2016 Math and Science Annual Report

November, 2016

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November 29, 2016

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Dear Governor Martinez, Director Abbey and Director Gudgel:

The Public Education Department (PED) is pleased to enclose the *Math and Science Annual Report for School Year 2015–2016*. This annual report fulfills the statutory requirement of the Mathematics and Science Education Act in relevant part as follows:

**Subsection E of 22-15E-5 NMSA 1978. Council duties.**
Produce an annual report on public elementary and secondary mathematics and science student achievement to be submitted to the department, the governor, and the legislature no later than November 30 of each year.
This report is a comprehensive compilation of data that describes the efficiency, the effectiveness, and the progress of math and science education.

We look forward to working with you and your colleagues to ensure that math and science education increases student achievement for all New Mexico students.

Warm regards,

[Signature]

Hanna Skandera
Secretary of Education

HS/DM/mb


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The State of New Mexico

Math and Science Advisory Council
Public Elementary and Secondary Mathematics and Science Achievement
For School Year 2015–2016
Issued November 2016

Susana Martinez
Governor

Hanna Skandera
Secretary of Education

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Notes
- This report is available at www.ped.state.nm.us. Click on the A–Z directory to locate it under Math and Science Bureau.
- All acronyms in this report are defined in the appendix under Glossary and Acronyms

Cover photo: Van Buren Middle School students Daniel Figueroa (left), Jesus Lopez (right), Shaun Gazolas (behind), and other math, engineering, science achievement (MESA) students enjoy the delights of macro-invertebrate discovery. Photo: Kim Scheerer
Acknowledgements

The Secretary of Education thanks the following individuals for their contributions to this report:

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Executive Summary

Activities of the Public Education Department (PED) in the Math and Science Bureau

The legislature continued to invest in science, technology, engineering, and mathematics (STEM) education with a $2.4 million appropriation. The Math and Science Bureau—in conjunction with strong partnerships and collaborations with the Los Alamos National Laboratory (LANL), LANL Foundation, the New Mexico Experimental Program to Stimulate Experimental Research (EPScoR) and the Informal Science Education Network (ISE NET), the Albuquerque Public Schools Curriculum and Instruction office, and WestEd—continued to develop effective programs for teacher professional learning in math and science. Some of the highlights of the professional learning include

- Making Sense of Science (MSS) Facilitation Academy and Teacher five-day Summer Institutes;
- Making Sense of Student Work—follow-up training to MSS with formative assessment protocols;
- Math Discussions: Professional learning to support the Common Core State Standards in Math; and
- The STEM Symposium—a two-day conference exclusively for New Mexico STEM teachers.

In addition, the legislative appropriation was enhanced by partnerships and collaborations that strengthened STEM education for teachers and students. The Math and Science Bureau

- purchased science kits for the LANL Foundation Inquiry Science Education program to expand to Chama Valley and Jemez Mountain Public Schools;
- provided stipends for STEM teachers to attend the national MidSchoolMath conference and the New Mexico math and science teachers annual conference;
- partnered with the New Mexico EPScoR to train ISE NET educators as MSS facilitators and to support a week-long course for teachers in the Alamogordo area;
- provided scholarships to STEM teachers in the Master of Science Teaching program at New Mexico Tech;
- provided funding to the New Mexico chapter of the American Association of University Women for additional teachers for the Tech Trek summer camp for grade 8 girls; and
- provided funding to New Mexico MESA for STEM curriculum training of coaches.

Federal funding of $1.2 million from the Mathematics and Science Partnership grant from the US ED funded the work of Mathematically Connected Communities (MC²) to work with

- 1,064 teachers in 20 school districts to provide summer professional learning and ongoing support; and
- the Teacher Leader Cadre in designing and implementing professional learning across the state.

Activities of the Math and Science Advisory Council

- Used STEM Strategic Framework (page 10) to solicit stakeholder input on improving STEM education in NM
- Developed recommendations to improve math education and student achievement (see below and page 9)

Student Data for Math and Science

- Student achievement in math and science improved in every grade level.
- More students are taking and passing Advanced Placement exams in math and science.
- In national tests—including NAEP for grade 4 and grade 8 students, ACT, and SAT—New Mexico scores are lower than the national average.

2016 Action Recommendations of the Math and Science Advisory Council (MSAC)

- Adopt the Next Generation Science Standards (NGSS) as written
- Analyze PARCC math data to identify both high-performing districts and schools and best practices
- Establish an elementary mathematics endorsement
- Adopt math teacher competencies aligned to NM Common Core State Standards
Introduction

The Mathematics and Science Advisory Council (MSAC) is composed of twelve members representing New Mexico's diverse demographics, including geographic distribution, gender, and ethnic diversity. The members represent public schools; public, post-secondary educational institutions; the private sector, including the national laboratories, museums, and science- and engineering-based businesses; and one member who represents the New Mexico Partnership for Mathematics and Science Education. The MSAC was created to support and advise the PED Math and Science Bureau, as they seek to implement smart policy and programs, pursuant to the Mathematics and Science Education Act. As part of its charge, MSAC produces an annual report on public elementary and secondary mathematics and science student achievement. This 2015/2016 report serves as that document and seeks to (1) describe the activities of the Math and Science Bureau, (2) describe the activities of the MSAC, (3) provide an overview of student math and science data, (4) present the STEM Strategic Framework for New Mexico, and (5) provide concrete recommendations for improving math and science education in New Mexico.

