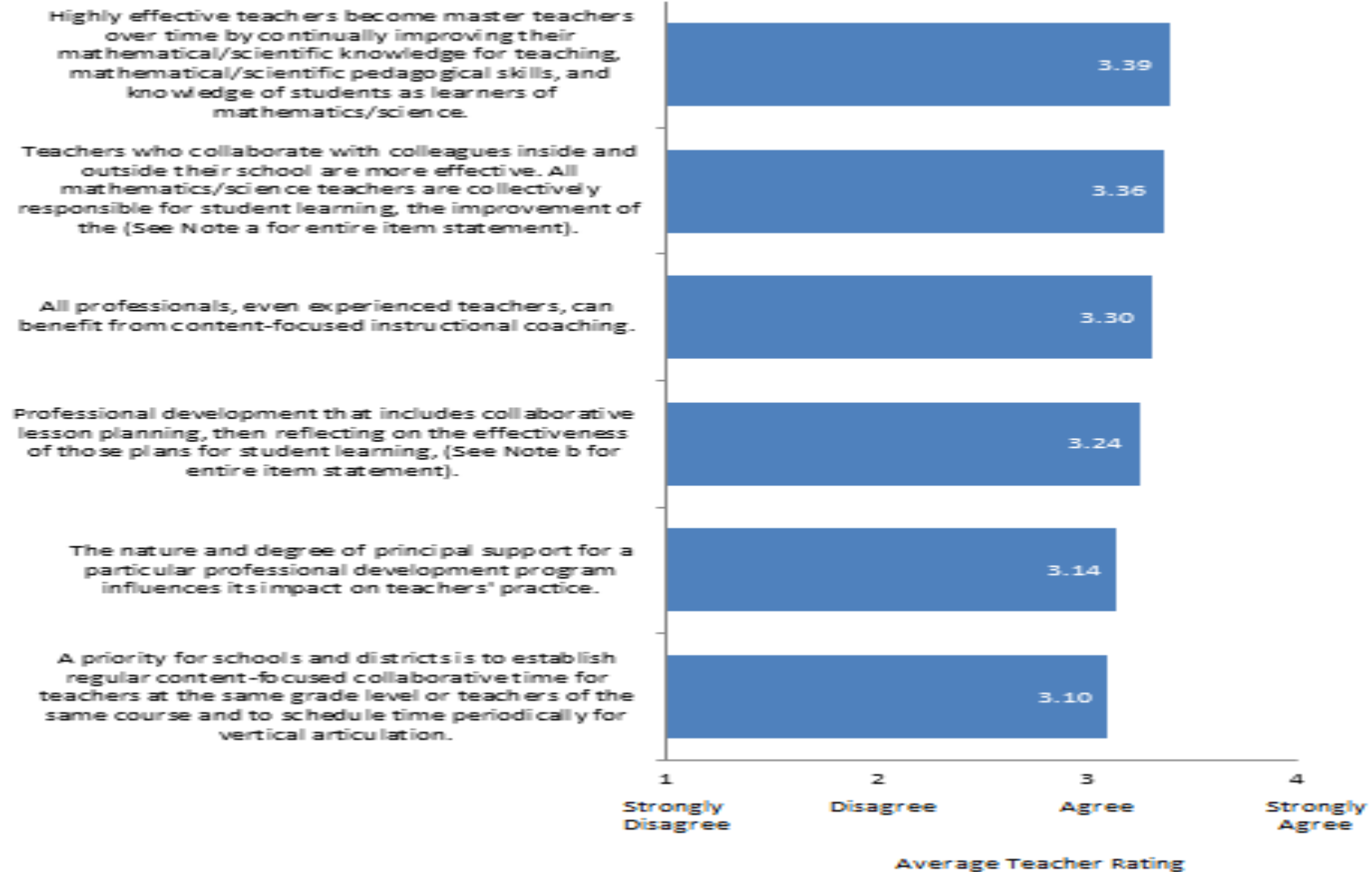
**EXHIBIT 16. ITEMS OF AGREEMENT WITH ATTITUDES ABOUT TEACHING AND LEARNING (N = 1,254)**





# Results

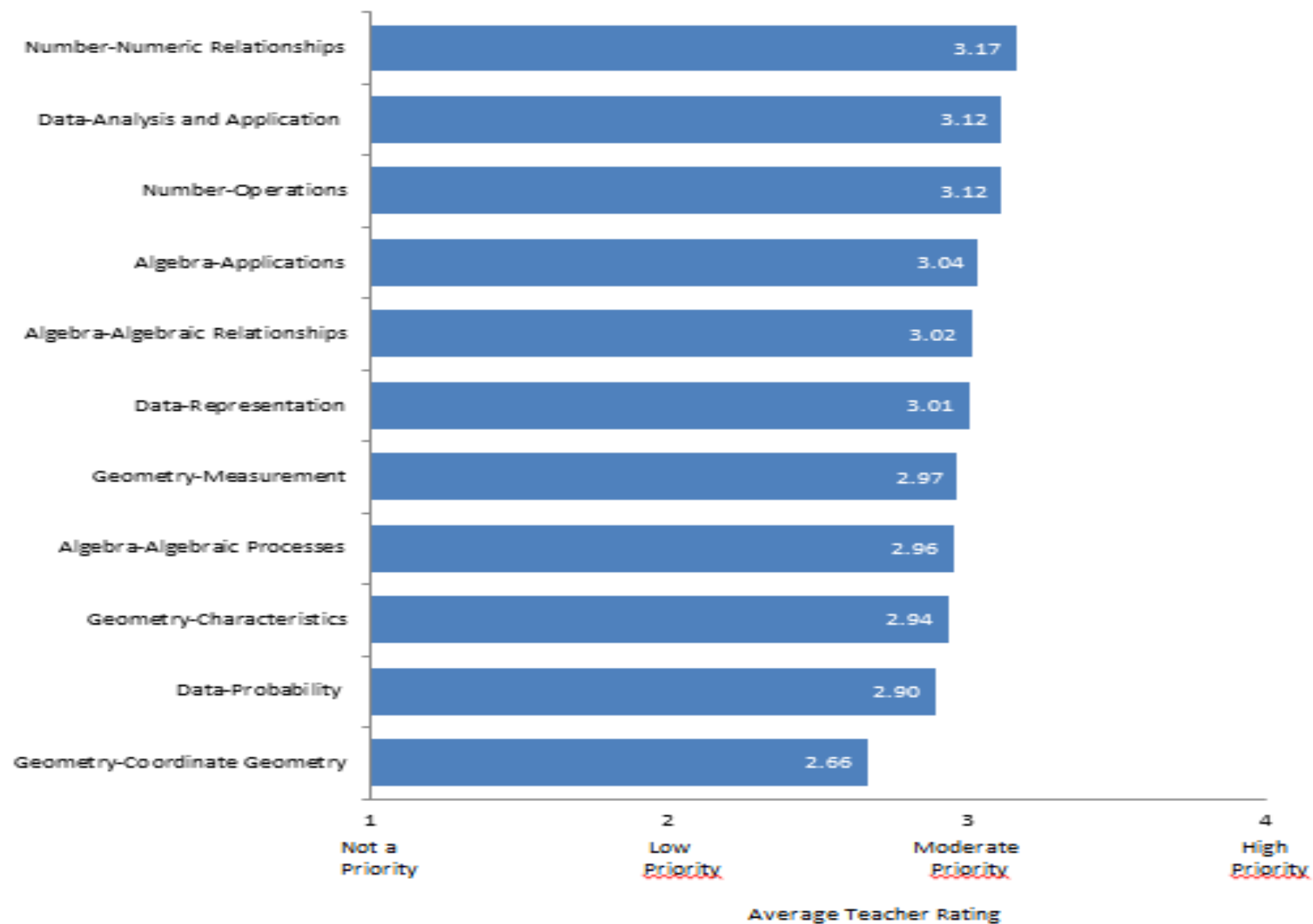
**EXHIBIT 16. ITEMS OF AGREEMENT WITH ATTITUDES ABOUT TEACHING AND LEARNING (N = 1,254)**





# Results

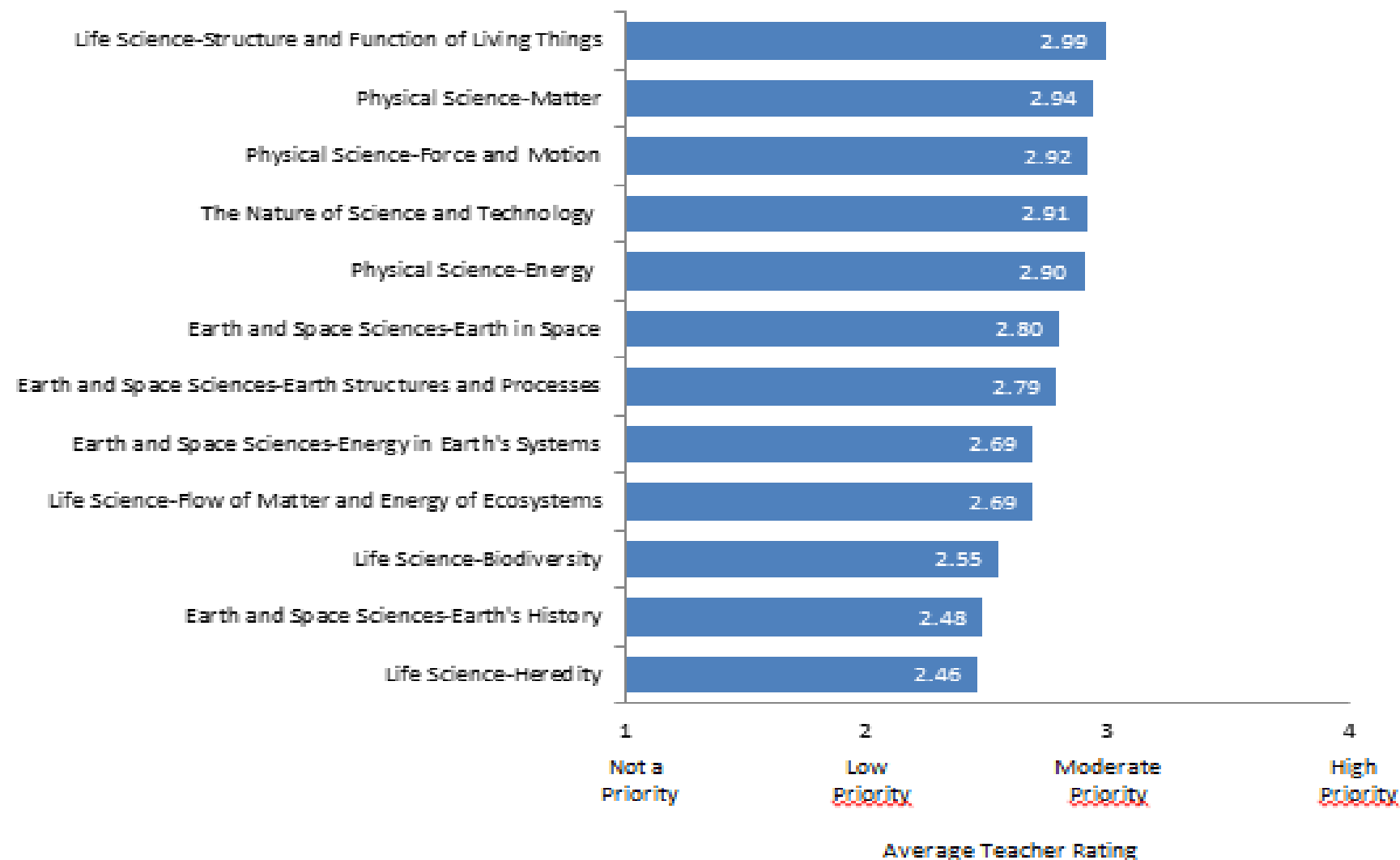
EXHIBIT 21. RATINGS OF PRIORITY FOR PROFESSIONAL DEVELOPMENT IN MATHEMATICS (N = 868)





# Results

EXHIBIT 27. PRIORITIES FOR PROFESSIONAL DEVELOPMENT IN SCIENCE (N = 656)



# Presentation Sections



Methodology



Results



Comparisons



Summary



Recommendations



# Comparison

- Years of Teaching - No significant differences were discovered for levels of preparedness for teaching mathematics and science or for levels of needs for professional development in mathematics and science for these teacher groupings.
- Adequate Yearly Progress - No significant differences were found in ratings from teachers who worked in schools that met AYP compared to those in schools that did not meet AYP in mathematics or science needs.
- ESU Clusters - Cluster 1 (ESU 1, 2, 3, 4, 19); Cluster 2 (ESU 5, 6, 7, 18); Cluster 3 (ESU 8, 9, 10, 11); and Cluster 4 (ESU 13, 15, 16, 17). No significant differences were discovered for any of the scale measures for these teacher groupings.



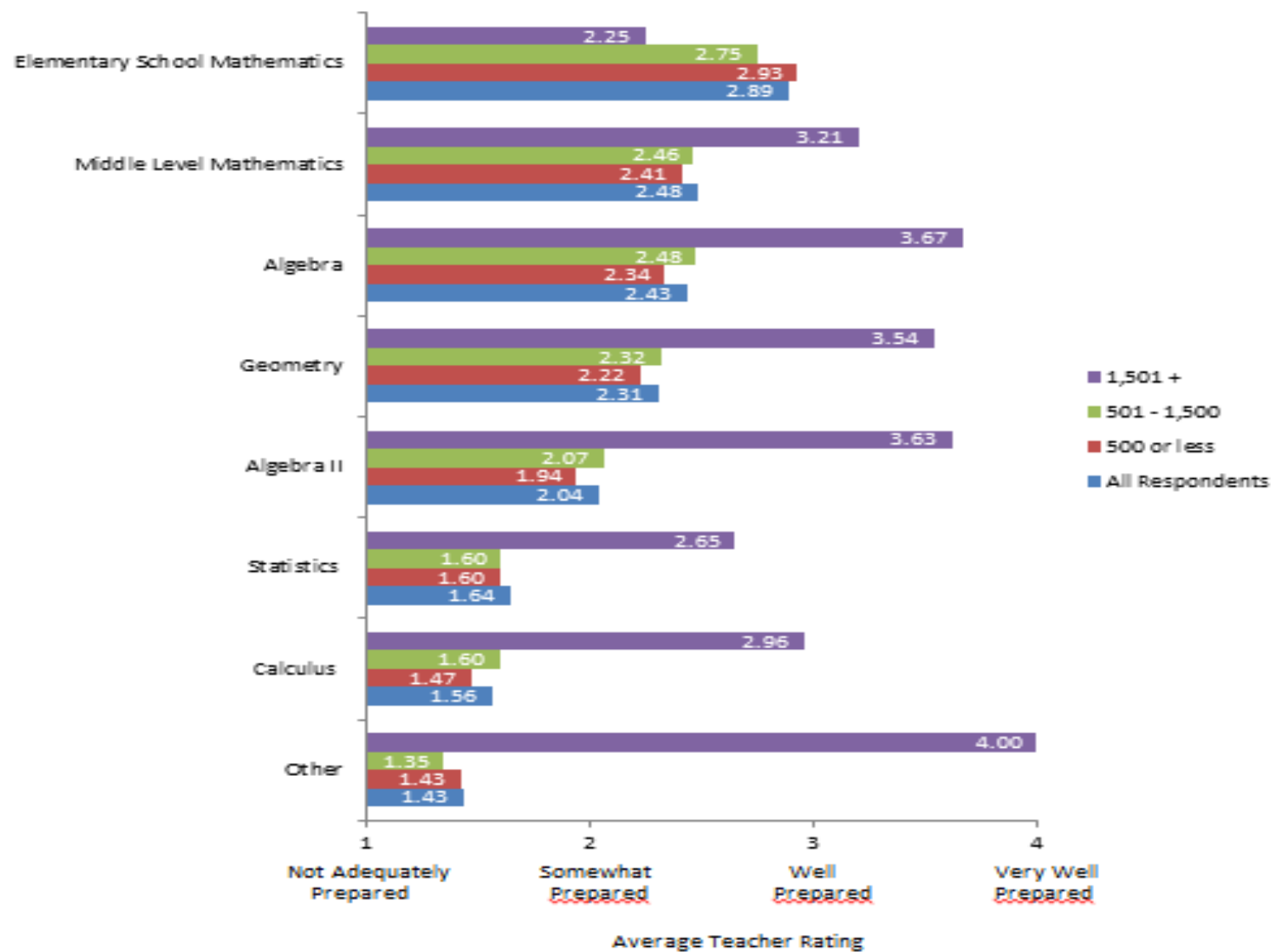
# Comparison

- School Size - (a) teachers who taught at schools with 500 or fewer students, (b) teachers who taught at schools with 501-1,500 students, and (c) teachers who taught at schools with 1,501 or more students.
  - ❖ For Preparedness to Teach Mathematics, teachers in large schools had significantly higher ratings for levels of preparedness than teachers in small or medium schools.
  - ❖ For Student Readiness for Mathematical Processes, teachers in small and medium schools had significantly higher ratings for student readiness than teachers in large schools.
  - ❖ For Preparedness to Meet Student Needs in Science, teachers in small and medium schools had significantly lower ratings for levels of preparedness than teachers in large schools.



# Comparison

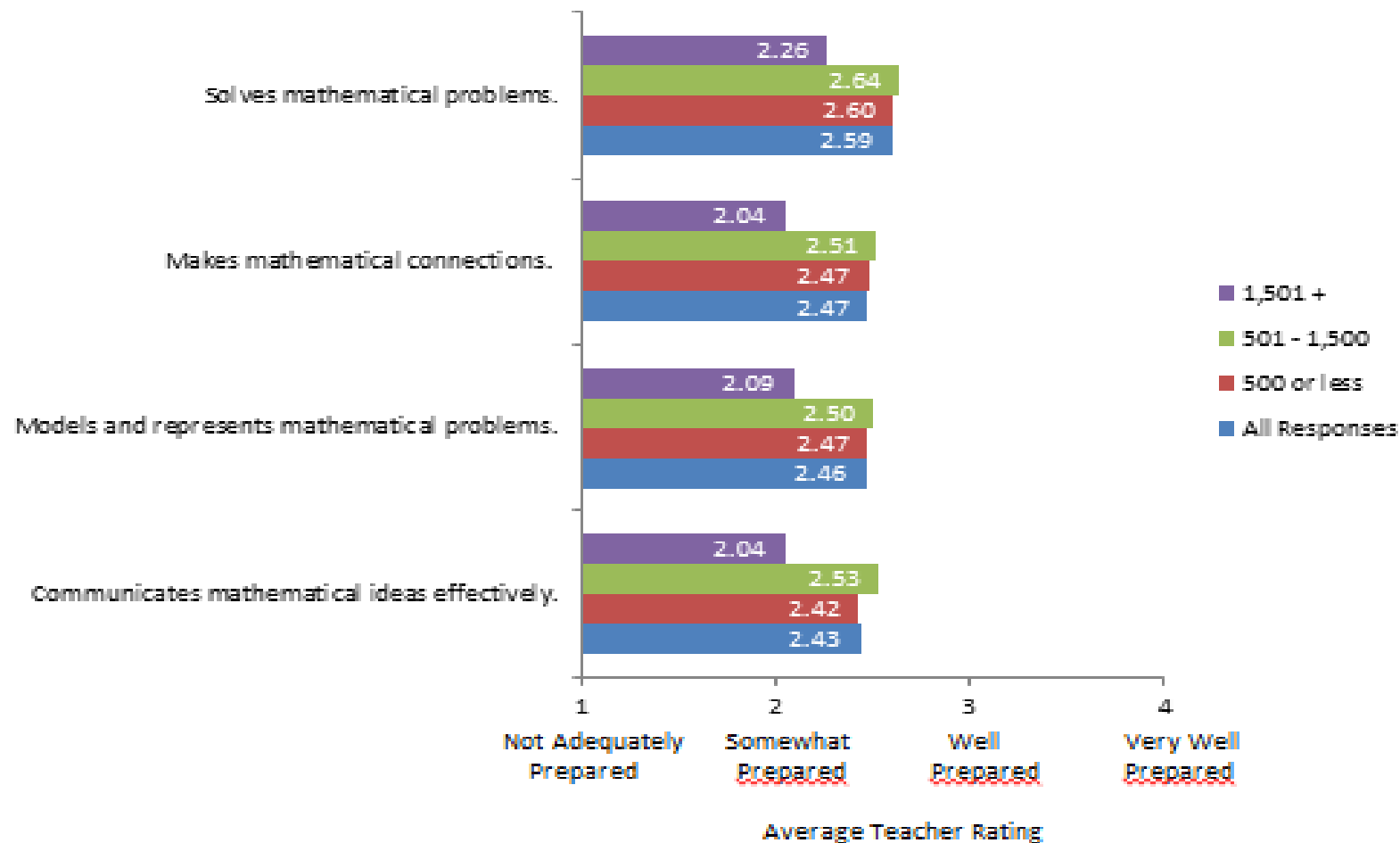
EXHIBIT 29. RATINGS OF PREPAREDNESS FOR TEACHING MATHEMATICS WITH RESPONSES FOR SCHOOL SIZE BASED ON NUMBER OF STUDENTS





# Comparison

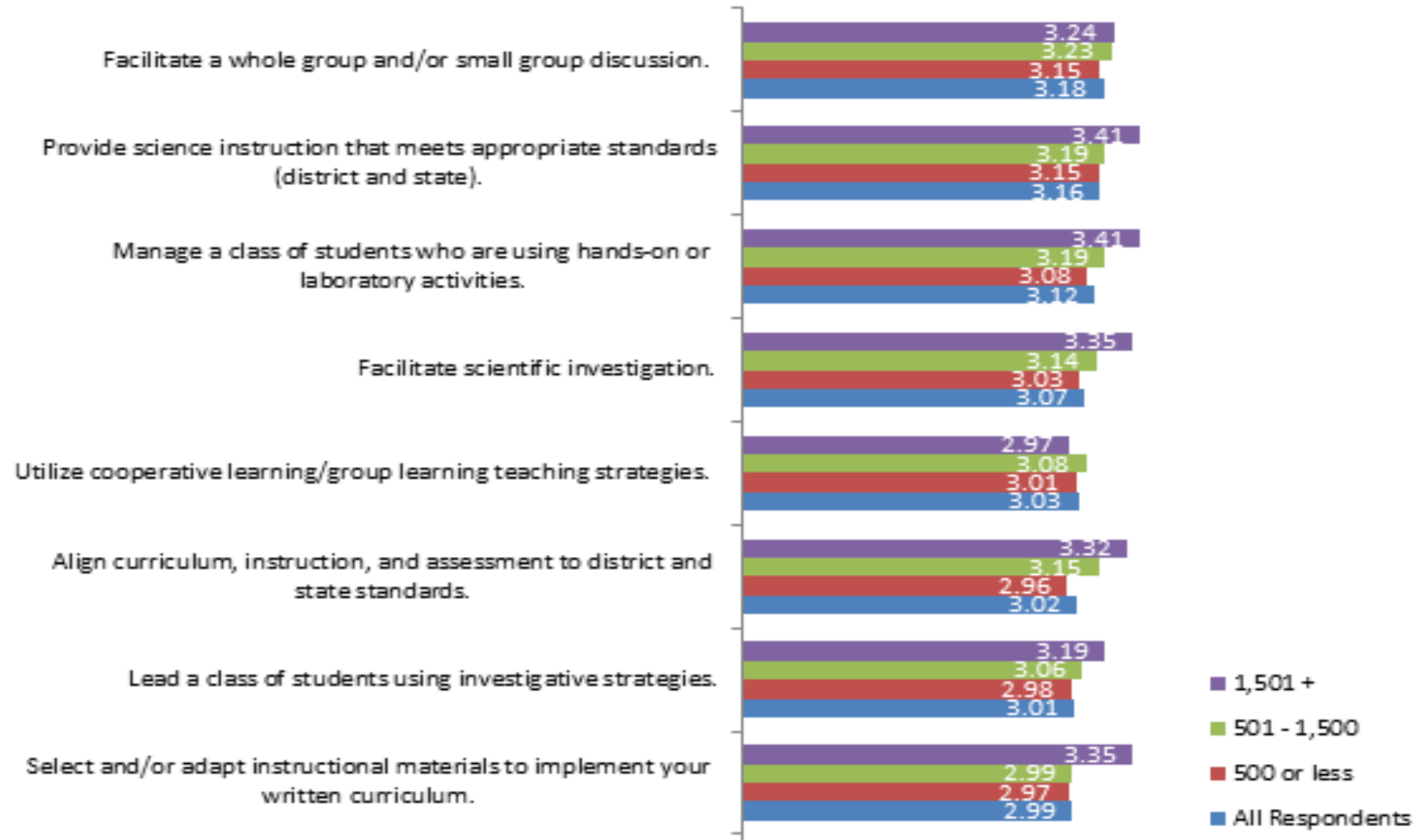
**EXHIBIT 30. STUDENT READINESS FOR MATHEMATICAL PROCESSES WITH RESPONSES FOR SCHOOL SIZE BASED ON NUMBER OF STUDENTS**