The New Mexico Public Education Department (PED) has made steady improvements in STEM education with the ongoing implementation of the Common Core State Standards (CCSS). However, as evidenced in this report in Section 2.1, there is extensive room for growth in our students’ college and career readiness assessment scores. The STEM strategic framework, introduced in this section, is intended to be a mechanism to promote conversations among interested STEM stakeholders throughout the state on ways to improve STEM education. It is also a mechanism for identifying critical issues, developing strategic approaches to address the issues, setting clear goals, and outlining the measurable benchmarks for reaching these goals. The proposed framework is not rigid; it is meant to be modified as new approaches are identified or as issues are addressed. To be successful, this strategic framework requires a close collaboration between all critical stakeholders: the New Mexico State Legislature, state government, private businesses, non-profit organizations, educational institutions, government labs, and private citizens. Only when disparate voices are united as a collective will we be able to develop a common vision of improved STEM education in New Mexico.

The following sections provide an overview of the strategic framework, describe identified critical needs and issues, and provide concrete recommendations intended to address these issues. Statistical data presented in the report are used to support the critical issues and to demonstrate the current state of STEM education in New Mexico. Working together to address these issues, we can make a difference!
Critical Issues to be Addressed in STEM Education

Critical Issue # 1—A Unified, Statewide Vision for STEM Education
A statewide vision for STEM education for alignment and guidance is needed for the development of our students. This vision will provide direction for New Mexico STEM stakeholders and help encourage them to work toward the same goal.

- Develop a STEM vision with action steps for implementation to include CCSS and NGSS
- Increase cooperation and leverage the capacity of STEM stakeholders

Critical Issue # 2—High Educational Performance for all New Mexico Students
There is an achievement gap at all grade levels for economic, ethnic, race, and gender sub-groups in math and science subjects. Take actions to systematically acknowledge and address the achievement gap.

- Continue to analyze PARCC data and provide guidance on CCSS to districts in a timely manner.
- Develop a comprehensive NGSS implementation plan that is informed by best practices.

Critical Issue # 3—High Academic Standards and Aligned Assessments
New Mexico students rank lower than average on national and international benchmarks in STEM at all grade levels (ACT 2015, NAEP 2015, SAT 2015). Significantly more rigorous than previous standards, 46 states adopted the CCSS. Therefore, teachers must be supported to deepen their pedagogical content knowledge and receive professional learning opportunities to teach effectively.

- Continue to analyze PARCC data and provide guidance on CCSS to districts in a timely manner.
- Analyze other states’ policies on STEM curriculum, student assessment, teacher evaluation, and support systems to determine best practices.
- Develop a comprehensive NGSS implementation plan informed by best practices.

Critical Issue # 4—Highly Trained STEM Teachers for All Students
New, out-of-state, or alternatively certified teachers are often not fully prepared for the unique challenges of the New Mexico classroom. Current educators require a support mechanism within the system to engage in continuous professional learning. Therefore, innovative and robust teacher induction, mentorship, and professional learning programs are needed.

- Provide access to rich and authentic STEM professional learning opportunities.
- Implement job-embedded professional learning with a continuous improvement focus.
- Incentivize teachers to obtain an elementary mathematics endorsement.
- Fund innovative models for teacher induction and support programs.
- Develop STEM teacher leaders within schools and districts.
Critical Issue #5—STEM Learning Opportunities for Students at all Grade Levels
There is little evidence that all K–6 students are receiving sufficient STEM instruction. Additionally, curricular materials and equipment are insufficient in STEM classes at all grade levels. As part of the comprehensive NGSS implementation plan ensure:

- science is taught in elementary schools across the state;
- every student has a highly qualified STEM teacher;
- engineering and technology, including computer science, are taught in all schools; and
- ancillary materials, equipment, educational technology, manipulatives, and supplies are provided.

Critical Issue # 6—Out-of-School STEM Learning
Although STEM learning occurs in the classroom, it is strengthened in afterschool and summer programs; at science centers, museums, and natural environments; and through media, competitions, and informal experiences at home. However, out-of-school STEM opportunities are not equitably distributed across geographic areas of the state, and significant economic barriers to full participation exist.

- Engage local STEM community partners in the NGSS process.
- Leverage existing state and federal funding to increase capacity of afterschool programs to provide STEM education.
- Strengthen partnerships between schools and informal science education organizations.
- Encourage flexible and creative transportation mechanisms to provide learning opportunities off campus.

2016 Action Recommendations of the Math and Science Advisory Council

The New Mexico Public Education Department (PED) has made steady improvements in STEM education with the ongoing implementation of the Common Core State Standards (CCSS). However, as evidenced in this report in Section 2.1, there is extensive room for growth in our students’ college and career readiness assessment scores. The Math and Science Advisory Council (MSAC) has identified four key recommendations for immediate action that will positively impact the critical issues identified in the STEM Strategic Framework (the Framework) introduced in 2015 (see page 10). We have also included longer term recommendations (two–five years), as we work toward continuous improvement. The Framework is intended as a mechanism to promote conversation among interested STEM stakeholders throughout the state on ways to improve STEM education. The graphic representation is designed to provide a systematic and readily available reference to track the progress of STEM education, from the critical needs and issues, through developing strategies, to positive outcomes. This document will help bring the STEM community stakeholders together to address these issues by collaboratively expanding the details of this strategic framework.

1. Adopt the Next Generation Science Standards (NGSS).

New Mexico science standards date from 2003 and are based on the 1996 National Science Education Standards. Students need to be prepared to apply basic scientific knowledge to their lives and to their careers, regardless of whether they are planning STEM-based careers. NGSS is based on current science and education research, provides modern science content, teaches science and engineering practices, and is connected to the CCSS.