# Comparison

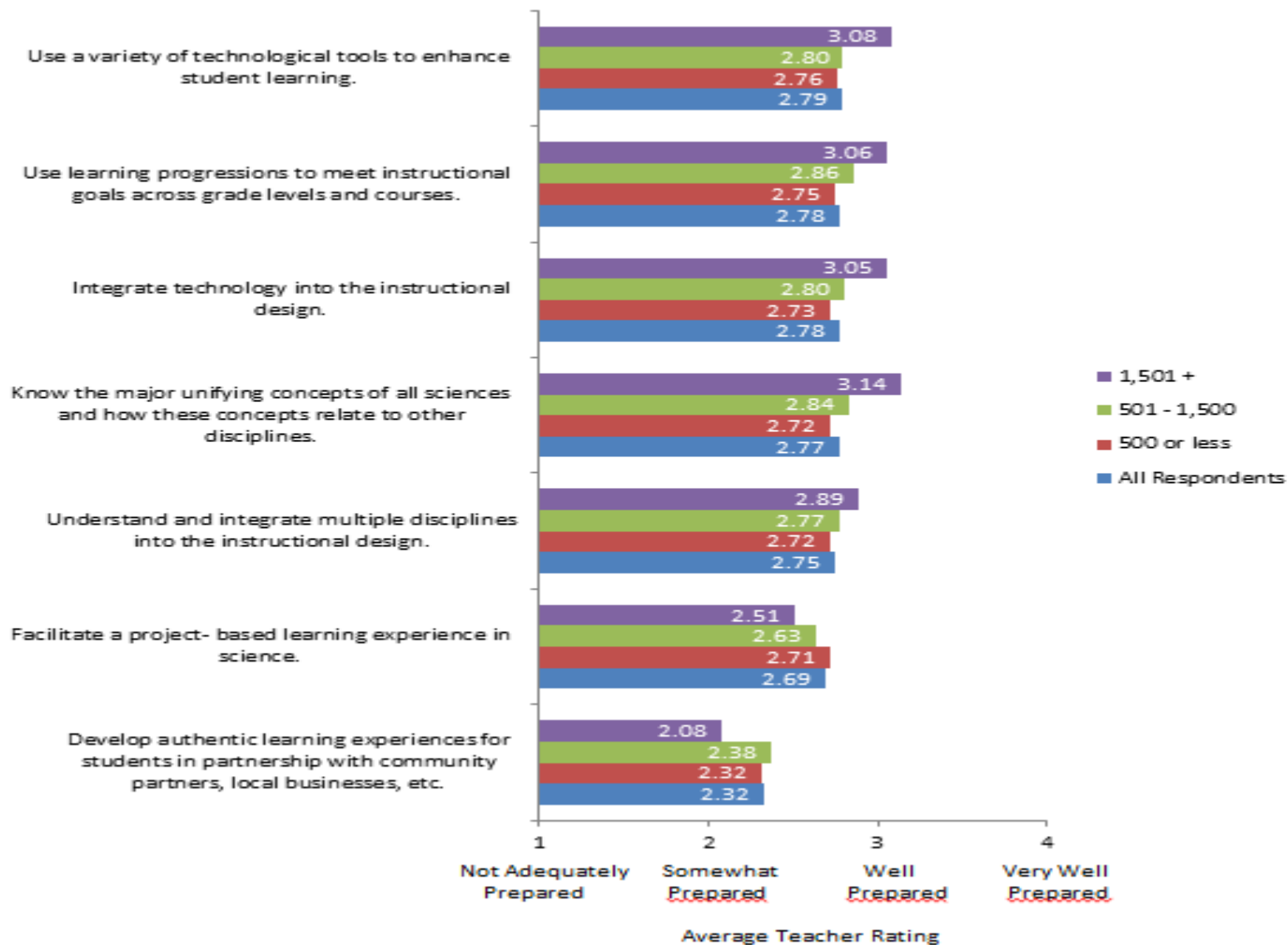
EXHIBIT 32. HIGHEST RATINGS OF READINESS TO MEET STUDENT NEEDS IN SCIENCE  
WITH RESPONSES FOR SCHOOL SIZE BASED ON NUMBER OF STUDENTS





# Comparison

**EXHIBIT 33. LOWEST RATINGS OF READINESS TO MEET STUDENT NEEDS IN SCIENCE  
WITH RESPONSES FOR SCHOOL SIZE BASED ON NUMBER OF STUDENTS**





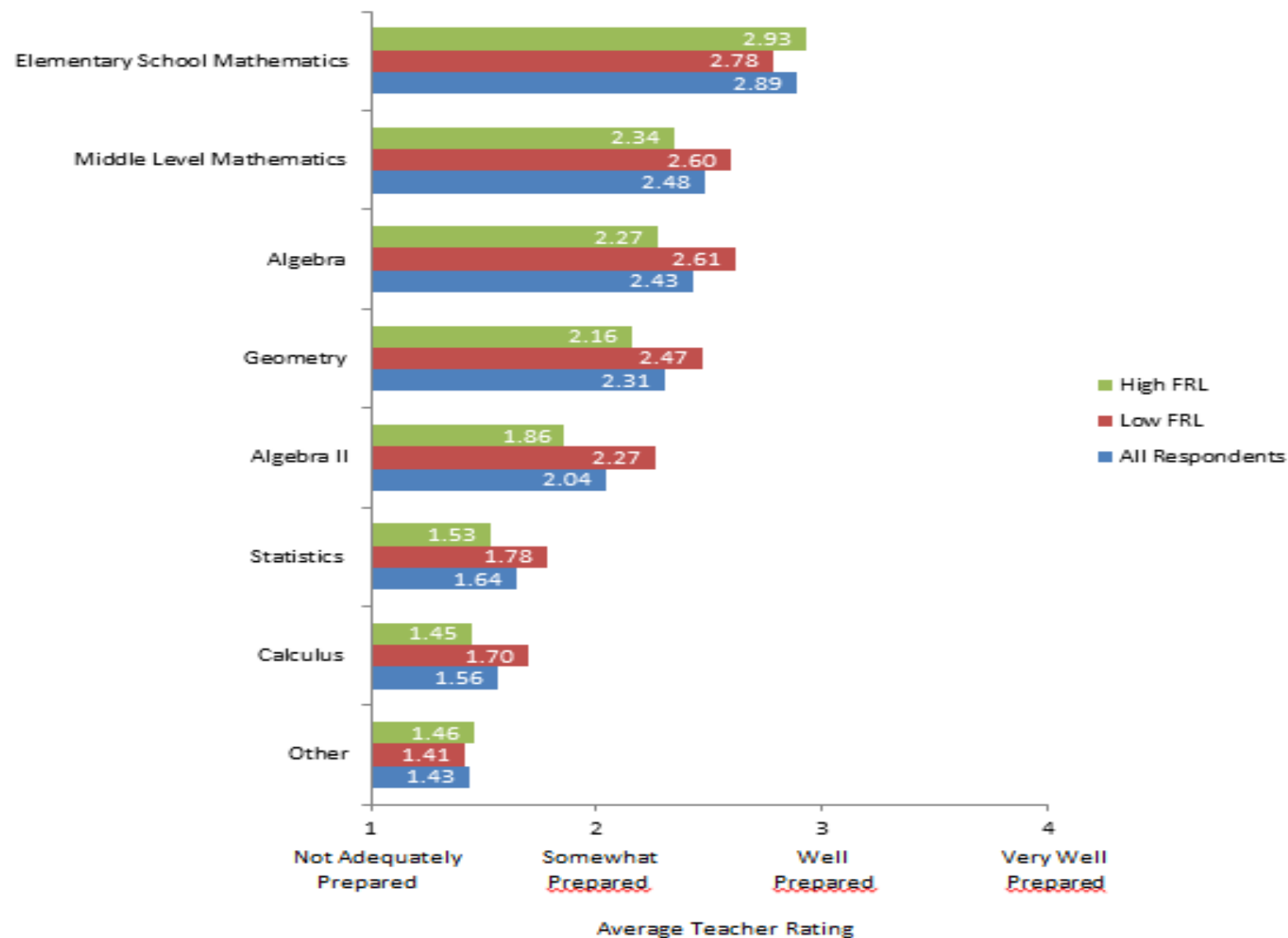
# Comparison

- Free and Reduced Lunch - Schools composed of 40% or greater students who qualified for FRL were classified as high FRL, and schools with fewer than 40% of students qualifying for FRL were classified as low FRL.
- ❖ For Preparedness to Teach Mathematics, teachers in schools with high FRL in schools with high FRL had lower ratings for levels of preparedness to teach mathematics.
- ❖ For Student Readiness for Mathematical Processes, teachers in in schools with high FRL had lower ratings for student readiness for mathematical processes.
- ❖ For Preparedness to Teach Science Content, Science Concepts, and Student Readiness to Learn Science, teachers in schools with high FRL had lower ratings for levels of preparedness and readiness than teachers in schools with low FRL.



# Comparison

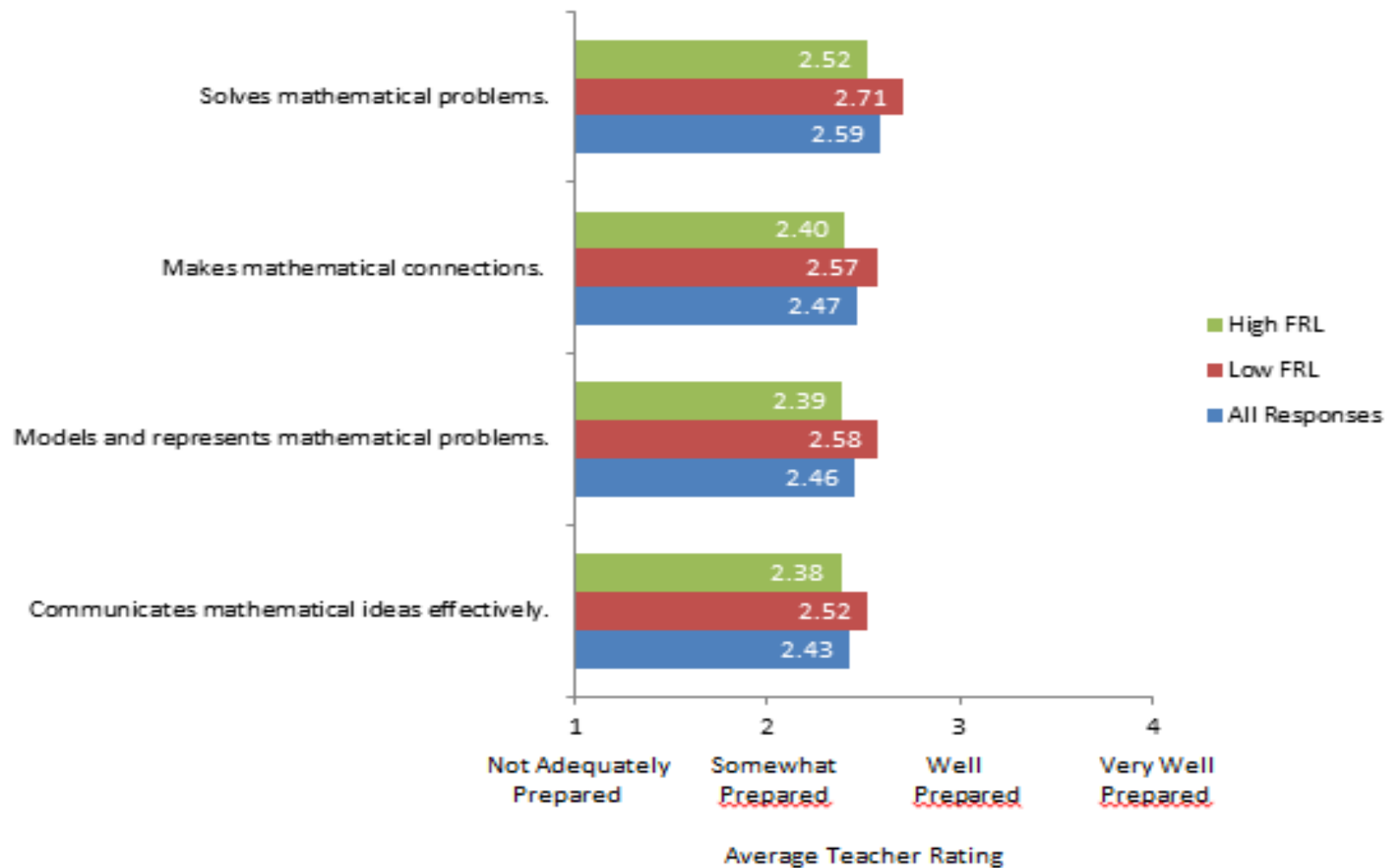
EXHIBIT 35. RATINGS OF PREPAREDNESS FOR TEACHING MATHEMATICS WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH





# Comparison

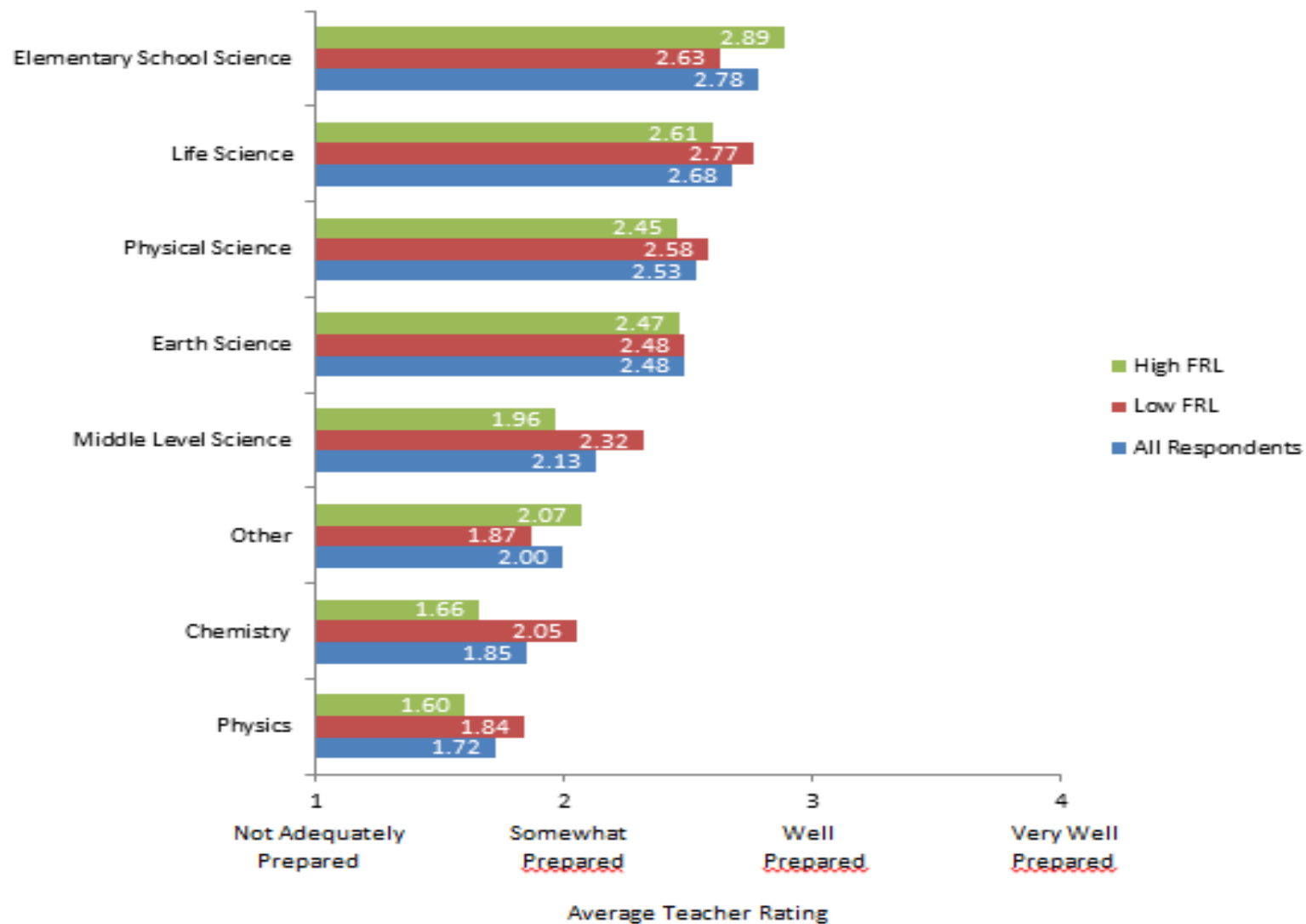
EXHIBIT 36. STUDENT READINESS FOR MATHEMATICAL PROCESSES WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH





# Comparison

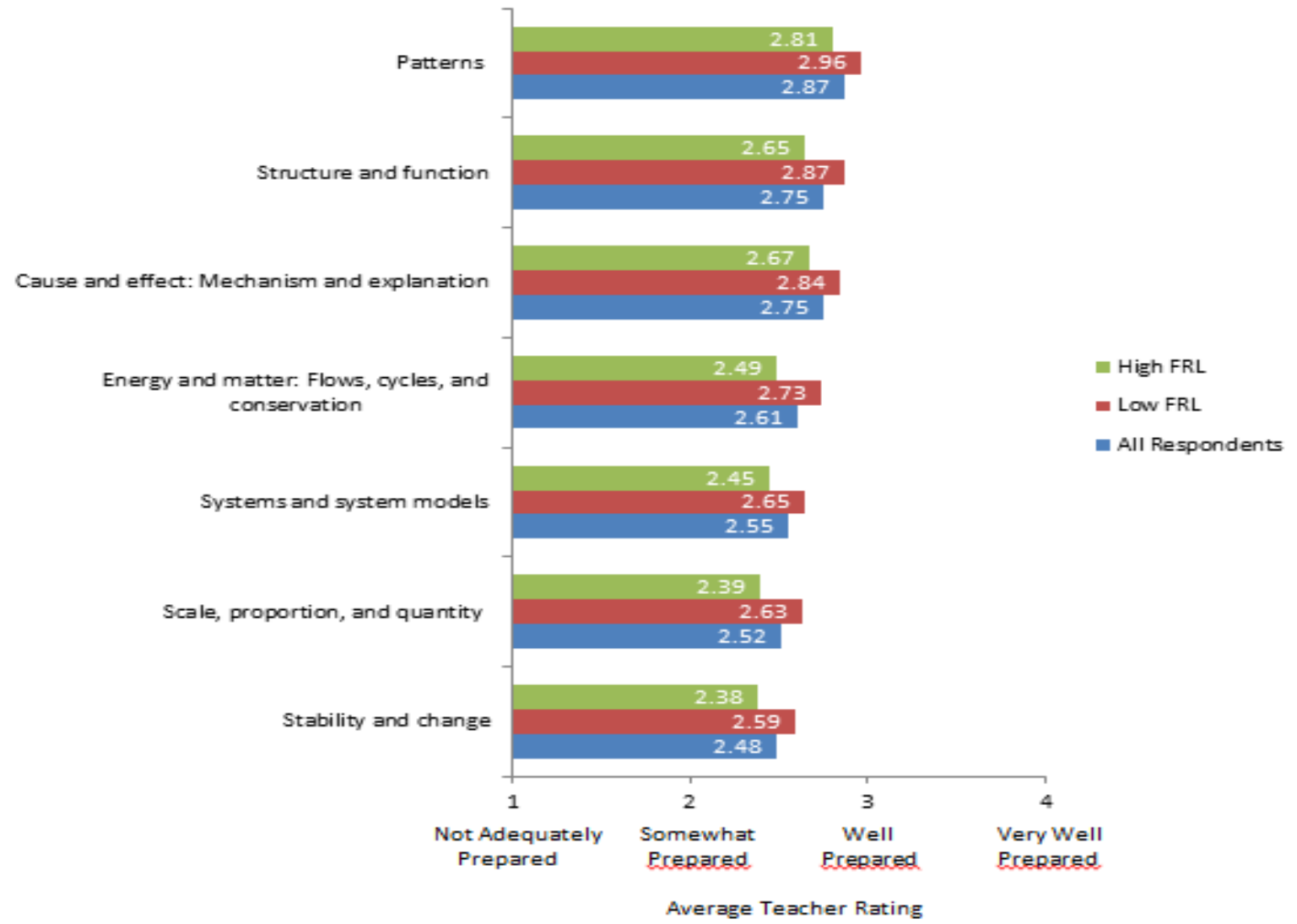
EXHIBIT 38. RATINGS OF PREPAREDNESS FOR TEACHING SCIENCE WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH





# Comparison

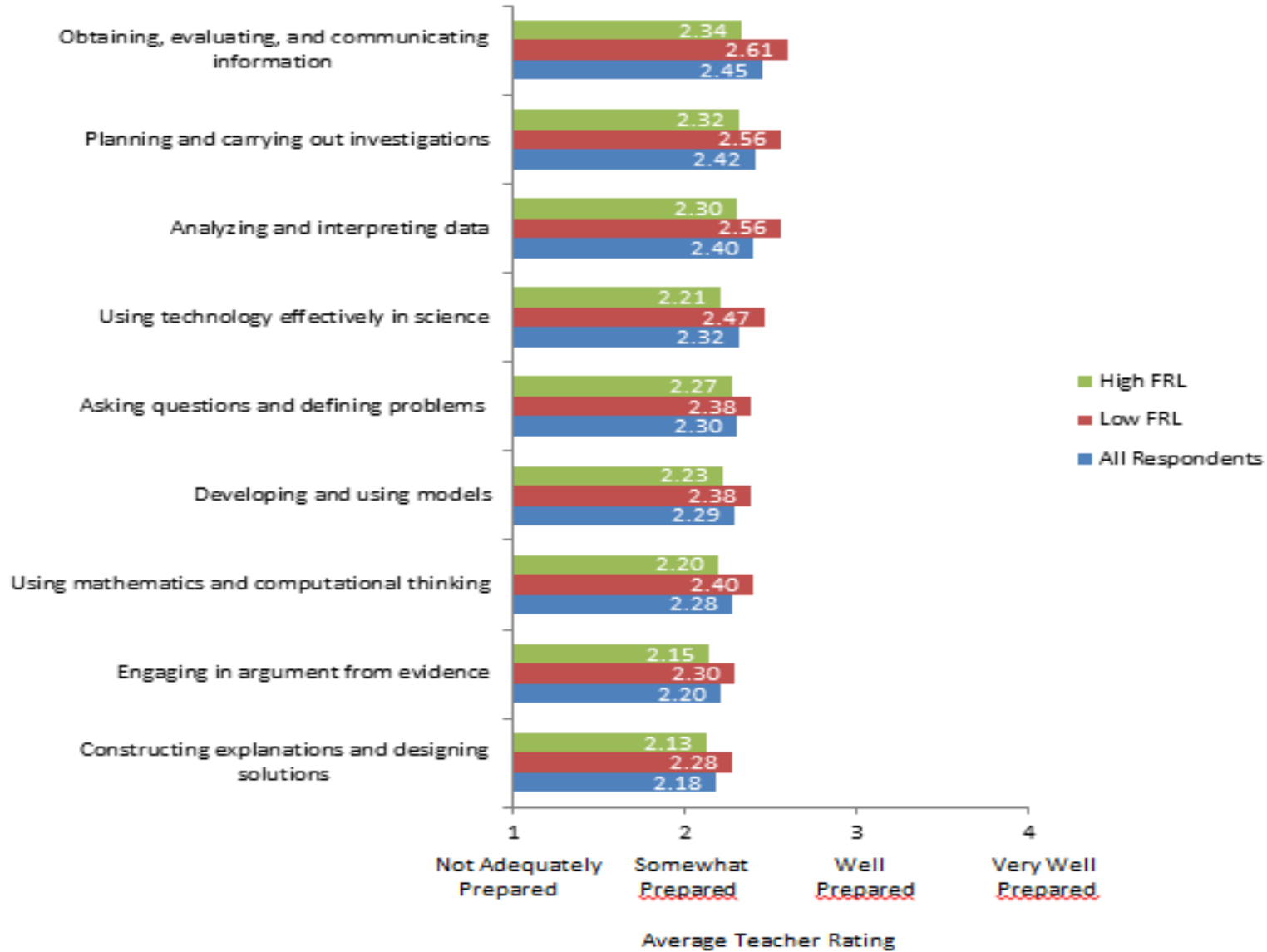
EXHIBIT 39. PREPAREDNESS TO TEACH SCIENCE CONCEPTS WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH





# Comparison

EXHIBIT 40. STUDENT READINESS FOR SCIENTIFIC PROCESSES  
WITH RESPONSES FOR HIGH AND LOW FREE AND REDUCED LUNCH





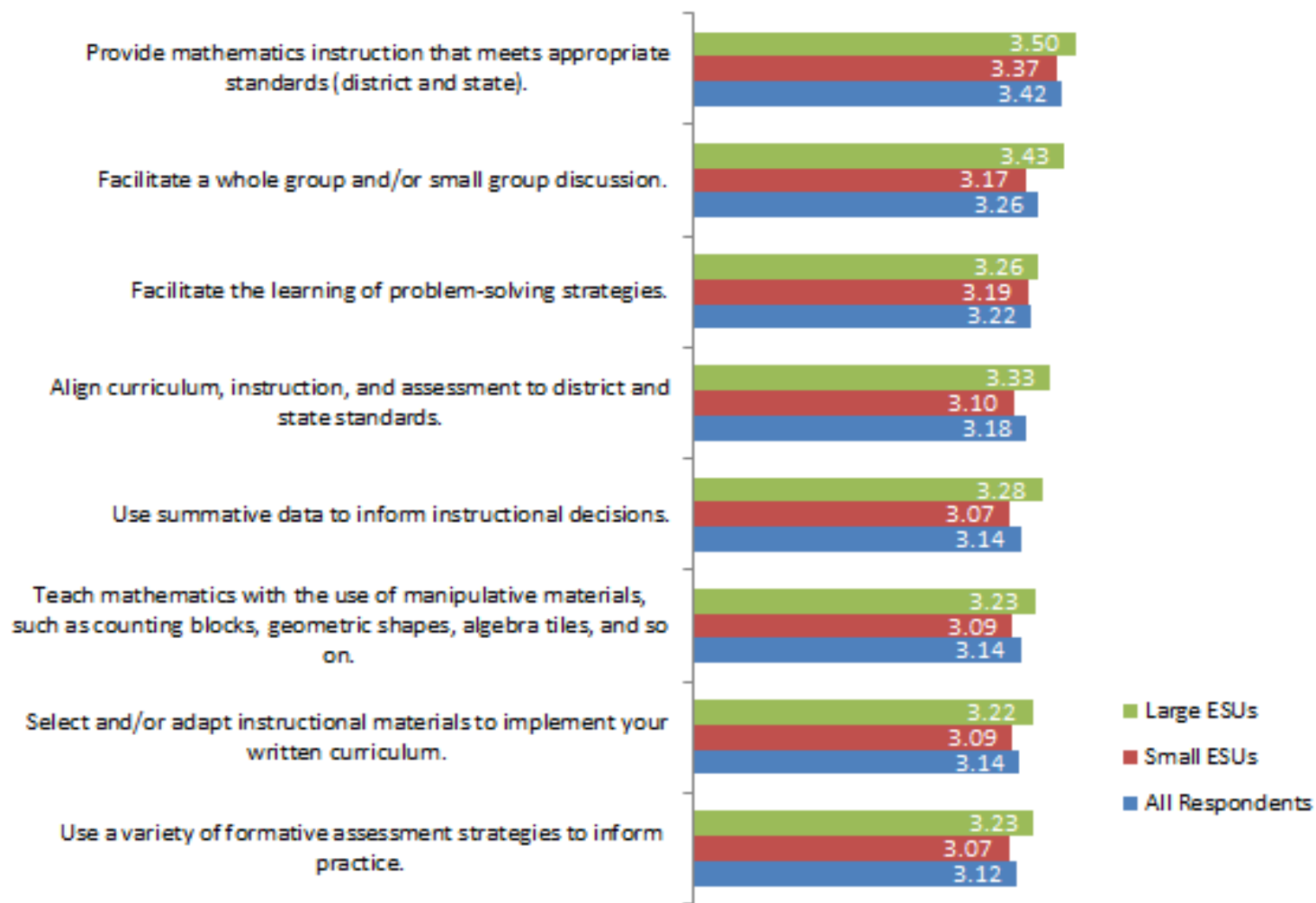
# Comparison

- ESU Size - large ESUs (3, 18, and 19) compared to smaller ESUs (all others).
  - ❖ For Preparedness to Meet Student Needs in Mathematics, teachers in smaller ESUs had significantly higher levels of readiness than teachers in larger ESUs.
  - ❖ For Preparedness to Teach Science Content, teachers in smaller ESUs had statistically significant higher ratings of preparedness to teach science content than did teachers in larger ESUs.
  - ❖ For Science Professional Development Needs, teachers in smaller ESUs showed statistically significant greater needs for Science professional development than did teachers in large ESUs.