In the next two to five years, the NM PED must lead the development and implementation of a comprehensive rollout strategy for NGSS, with adequate funding for teacher and administrator training, ongoing professional learning, curriculum support, and science materials and equipment. In parallel with the rollout and implementation, we recommend a statewide campaign to promote STEM teaching as a profession. See Appendix D.

2. Analyze PARCC math data to identify both high performing districts and schools, and best practices.

PARCC data reveals that only 1 in 10 graduating students in 2015–2016 meets or exceeds expectations in math. However, there are pockets of excellence in districts and schools across the state. We recommend that the NM PED analyze PARCC data to identify high-performing districts and schools across demographic categories (rural/urban, small/large schools, high/low SES, high/low minority populations) and commission a study of best practices.

In the next two to five years, the NM PED should provide guidance to districts based on the above PARCC score and best practices analysis.

3. Establish an elementary mathematics endorsement.

Nearly half of New Mexico students entering college require remediation in math. Research shows that mastery in grade 3 is a strong indicator of success in later years and that increasing math capabilities in elementary schools is critical to students’ future successes. Establishing an elementary level mathematics endorsement would lead to more effective practices in teaching foundational elementary mathematics.

In the next two to five years, continue to provide leadership on elementary mathematics professional learning and work with higher education and school districts, including incentives to support elementary math specialists.

4. Adopt math teacher competencies aligned to NM Common Core State Standards.

The NM math teacher competencies were last updated in 2001 and are not aligned with NM CCSS. These can be updated through a change in the NM Administrative Code, and will provide a clear signal to teacher preparation programs. It is recommended that the PED adopts the competencies developed by the Association of Mathematics Teacher Educators (AMTE) in 2015.
2.1 Student Data

2.1.1 New Mexico Assessments

In 2010, New Mexico raised the academic bar and adopted new state standards for English language arts (ELA) and math, known as the New Mexico Common Core State Standards. The Partnership for Assessment of Readiness for College and Careers (PARCC) is a group of states, including New Mexico, that brought together educators and other experts to develop tests aligned to the higher standards and provide a deeper level of information to teachers and parents to support students. The PARCC replaces New Mexico’s previous standards-based assessments (SBA) annual tests in math and ELA. The SBA remain in place to assess students in science and Spanish reading.

The PARCC assessments are based on the higher standards students are being taught in the classroom and that prepare them for success in today’s world. The tests are more sophisticated than fill-in-the bubble questions and require students to read complex text, develop well-organized written responses, answer real-world math problems, and describe and defend their reasoning. The PARCC was administered to New Mexico public school students in grades 3–11 for the first time in the spring of 2015.

<table>
<thead>
<tr>
<th>NEW MEXICO ASSESSMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PARCC</strong></td>
</tr>
<tr>
<td>English Language Arts 3–11</td>
</tr>
<tr>
<td>Math 3–8</td>
</tr>
<tr>
<td>Algebra I (may be given in grade 8*)</td>
</tr>
<tr>
<td>Algebra II</td>
</tr>
<tr>
<td>Geometry (may be given in grade 8*)</td>
</tr>
<tr>
<td>Integrated Math I (may be given in grade 8*)</td>
</tr>
<tr>
<td>Integrated Math II</td>
</tr>
<tr>
<td>Integrated Math III</td>
</tr>
<tr>
<td><strong>SBA</strong></td>
</tr>
<tr>
<td>Science</td>
</tr>
<tr>
<td>Spanish Reading</td>
</tr>
<tr>
<td><strong>NMAPA</strong></td>
</tr>
<tr>
<td>Reading for students with disabilities</td>
</tr>
<tr>
<td>Math for students with disabilities</td>
</tr>
<tr>
<td>Science for students with disabilities</td>
</tr>
</tbody>
</table>

* If student is taking the course

During school year 2014–2015, students in grades 3–11 were tested as indicated in the table above. Students with learning disabilities were assessed using the NM Alternate Performance Assessment, based on alternate achievement standards. The graphs in this report show the statewide percentage of students who are at or above proficiency as measured by the New Mexico assessments.

The PARCC test has established a new, more accurate baseline from which progress can be measured moving forward. Because PARCC is more challenging than the previous SBA, those PARCC scores for the 2014–2015 school year were lower across the board.
Figure 1 shows the percentage of NM students who met or exceeded expectations on the math portion of the statewide assessment in school years 2014–2015 and 2015–2016.

Table 1. The percentage of students in NM who met or exceeded expectations on the math portion of the statewide assessment in school years 2014–2015 and 2015–2016

<table>
<thead>
<tr>
<th>Grade</th>
<th>SY 2014–15</th>
<th>SY 2015–16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3</td>
<td>25.6</td>
<td>30.2</td>
</tr>
<tr>
<td>Grade 4</td>
<td>18.8</td>
<td>23.4</td>
</tr>
<tr>
<td>Grade 5</td>
<td>20.8</td>
<td>25.5</td>
</tr>
<tr>
<td>Grade 6</td>
<td>18.8</td>
<td>20.1</td>
</tr>
<tr>
<td>Grade 7</td>
<td>15.5</td>
<td>17.7</td>
</tr>
<tr>
<td>Grade 8</td>
<td>17.2</td>
<td>19.5</td>
</tr>
<tr>
<td>Grade 9</td>
<td>n/a</td>
<td>18.2</td>
</tr>
<tr>
<td>Grade 10</td>
<td>12.4</td>
<td>13.5</td>
</tr>
<tr>
<td>Grade 11</td>
<td>10.0</td>
<td>10.1</td>
</tr>
</tbody>
</table>

Figure 1 and Table 1 show that the number of students proficient or advanced on the mathematics statewide assessment increased in every grade level, with grade 5 students showing an increase of nearly 5%.
Table 2. NM students who met or exceeded expectations on the math statewide assessment for SY 2015–16, by group

<table>
<thead>
<tr>
<th>Group</th>
<th>Grade 4 Math</th>
<th>Grade 7 Math</th>
<th>Grade 11 Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Students</td>
<td>23.4</td>
<td>17.7</td>
<td>10.1</td>
</tr>
<tr>
<td>Female</td>
<td>23.0</td>
<td>18.3</td>
<td>9.5</td>
</tr>
<tr>
<td>Male</td>
<td>23.7</td>
<td>17.1</td>
<td>10.6</td>
</tr>
<tr>
<td>Caucasian</td>
<td>37.8</td>
<td>30.2</td>
<td>19.3</td>
</tr>
<tr>
<td>African American</td>
<td>18.7</td>
<td>13.3</td>
<td>7.1</td>
</tr>
<tr>
<td>Hispanic</td>
<td>19.1</td>
<td>14.0</td>
<td>7.1</td>
</tr>
<tr>
<td>Asian</td>
<td>49.3</td>
<td>44.8</td>
<td>29.4</td>
</tr>
<tr>
<td>American Indian</td>
<td>13.0</td>
<td>8.2</td>
<td>4.9</td>
</tr>
<tr>
<td>Econ. Disadvantaged</td>
<td>17.4</td>
<td>12.0</td>
<td>6.8</td>
</tr>
<tr>
<td>Students w/ Disabilities</td>
<td>8.2</td>
<td>6.6</td>
<td>7.7</td>
</tr>
<tr>
<td>English LLs, Current</td>
<td>7.2</td>
<td>3.5</td>
<td>4.2</td>
</tr>
<tr>
<td>Migrant</td>
<td>12.1</td>
<td>4.3</td>
<td>&lt;2</td>
</tr>
</tbody>
</table>

Figure 2 and Table 2 show that, for the most recent school year, the percentage of NM students categorized as Hispanic and American Indian who met or exceeded math testing expectations is smaller than is the percentage of students in the Caucasian and Asian sub-groups meeting or exceeding expectations. Hispanic and American Indian students are the dominant sub-groups, comprising 70 percent of the student population in New Mexico.

The same trend holds for the percentage of economically disadvantaged students who met or exceeded expectations on the math portion of the statewide assessments.
Figure 3 shows the percentage of NM students who are proficient or advanced over the past five years. The science statewide assessment in NM is only administered in grades 4, 7, and 11 every year.

Figure 3a illustrates the trend in NM over the last five years in science proficiency scores for elementary (grade 4), middle school (grade 7), and high school (grade 11).
Table 3. The percentage of students in NM who are proficient or advanced on the science portion of the statewide assessments over the past five years

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage of NM Students Proficient or Advanced on the Science Statewide Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade 4 Science</td>
</tr>
<tr>
<td>SY 2011–12</td>
<td>47.6</td>
</tr>
<tr>
<td>SY 2012–13</td>
<td>53.0</td>
</tr>
<tr>
<td>SY 2013–14</td>
<td>48.3</td>
</tr>
<tr>
<td>SY 2014–15</td>
<td>42.5</td>
</tr>
<tr>
<td>SY 2015–16</td>
<td>43.0</td>
</tr>
</tbody>
</table>

Figures 3 and 3a and Table 3 confirm that although science proficiency has remained relatively flat for all students in grades 4, 7, and 11 over the past five years, students made gains in proficiency in each grade assessed. Grade 7 students showed an increase of nearly 5 percent in proficiency.

![Figure 4](image-url)
Table 4. NM students proficient or advanced on the science statewide assessment for SY 2015–16, by group

<table>
<thead>
<tr>
<th>Group</th>
<th>Percentage of NM Students Proficient or Advanced on the Science Statewide Assessment, by Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade 4 Science</td>
</tr>
<tr>
<td>All Students</td>
<td>43.0</td>
</tr>
<tr>
<td>Female</td>
<td>42.1</td>
</tr>
<tr>
<td>Male</td>
<td>43.9</td>
</tr>
<tr>
<td>Caucasian</td>
<td>63.9</td>
</tr>
<tr>
<td>African American</td>
<td>40.5</td>
</tr>
<tr>
<td>Hispanic</td>
<td>37.7</td>
</tr>
<tr>
<td>Asian</td>
<td>66.9</td>
</tr>
<tr>
<td>American Indian</td>
<td>22.4</td>
</tr>
<tr>
<td>Econ. Disadvantaged</td>
<td>35.1</td>
</tr>
<tr>
<td>Students w/ Disabilities</td>
<td>18.9</td>
</tr>
<tr>
<td>English LLS, Current</td>
<td>13.4</td>
</tr>
<tr>
<td>Migrant</td>
<td>18.2</td>
</tr>
</tbody>
</table>

Figure 4 and Table 4 illustrate that the percentage of students who are proficient or advanced in science in the subgroups of Hispanic and American Indian—the dominant sub-groups in New Mexico—is smaller than the percentage of proficient or advanced scores of the Caucasian and Asian sub-groups. These data are significant because Hispanic and American Indian students comprise 70 percent of the student population in New Mexico.