# Comparison

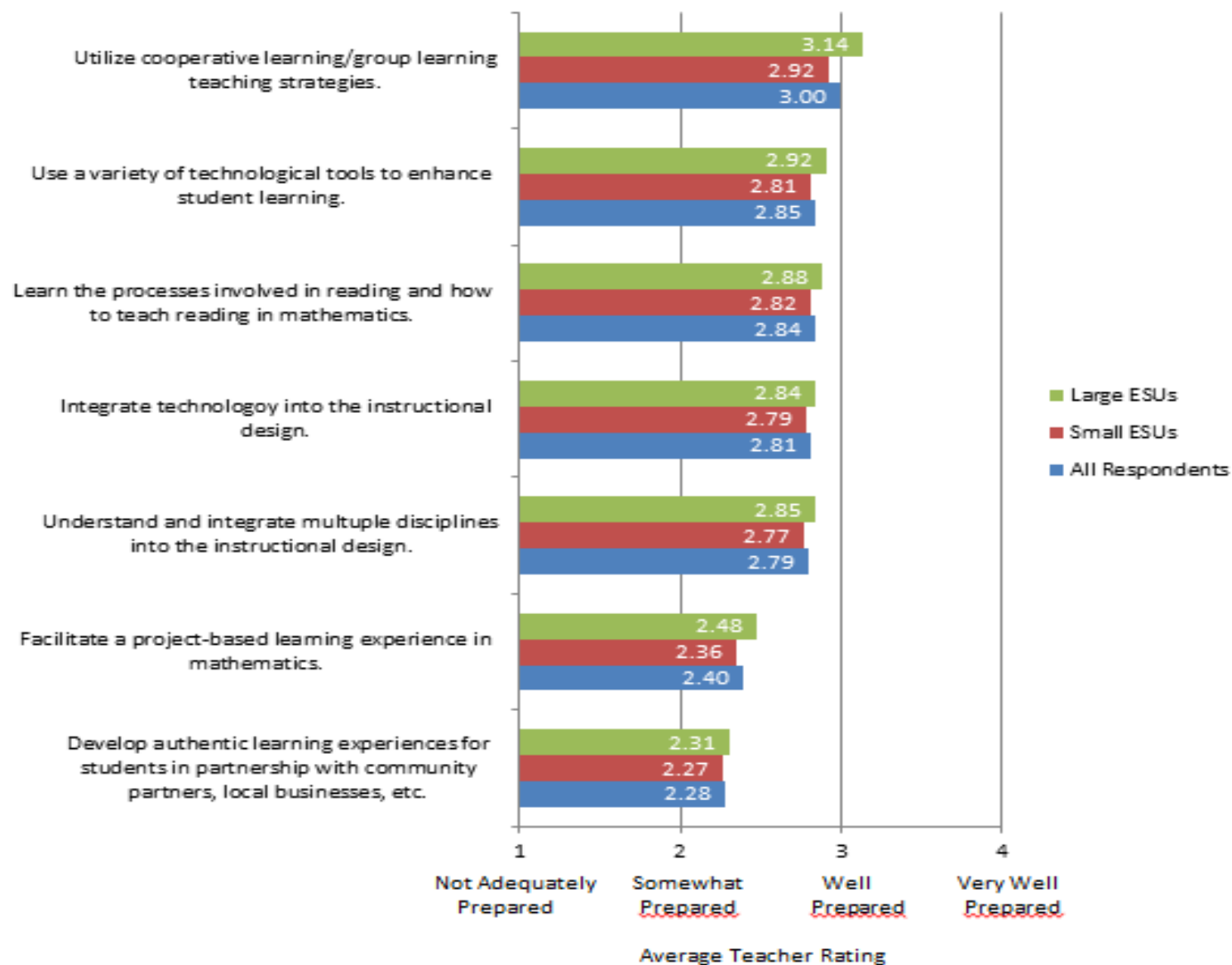
EXHIBIT 42. HIGHEST RATINGS OF READINESS TO MEET STUDENT NEEDS WITH RESPONSES FOR SMALL AND LARGE ESUS





# Comparison

EXHIBIT 43. LOWEST RATINGS OF READINESS TO MEET STUDENT NEEDS WITH RESPONSES FOR SMALL AND LARGE ESUS





# Comparison

EXHIBIT 45. RATINGS OF PREPAREDNESS FOR TEACHING SCIENCE  
WITH RESPONSES FOR SMALL AND LARGE ESUs

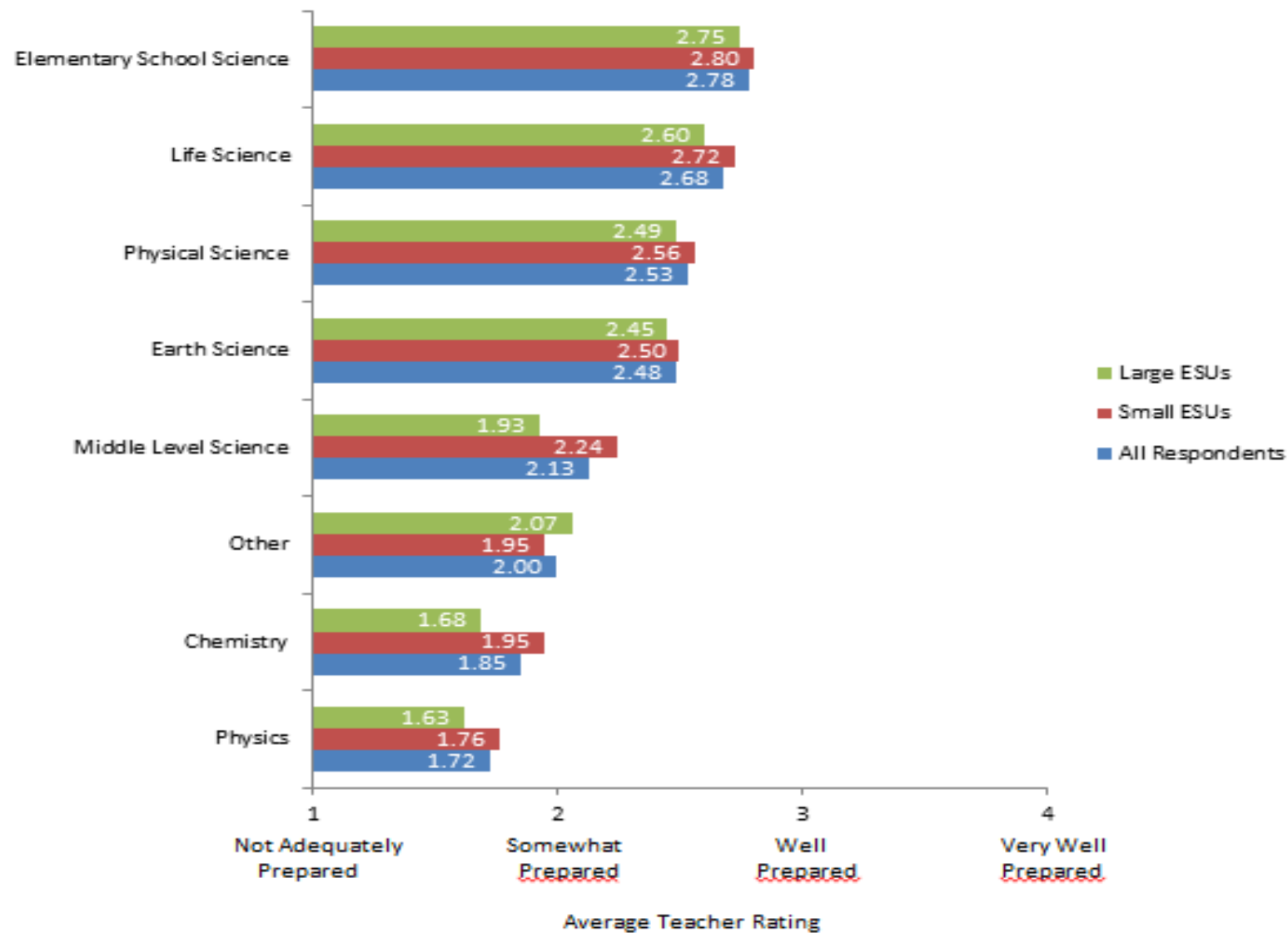
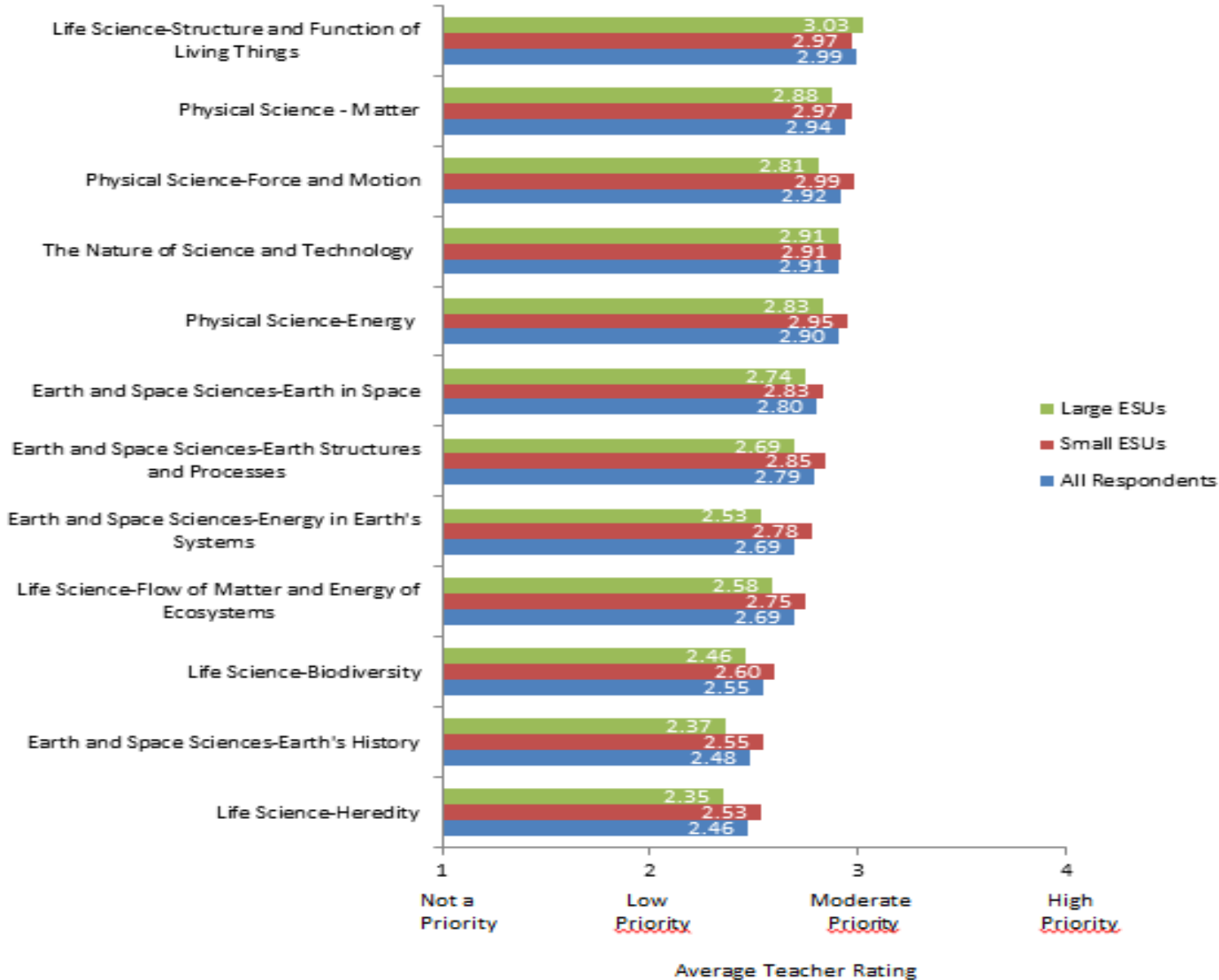