The same trend holds for the percentage of economically disadvantaged students who are proficient or advanced on the science portion of the statewide assessments.

SUMMARY OF ALL STUDENT DATA FOR THE NEW MEXICO STATEWIDE ASSESSMENTS

Student achievement in math and science increased in every grade level.

- The number of students proficient or advanced on the mathematics statewide assessment increased in every grade level, with grade 5 students showing an increase of nearly 5%.
- The number of students proficient or advanced in science increased in every grade tested, with grade 7 students showing an increase of nearly 5%.

All of the New Mexico Statewide Assessment data shows that the majority of New Mexico students are not proficient in math and science.
2.1.2 National Assessment of Educational Progress (NAEP)

NAEP results provide comparison data of student achievement across states and compare student proficiency levels on state assessments with a national standard. Extensive data on recent NAEP results are available at the Nation's Report Card website: (http://nationsreportcard.gov).

State participation in the NAEP science assessment is voluntary. Most states participated in the 2009 assessment, and all 50 states, the District of Columbia, and Department of Defense schools elected to participate in 2011. The schools and students participating in NAEP assessments are selected to be representative of all schools nationally and of public schools at the state level. Samples of schools and students are drawn from participating states and from the District of Columbia and Department of Defense schools.

Since the late 1960s, NAEP exams have been given periodically to a random sample of U.S. students in mathematics, reading, science, writing, the arts, civics, economics, geography, and US history in grades 4, 8, and 12. The results are not reported at the individual student level. In fact, given the matrix sampling used to cover a wide variety of content, all students do not receive the same exams. Like the New Mexico statewide assessments, the NAEP exams include both multiple-choice and extended-response items.

Table 5a. Comparison of Students in Grade 4 in New Mexico and the Nation, Percentage Proficient or Advanced On NAEP Math

<table>
<thead>
<tr>
<th></th>
<th>NEW MEXICO</th>
<th>NATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math 2007</td>
<td>24%</td>
<td>39%</td>
</tr>
<tr>
<td>Math 2009</td>
<td>26%</td>
<td>39%</td>
</tr>
<tr>
<td>Math 2011</td>
<td>30%</td>
<td>39%</td>
</tr>
<tr>
<td>Math 2013</td>
<td>31%</td>
<td>41%</td>
</tr>
<tr>
<td>Math 2015</td>
<td>27%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Table 5b. Comparison of Students in Grade 8 New Mexico and the Nation, Percentage Proficient or Advanced On NAEP Math

<table>
<thead>
<tr>
<th></th>
<th>NEW MEXICO</th>
<th>NATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math 2007</td>
<td>18%</td>
<td>32%</td>
</tr>
<tr>
<td>Math 2009</td>
<td>20%</td>
<td>34%</td>
</tr>
<tr>
<td>Math 2011</td>
<td>24%</td>
<td>34%</td>
</tr>
<tr>
<td>Math 2013</td>
<td>23%</td>
<td>34%</td>
</tr>
<tr>
<td>Math 2015</td>
<td>21%</td>
<td>33%</td>
</tr>
</tbody>
</table>

New Mexico ranks lower than the national average for students in both grades 4 and 8 on the NAEP mathematics results. Although New Mexico students have made gains over 2007, they are still performing far below the national average.
Table 6a. Comparison of Grade 4 Students in New Mexico and the Nation, Percentage Proficient or Advanced On NAEP Science

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>NEW MEXICO</th>
<th>NATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science 2009</td>
<td>24%</td>
<td>32%</td>
</tr>
<tr>
<td>Science 2011</td>
<td>Only grade 8 students tested this year</td>
<td></td>
</tr>
<tr>
<td>Science 2015</td>
<td>25%</td>
<td>37%</td>
</tr>
</tbody>
</table>

Table 6b. Comparison of Grade 8 Students in New Mexico and the Nation, Percentage Proficient or Advanced On NAEP Science

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>NEW MEXICO</th>
<th>NATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science 2009</td>
<td>21%</td>
<td>27%</td>
</tr>
<tr>
<td>Science 2011</td>
<td>22%</td>
<td>31%</td>
</tr>
<tr>
<td>Science 2015</td>
<td>21%</td>
<td>31%</td>
</tr>
</tbody>
</table>

Figure 5

The data show that approximately one out of five New Mexico students in grade 8 were proficient or advanced in science in 2015, lagging behind their counterparts nationwide.

The percentage of grade 8 students in New Mexico who performed at or above the NAEP Proficient level in science was 21 percent in 2015. This percentage was not significantly different from that in 2011 (22 percent) nor from that in 2009 (21 percent).

- In 2015, NM Hispanic students had an average score that was 24 points lower than that for White students. This performance gap was not significantly different from that in 2009 (27 points).
- In 2015, male students in New Mexico had an average score that was not significantly different from that for NM female students.
- In 2015, NM students who were eligible for free/reduced-price school lunch, an indicator of low family income, had an average score that was 21 points lower than that for students who were not eligible. This performance gap was not significantly different from that in 2009 (24 points).

NAEP results can be accessed at: [http://nces.ed.gov/nationsreportcard/states/](http://nces.ed.gov/nationsreportcard/states/)
### 2.1.3 ACT and SAT

ACT and SAT scores are another measure of student achievement. The tables below indicate average scores and participation rates. These tests are not mandatory and are generally taken by college-bound students. The reported scores do not reflect percent correct on test items. The scores are normalized to reflect a comparison of the student’s performance to a national population. Many colleges’ entrance requirements are based on ACT and SAT scores.