EXHIBIT 46. PRIORITIES FOR PROFESSIONAL DEVELOPMENT IN SCIENCE WITH RESPONSES FOR SMALL AND LARGE ESUS

# Comparison





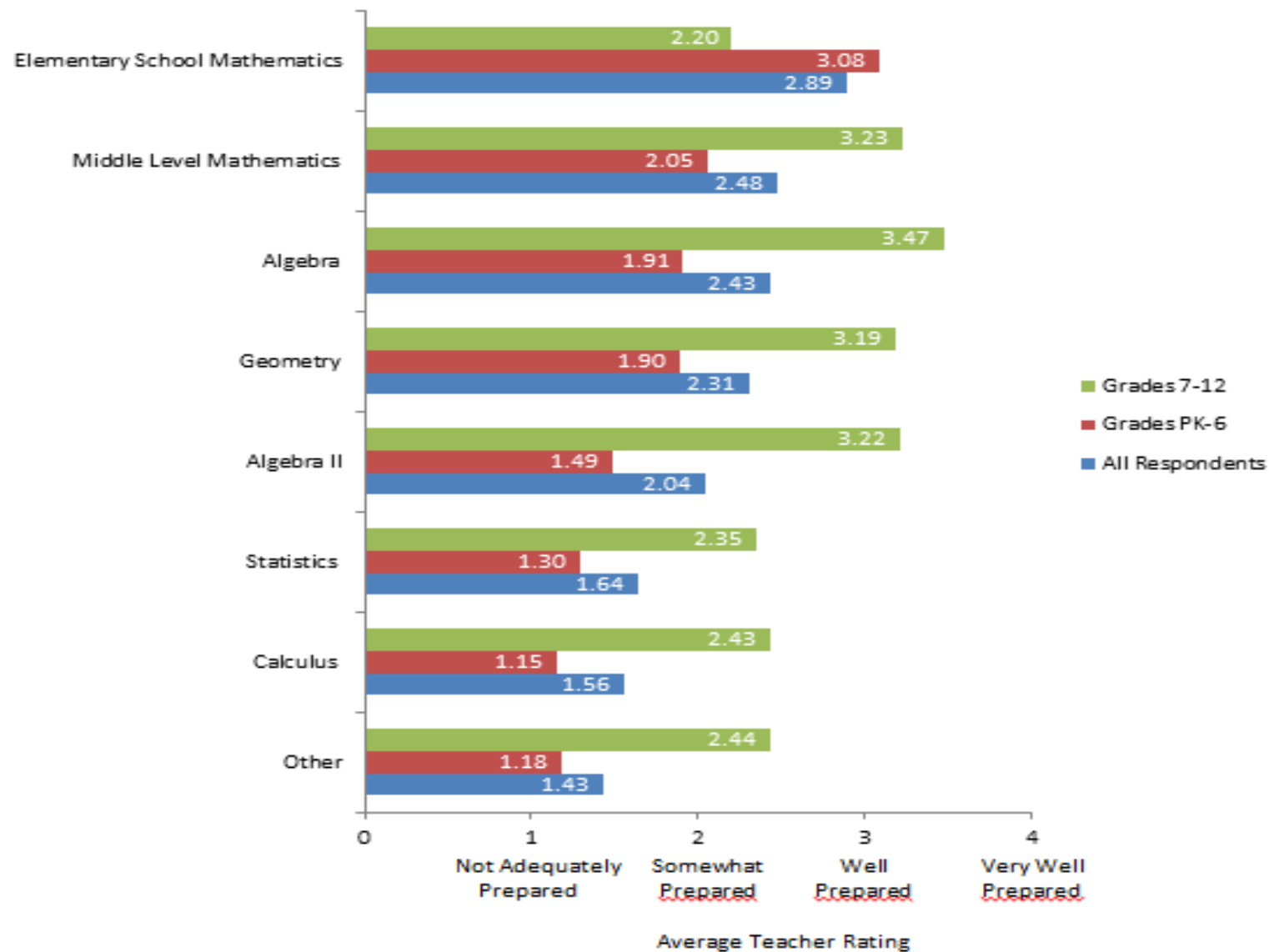
# Comparison

- School Grades - Schools composed of any grades between PK-6 were considered elementary, and schools composed of any Grades 7-12 were MS/HS.
  - ❖ For Preparedness for Teaching Mathematics, teachers in MS/HS had significantly higher ratings for levels of preparedness than teachers in elementary grades.
  - ❖ Preparedness to Meet Student Needs in Mathematics, teachers in elementary grades had significantly higher ratings for levels of preparedness than teachers in MS/HS.
  - ❖ For Preparedness to Teach Science Content, Science Concepts, Meet Student Needs in Science, and Student Readiness to Learn Science, teachers in MS/HS had statistically significant higher ratings of preparedness and readiness than did teachers in elementary grades.



# Comparison

EXHIBIT 48. RATINGS OF PREPAREDNESS FOR TEACHING MATHEMATICS WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)





# Comparison

EXHIBIT 49. HIGHEST RATINGS OF READINESS TO MEET STUDENT NEEDS WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)

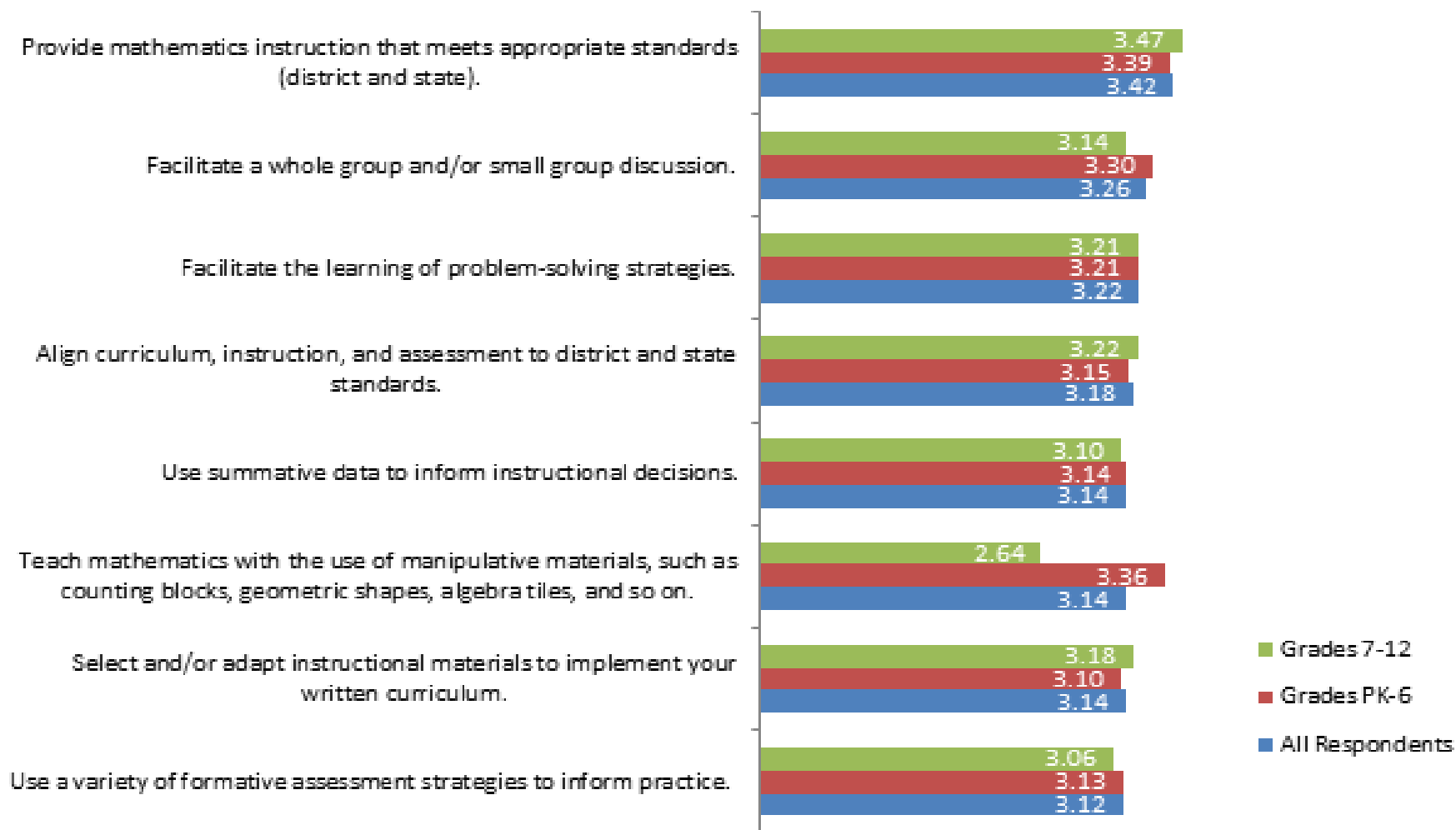
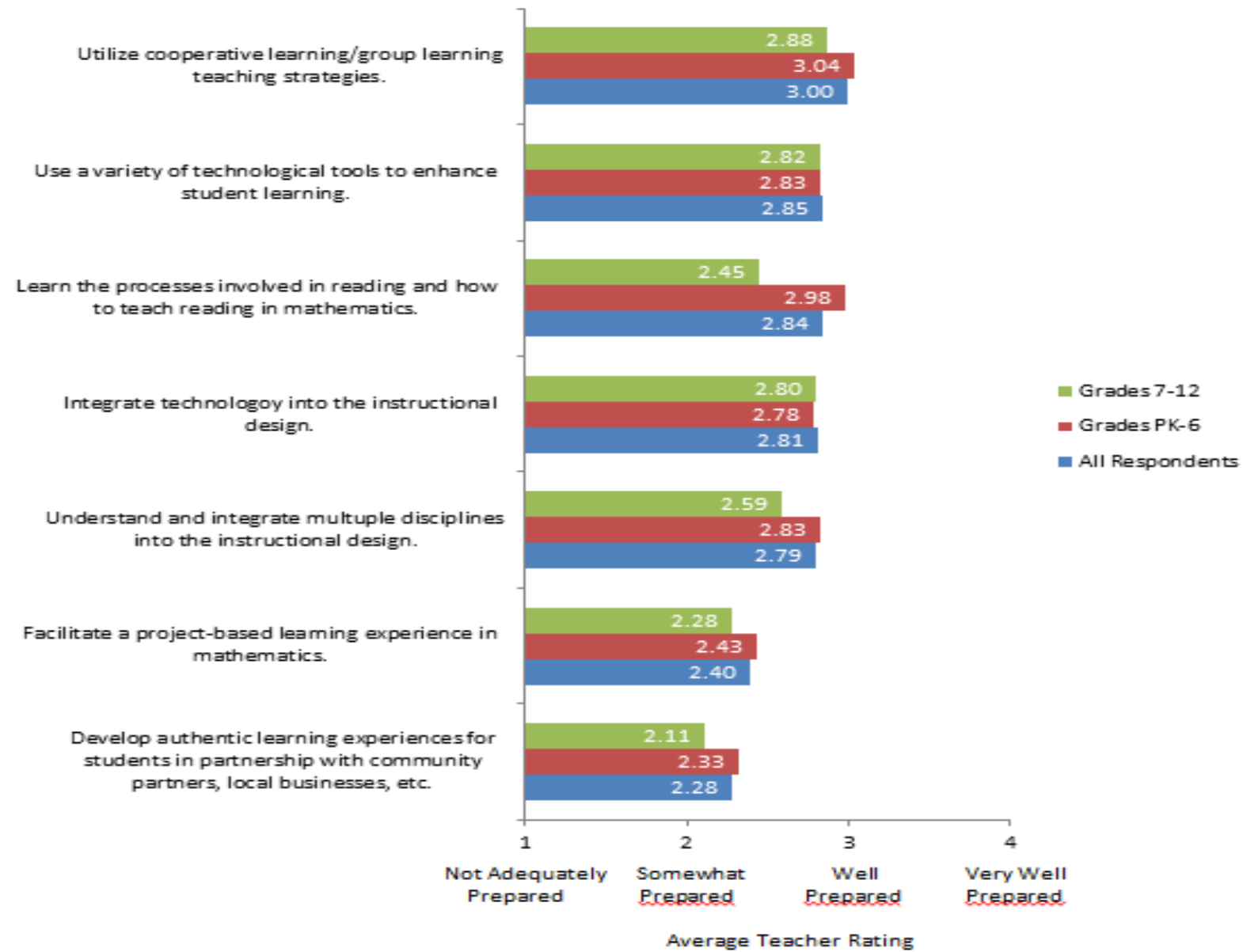




EXHIBIT 50. LOWEST RATINGS OF READINESS TO MEET STUDENT NEEDS WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)

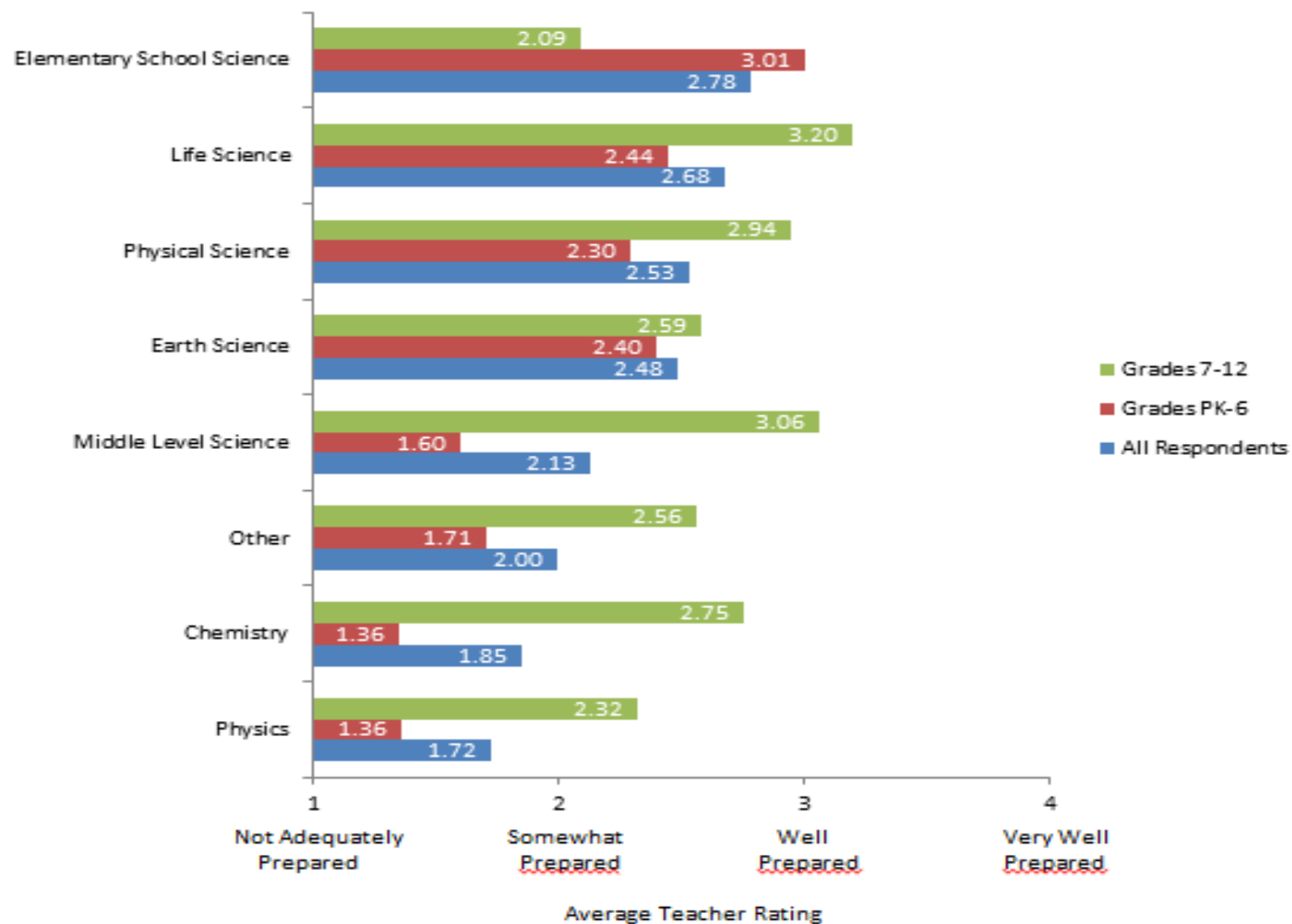
# Comparison





# Comparison

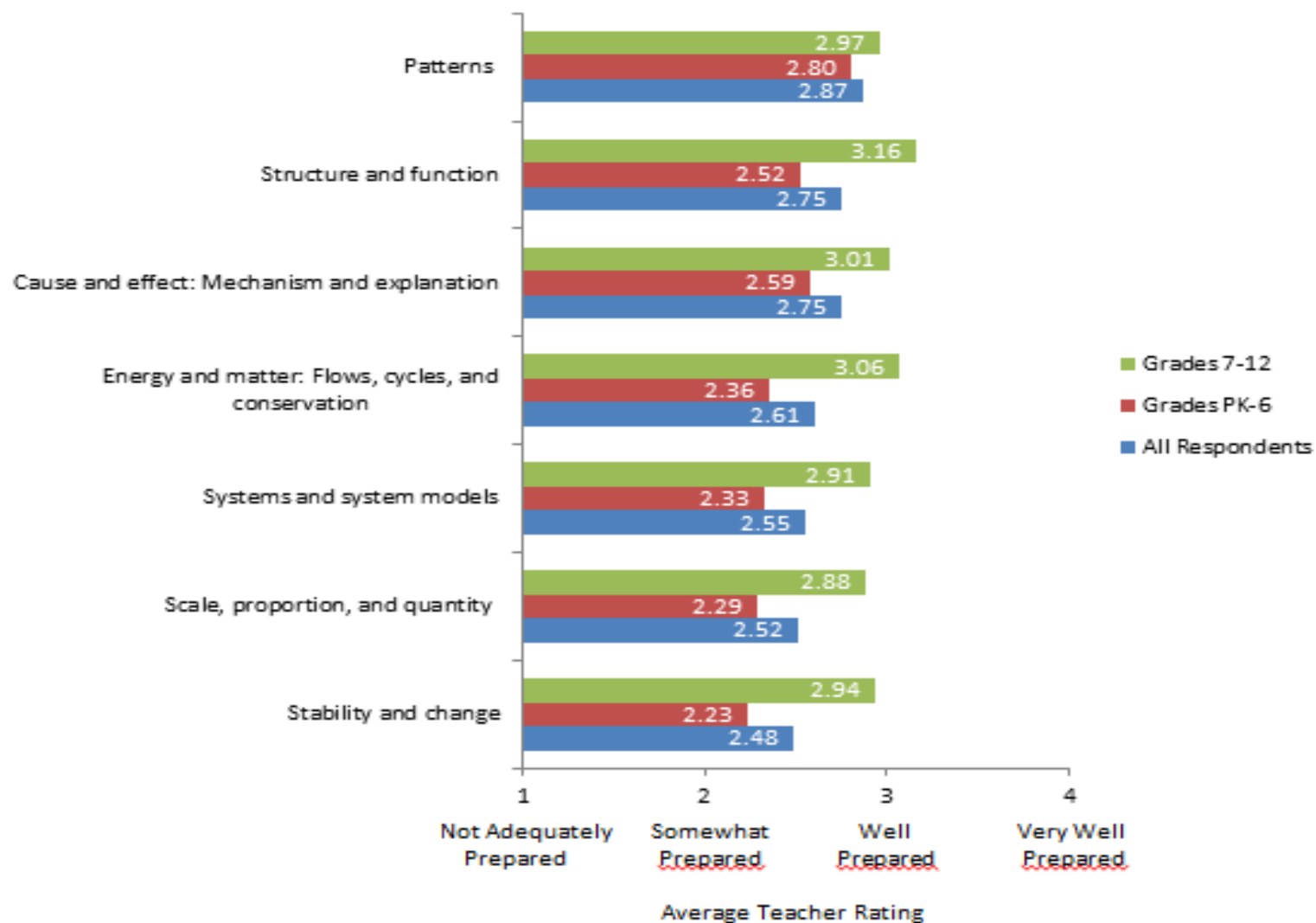
EXHIBIT 52. RATINGS OF PREPAREDNESS FOR TEACHING SCIENCE WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)





# Comparison

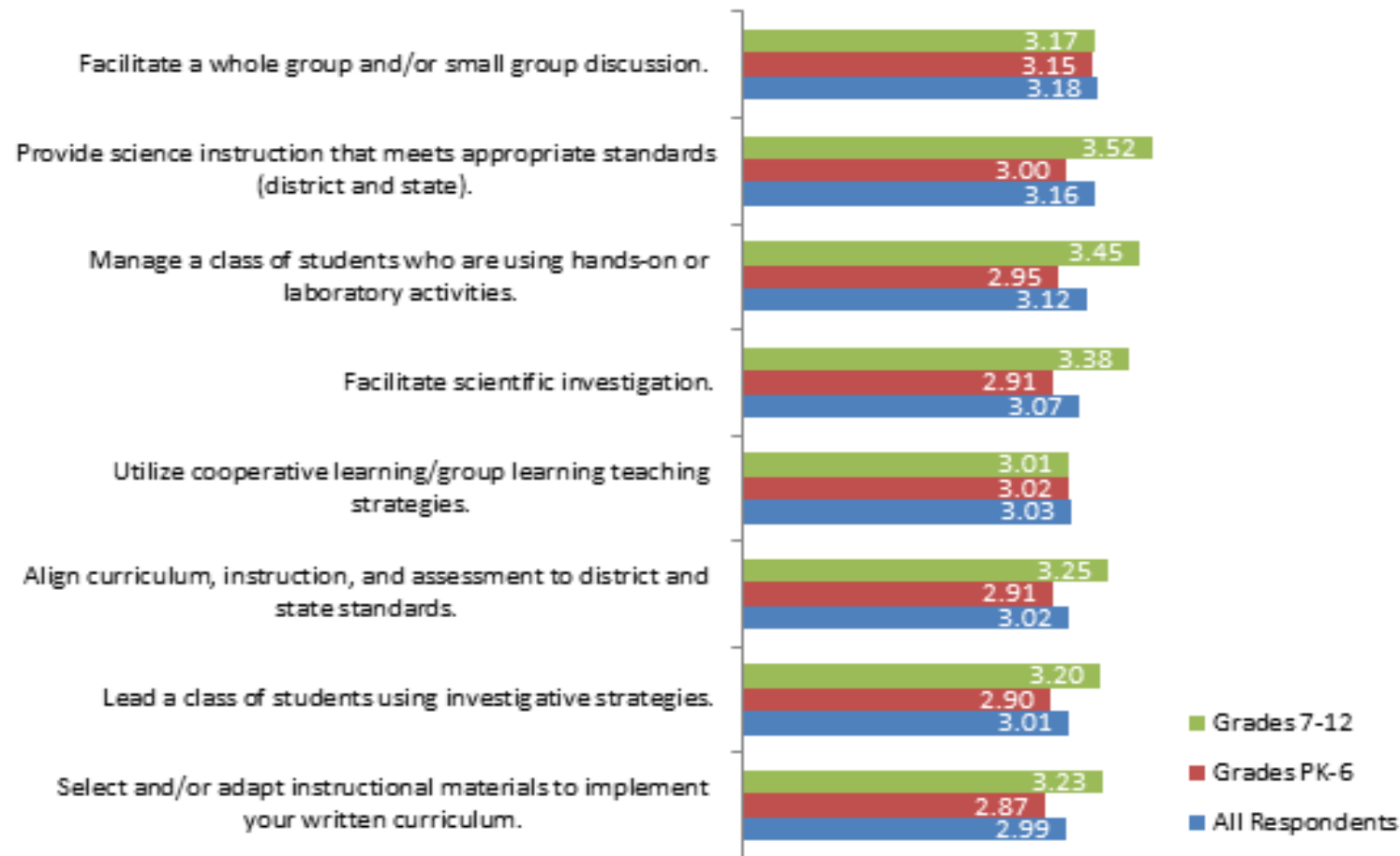
**EXHIBIT 53. PREPAREDNESS TO TEACH SCIENCE CONCEPTS WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)**