#### Table 7. Comparison of ACT Math Scores from 2012 to 2016 for New Mexico and the Nation’s Participating High School Seniors. College and Career Readiness benchmark score is 22)

<table>
<thead>
<tr>
<th>ACT MATH</th>
<th>NEW MEXICO</th>
<th>NATION</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>School Year</td>
<td>Average</td>
<td># of Seniors</td>
<td>% of Seniors Participating</td>
<td>Average</td>
<td># of Seniors</td>
<td>% of Seniors Participating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011–12</td>
<td>19.6</td>
<td>13,792</td>
<td>75</td>
<td>21.1</td>
<td>1,666,017</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012–13</td>
<td>19.7</td>
<td>13,423</td>
<td>70</td>
<td>20.9</td>
<td>1,799,243</td>
<td>54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013–14</td>
<td>19.7</td>
<td>12,945</td>
<td>64</td>
<td>20.9</td>
<td>1,845,787</td>
<td>43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014–15</td>
<td>19.8</td>
<td>13,393</td>
<td>Not available</td>
<td>20.8</td>
<td>1,924,436</td>
<td>59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015–16</td>
<td>19.5</td>
<td>13,435</td>
<td>67</td>
<td>20.6</td>
<td>2,090,342</td>
<td>64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Table 8. Comparison of ACT Science Scores from 2012 to 2016 for New Mexico and the Nation’s Participating High School Seniors. College and Career Readiness benchmark score is 23)

<table>
<thead>
<tr>
<th>ACT SCIENCE</th>
<th>NEW MEXICO</th>
<th>NATION</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>School Year</td>
<td>Average</td>
<td># of Seniors</td>
<td>% of Seniors Participating</td>
<td>Average</td>
<td># of Seniors</td>
<td>% of Seniors Participating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011–12</td>
<td>20.0</td>
<td>13,792</td>
<td>75</td>
<td>20.9</td>
<td>1,666,017</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012–13</td>
<td>20.1</td>
<td>13,423</td>
<td>70</td>
<td>20.7</td>
<td>1,799,243</td>
<td>54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013–14</td>
<td>20.1</td>
<td>12,945</td>
<td>64</td>
<td>20.8</td>
<td>1,845,787</td>
<td>43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014–15</td>
<td>20.3</td>
<td>13,393</td>
<td>Not available</td>
<td>20.9</td>
<td>1,924,436</td>
<td>59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015–16</td>
<td>20.1</td>
<td>13,435</td>
<td>67</td>
<td>20.8</td>
<td>2,090,342</td>
<td>64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Table 9. Comparison of SAT Math Scores from 2012 to 2016 for New Mexico and the Nation’s Participating High School Seniors. (College and Career Readiness benchmark score is 630)

<table>
<thead>
<tr>
<th>SAT MATH</th>
<th>NEW MEXICO</th>
<th>NATION</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>School Year</td>
<td>Average</td>
<td># of Seniors</td>
<td>% of Seniors Participating</td>
<td>Average</td>
<td># of Seniors</td>
<td>% of Seniors Participating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011–12</td>
<td>546</td>
<td>2,371</td>
<td>12</td>
<td>514</td>
<td>1,664,479</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012–13</td>
<td>545</td>
<td>2,303</td>
<td>11</td>
<td>514</td>
<td>1,660,047</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013–14</td>
<td>543</td>
<td>2,316</td>
<td>11</td>
<td>513</td>
<td>1,672,395</td>
<td>39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014–15</td>
<td>528</td>
<td>1,684</td>
<td>9.5</td>
<td>498</td>
<td>1,332,096</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015–16</td>
<td>545</td>
<td>1,842</td>
<td>9.2</td>
<td>508</td>
<td>1,637,589</td>
<td>Not available</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Participation rates in New Mexico for the ACT are much larger than those for the SAT. In 2015–2016, 31 percent of New Mexico students who took the ACT met the math benchmark and 28 percent met the science benchmark for college and career readiness.
2.2 Student Course-taking Patterns

2.2.1 Algebra 1 in Grade 8

The 2007 Legislature amended state law to include the provision, “Beginning with the 2008–2009 school year, in eighth grade, Algebra 1 shall be offered in regular classroom settings or through on-line courses or agreements with high schools.” [22-13-1E NMSA 1978]

Table 10. The percentage of New Mexico students in grade 8 taking Algebra 1 (course 2031) in years 2011–12 to 2015–16 for high school credit

<table>
<thead>
<tr>
<th>Year</th>
<th>Total number of students in grade 8</th>
<th>Grade 8 students in Algebra 1 (course 2031)</th>
<th>% grade 8 students in Algebra 1 (course 2031)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SY 2011–12</td>
<td>25,118</td>
<td>2,508</td>
<td>10</td>
</tr>
<tr>
<td>SY 2012–13</td>
<td>25,898</td>
<td>2,251</td>
<td>9</td>
</tr>
<tr>
<td>SY 2013–14</td>
<td>25,745</td>
<td>2,407</td>
<td>9</td>
</tr>
<tr>
<td>SY 2014–15</td>
<td>25,116</td>
<td>1,997</td>
<td>8</td>
</tr>
<tr>
<td>SY 2015–16</td>
<td>24,623</td>
<td>2,172</td>
<td>9</td>
</tr>
</tbody>
</table>

Note: Students who took Algebra 1 in grade 7 are not counted in the above table.

Table 10 shows the percentage of students taking Algebra 1 in grade 8. The percentage of students in grade 8 taking Algebra 1 for high school credit has been holding steady since SY 2011–2012.

Table 11. Number and percentage of students in grade 8 taking Algebra 1 (course 2031) in years 2011–12 to 2015–16 for high school credit who repeated Algebra I in Grade 9

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
<td>Number</td>
<td>%</td>
<td>Number</td>
</tr>
<tr>
<td>Algebra 1</td>
<td>1,848</td>
<td>40.3</td>
<td>609</td>
<td>24.2</td>
<td>547</td>
</tr>
</tbody>
</table>

In SY 2015–16, 17.6 percent of students who took Algebra 1 in grade 8 for high school credit (course 2031, STARS Vol. 2) repeated the course in grade 9. The number was arrived at by taking the student IDs for those students in Algebra I in grade 8 (SY 2014–15), and searching for that same set of students taking 2031 in grade 9 in (SY 2015–16). This data protocol would not have captured students repeating grade 8. STARS course 2031 requires a secondary math certified teacher for the course. The data show a clear downward trend; indicating that fewer students taking course 2031 in grade 8 are repeating course 2031 in grade 9.
2.2.2 High School Science Enrollments for 2015–2016

In 2009, the New Mexico Administrative Code was updated to state, “For grades 9–12, three units in science shall be required, one of which shall have a laboratory component.”

[6.29.10.6 NMAC - N, 6-30-2009]

No specific courses or course sequences are identified in statute, although high schools often require both a life science and physical science lab course.

Figure 6

Science Courses Taken by NM Students, by Category

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% other/integrated science</td>
<td>7%</td>
<td>7%</td>
<td>13%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>% life science</td>
<td>37%</td>
<td>36%</td>
<td>35%</td>
<td>38%</td>
<td>39%</td>
</tr>
<tr>
<td>% physical science</td>
<td>38%</td>
<td>38%</td>
<td>34%</td>
<td>38%</td>
<td>39%</td>
</tr>
<tr>
<td>% earth systems and space science</td>
<td>18%</td>
<td>19%</td>
<td>18%</td>
<td>12%</td>
<td>12%</td>
</tr>
</tbody>
</table>

Percent of students
Table 12. Student Enrollment in High School Science Classes from SY 2011–12 to SY 2015–16

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTEGRATED SCIENCES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IB Science Courses</td>
<td>91</td>
<td>98</td>
<td>115</td>
<td>175</td>
<td>175</td>
</tr>
<tr>
<td>Integrated/Unified Science</td>
<td>4,507</td>
<td>5,946</td>
<td>7,881</td>
<td>6,673</td>
<td>7,214</td>
</tr>
<tr>
<td>General Science</td>
<td>2,701</td>
<td>2,177</td>
<td>2,611</td>
<td>2,446</td>
<td>1,714</td>
</tr>
<tr>
<td>Other</td>
<td>6,552</td>
<td>6,825</td>
<td>5,781</td>
<td>1,089</td>
<td>680</td>
</tr>
<tr>
<td>Total Other/Integrated Science Students</td>
<td>13,851</td>
<td>15,046</td>
<td>16,388</td>
<td>10,383</td>
<td>9,783</td>
</tr>
<tr>
<td><strong>LIFE SCIENCES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AP Biology</td>
<td>573</td>
<td>658</td>
<td>975</td>
<td>914</td>
<td>1,155</td>
</tr>
<tr>
<td>Anatomy and Physiology</td>
<td>3,232</td>
<td>3,333</td>
<td>2,922</td>
<td>3,172</td>
<td>2,904</td>
</tr>
<tr>
<td>Biology 1</td>
<td>22,906</td>
<td>22,809</td>
<td>24,406</td>
<td>24,997</td>
<td>25,591</td>
</tr>
<tr>
<td>Biology 2</td>
<td>2,128</td>
<td>1,593</td>
<td>1,436</td>
<td>2,658</td>
<td>1,901</td>
</tr>
<tr>
<td>Biology Other</td>
<td>928</td>
<td>1,348</td>
<td>1,893</td>
<td>241</td>
<td>1,071</td>
</tr>
<tr>
<td>Total Life Science Students</td>
<td>29,767</td>
<td>29,741</td>
<td>31,572</td>
<td>31,982</td>
<td>32,622</td>
</tr>
<tr>
<td><strong>PHYSICAL SCIENCES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AP Chemistry</td>
<td>401</td>
<td>383</td>
<td>747</td>
<td>480</td>
<td>699</td>
</tr>
<tr>
<td>AP Physics</td>
<td>420</td>
<td>473</td>
<td>634</td>
<td>1,080</td>
<td>922</td>
</tr>
<tr>
<td>Chemistry 1</td>
<td>12,193</td>
<td>12,529</td>
<td>13,059</td>
<td>14,575</td>
<td>14,869</td>
</tr>
<tr>
<td>Chemistry 2</td>
<td>797</td>
<td>606</td>
<td>759</td>
<td>880</td>
<td>624</td>
</tr>
<tr>
<td>Chemistry Other</td>
<td>833</td>
<td>150</td>
<td>848</td>
<td>745</td>
<td>605</td>
</tr>
<tr>
<td>Forensic Science</td>
<td>1,279</td>
<td>1,429</td>
<td>1,814</td>
<td>1,817</td>
<td>1,839</td>
</tr>
<tr>
<td>Physical Science</td>
<td>7,698</td>
<td>5,910</td>
<td>8,618</td>
<td>7,251</td>
<td>7,271</td>
</tr>
<tr>
<td>Physics 1</td>
<td>4,640</td>
<td>5,995</td>
<td>5,067</td>
<td>4,583</td>
<td>5,001</td>
</tr>
<tr>
<td>Physics 2</td>
<td>192</td>
<td>192</td>
<td>159</td>
<td>234</td>
<td>174</td>
</tr>
<tr>
<td>Physics Other</td>
<td>18</td>
<td>4</td>
<td>15</td>
<td>75</td>
<td>77</td>
</tr>
<tr>
<td>Total Physical Science Students</td>
<td>28,471</td>
<td>27,671</td>
<td>31,720</td>
<td>31,720</td>
<td>32,581</td>
</tr>
<tr>
<td><strong>EARTH SYSTEMS AND SPACE SCIENCES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AP Environmental Science</td>
<td>140</td>
<td>149</td>
<td>681</td>
<td>597</td>
<td>604</td>
</tr>
<tr>
<td>Astronomy</td>
<td>1,515</td>
<td>1,548</td>
<td>1,320</td>
<td>1,326</td>
<td>1,481</td>
</tr>
<tr>
<td>Earth and Space Sciences</td>
<td>147</td>
<td>59</td>
<td>6,568</td>
<td>4,906</td>
<td>4,144</td>
</tr>
<tr>
<td>Environmental Science</td>
<td>3,004</td>
<td>2,688</td>
<td>2,833</td>
<td>1,991</td>
<td>2,295</td>
</tr>
<tr>
<td>Geology</td>
<td>708</td>
<td>766</td>
<td>628</td>
<td>449</td>
<td>660</td>
</tr>
<tr>
<td>Total Earth Systems and Space Science Students</td>
<td>5,514</td>
<td>5,210</td>
<td>12,030</td>
<td>9,269</td>
<td>9,184</td>
</tr>
</tbody>
</table>