# Comparison

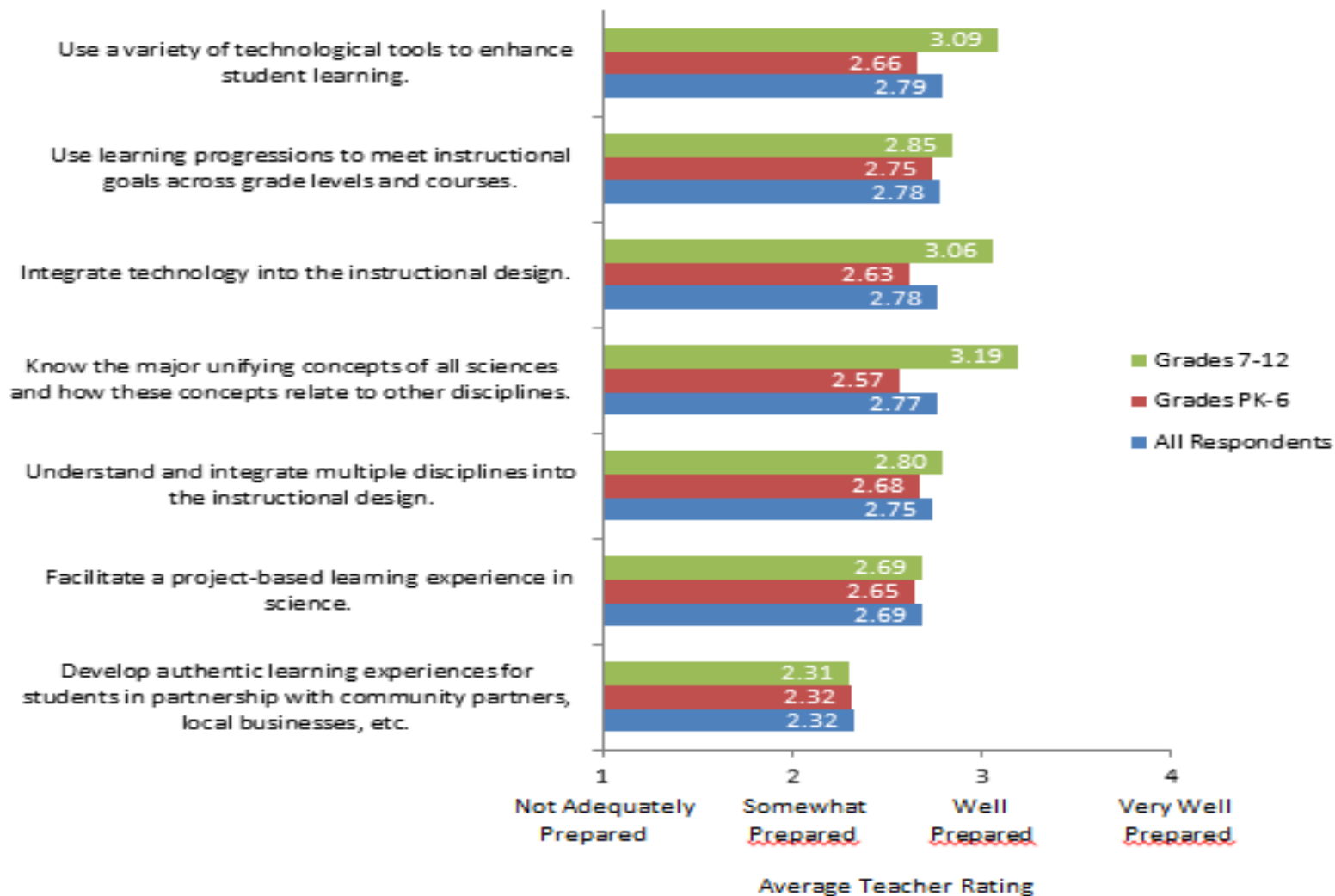
EXHIBIT 54. HIGHEST RATINGS OF READINESS TO MEET STUDENT NEEDS IN SCIENCE WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)





# Comparison

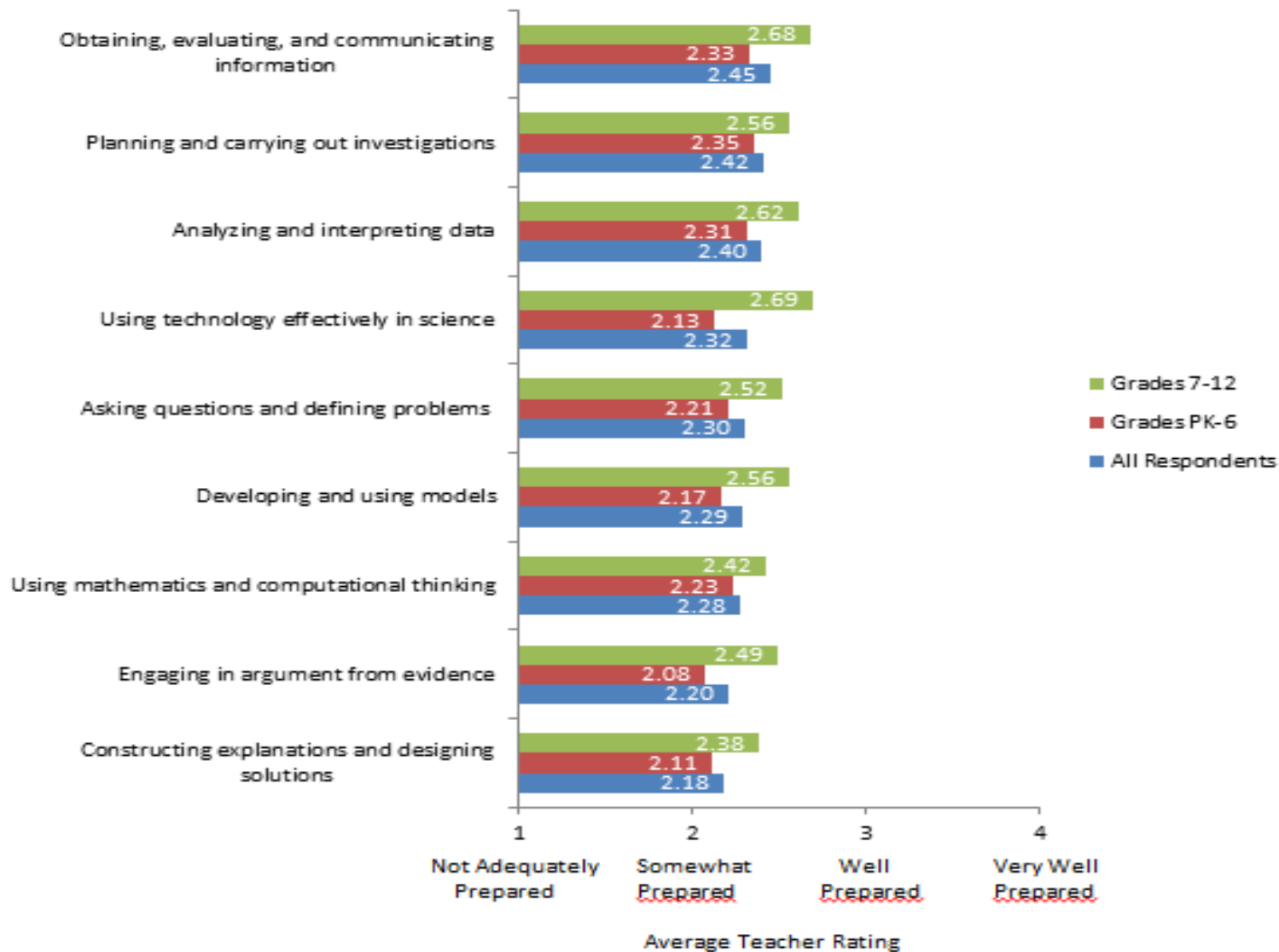
EXHIBIT 55. LOWEST RATINGS OF READINESS TO MEET STUDENT NEEDS IN SCIENCE WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)





# Comparison

EXHIBIT 56. STUDENT READINESS FOR SCIENTIFIC PROCESSES WITH RESPONSES FOR ELEMENTARY (PK-6) AND MIDDLE SCHOOL/HIGH SCHOOL (7-12)





# Comparison

- Nebraska State Assessment (NeSA) Math and Science - Correlations demonstrated the extent to which Nebraska State Assessment scores in teachers' schools were associated with teacher ratings on mathematics and science scales.



- Nebraska State Assessment (NeSA) Math
  - ❖ Mathematics scores were positively associated with student mathematical readiness ( $r = .22, p < .001$ ), suggesting higher scores were related to student mathematical readiness.
  - ❖ Mathematics scores were positively associated with student scientific readiness ( $r = .086, p < .01$ ), suggesting higher scores were related to student scientific readiness.



- Nebraska State Assessment (NeSA) Science
  - ❖ Science scores were associated positively with preparedness to teach mathematics ( $r = .10, p < .01$ ) and student mathematical readiness ( $r = .20, p < .001$ ); higher scores were related to greater teacher preparedness to teach mathematics and higher levels of student mathematical readiness.



- Nebraska State Assessment (NeSA) Science
  - ❖ Science scores were positively related to preparedness to teach science content ( $r = .11, p < .01$ ), preparedness to teach science concepts ( $r = .12, p < .01$ ), teacher feelings that they are able to meet student needs ( $r = .12, p < .01$ ), and student science readiness ( $r = .18, p < .001$ ).
  - ❖ As teacher confidence in their ability to teach science content and concepts, and meet student needs increase, student scores on science assessments also increase. Similarly, student readiness to engage in science is related to higher student NeSA scores.

# Presentation Sections



Methodology



Results



Comparisons



Summary



Recommendations



# Summary

- **The majority of respondents did not participate in previous NE MSP activities.**
- **More than half of respondents hold advanced degrees.**
- **The majority of participants held an elementary endorsement.**
- **More than half the respondents indicated they preferred attending professional development for extended weeks during the summer.**
- **Respondents rated engaging students, supporting a range of strategies and productive struggle highly.**
- **Respondents rated continuous improvement, collaboration, and content-focused instructional coaching highly.**



## Summary

- **Mathematics teachers felt well prepared to teach elementary and middle school mathematics and algebra.**
- **Mathematics teachers felt well prepared to teach mathematics using a variety of strategies, approaches, and instructional support activities.**
- **Mathematics teachers identified professional development needs focusing on a number of mathematics topics.** Areas of greatest priority for PD were: *number-numeric relationships, data analysis and application, number-operations, algebra applications, algebra-algebraic relationships, and data-representation.*



## Summary

- **Science teachers felt better prepared to teach the elementary school and life science.**
- **Science teachers felt well prepared to teach science concepts.**
- **Science teachers felt well prepared to teach science using a variety of strategies, approaches, and instructional support activities.**
- **Science teachers identified professional development needs focused on a number of science topics.** Areas of greatest priority were *Life Science - Structure and Function of Living Things, Physical Science - Matter, Physical Science - Force and Motion, The Nature of Science and Technology, and Physical Science - Energy.*



# Summary

- **Years of Teaching, AYP, and ESU Clusters show no differences between groups on scale measures in mathematics and science.**
  
- **Levels of preparedness for teaching mathematics and science varied by school size (effect sizes were small  $<.20$ ).**
  - ❖ 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 and medium schools had significantly lower levels of preparedness than teachers in large schools.
  - ❖ For Student Readiness for Mathematics Processes, teachers in small and medium schools had significantly higher levels of student readiness than teachers in large schools.
  - ❖ For Preparedness to Meet Student Needs in Science, teachers in small and medium schools had significantly lower levels of preparedness than teachers in large schools. Effect sizes were small ( $<.20$ ).



- **Some scale measures for mathematics and science varied by schools with high versus low percentage of students qualifying for FRL.**
  - ❖ For Preparedness to Teach Mathematics, teachers in schools with high FRL had significantly lower levels of preparedness than teachers in schools with low FRL.
  - ❖ For Student Readiness for Mathematics Processes, teachers in schools with low FRL had significantly higher levels of student readiness than teachers in schools with large FRL.
  - ❖ For Preparedness to Teach Science Content, Preparedness to Teach Science Concepts, and Student Readiness to Learn Science, teachers in schools with low FRL had significantly higher levels of preparedness and students were more ready to learn science than teachers and students in schools with high FRL.



# Summary

- **Some scale measures for mathematics and science differed by ESU size.**
  - ❖ For Preparedness to Meet Student Needs, teachers in large ESUs were significantly more prepared than teachers in small ESUs.
  - ❖ For Preparedness to Teach Science Content, teachers in large ESUs indicated they were better prepared, and
  - ❖ For Science Professional Development Needs, teachers in small ESUs showed significantly higher ratings than teachers in large ESUs.



- **Some scale measures for mathematics and science differed by school grade composition.**
  - ❖ For Preparedness for Teaching Mathematics, teachers in MS/HS indicated they were significantly more prepared than teachers in elementary schools.
  - ❖ For Preparedness to Meet Student Needs in Mathematics, teachers in elementary schools indicated they were significantly more prepared than teachers in MS/HS.
  - ❖ For Preparedness to Teach Science Content, Preparedness for Teaching Science Concepts, and Preparedness to Meet Student Needs, teachers in MS/HS indicated they were more prepared.
  - ❖ For Student Readiness to Learn Science, teachers in MS/HS showed significantly higher ratings than teachers in elementary schools.



# Summary

- **Nebraska State Assessment scores correlate positively with student readiness for both mathematics and science.**
  - ❖ Mathematics scores were positively associated with student mathematical and scientific readiness.
  - ❖ Science scores were associated positively with preparedness to teach science and mathematics and student mathematical and scientific readiness.

# Presentation Sections



Methodology



Results



Comparisons



Summary



Recommendations



# Recommendations

- **Use extended summer institutes and/or hybrids with some follow up for professional development experiences.**
  - ❖ To the extent possible, consider offering participants the opportunity for university credit to apply to advanced degrees.
  
- **Ensure professional development experiences that are collaborative and help teachers develop content and pedagogical content knowledge.**
  - ❖ In many instances, what gets modeled gets learned.
  - ❖ Respondents believe all professionals can benefit from content-focused instructional coaching, so consider that as support for transferring knowledge and skills into classroom practice.



# Recommendations

- **Focus professional development experiences to help develop participant and student active learning.** In both mathematics and science, outcomes of the professional development experience rated most highly were to:
  - *develop authentic learning experiences for students in partnership with community partners, local businesses, etc.;*
  - *facilitate project-based learning; and*
  - *understand and integrate multiple disciplines into the instructional design.*



Questions?

# Thank You!

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