New Mexico school districts offer a variety of high school science courses. The statewide science assessment is administered in grade 11, and a student is tested on content that he or she may have completed up to two years earlier or on content that might not be studied until grade 12. Some school districts have adopted an integrated science curriculum that may alleviate this problem. Additionally, though earth and space sciences are in the state science standards, few students take those courses. This fact may also have an impact on the statewide assessment for student performance in science.
2.2.3 Advanced Placement (AP)

Since success on the Advanced Placement (AP) examinations taken in high school can result in college credit at many institutions of higher education, AP is often considered an indication of superior achievement in high school. AP grades are reported on a 5-point scale as follows: 5 Extremely well qualified; 4 Well qualified; 3 Qualified; 2 Possibly qualified; 1 No recommendation. AP scores of 3, 4, and 5 may qualify to receive college credit or advanced placement.

Traditionally, the measure used to determine AP success at the state level has been the percentage of students taking the exams who scored 3 or higher. Tables 13 and 14 provide the AP results for the math and science tests.

Table 13. Student Taking and Passing the Math Advanced Placement Courses From 2012 to 2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Calculus AB</th>
<th>Calculus BC</th>
<th>Computer Science A</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Take Test</td>
<td>% Pass Test</td>
<td>Take Test</td>
<td>% Pass Test</td>
</tr>
<tr>
<td>2012</td>
<td>931</td>
<td>45</td>
<td>247</td>
<td>84</td>
</tr>
<tr>
<td>2013</td>
<td>734</td>
<td>35</td>
<td>231</td>
<td>63</td>
</tr>
<tr>
<td>2014</td>
<td>968</td>
<td>34</td>
<td>190</td>
<td>73</td>
</tr>
<tr>
<td>2015</td>
<td>847</td>
<td>30</td>
<td>287</td>
<td>48</td>
</tr>
<tr>
<td>2016</td>
<td>879</td>
<td>33</td>
<td>356</td>
<td>53</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Year</th>
<th>Biology</th>
<th>Chemistry¹</th>
<th>Environmental Science</th>
<th>Physics B²</th>
<th>Physics C: Elec. and Mag.</th>
<th>Physics C: Mechanics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Take Test</td>
<td>% Pass Test</td>
<td>Take Test</td>
<td>% Pass Test</td>
<td>Take Test</td>
<td>% Pass Test</td>
</tr>
<tr>
<td>2012</td>
<td>658</td>
<td>35</td>
<td>383</td>
<td>34</td>
<td>149</td>
<td>31</td>
</tr>
<tr>
<td>2013</td>
<td>533</td>
<td>49</td>
<td>314</td>
<td>35</td>
<td>207</td>
<td>45</td>
</tr>
<tr>
<td>2014</td>
<td>679</td>
<td>53</td>
<td>491¹</td>
<td>32</td>
<td>229</td>
<td>44</td>
</tr>
<tr>
<td>2015</td>
<td>604</td>
<td>47</td>
<td>316</td>
<td>30</td>
<td>215</td>
<td>37</td>
</tr>
<tr>
<td>2016</td>
<td>677</td>
<td>40</td>
<td>422</td>
<td>22</td>
<td>217</td>
<td>38</td>
</tr>
</tbody>
</table>

¹ A revised chemistry exam was administered in 2013–14. It is not possible to make valid comparisons of the 2014 score distribution with those from prior years.

² Physics B was discontinued after the 2013–2014 school year. It was replaced by Physics 1 and Physics 2 exams. See table below.

Table 14b. Results from Physics 1 and Physics 2 Exams

<table>
<thead>
<tr>
<th>Year</th>
<th>Physics 1</th>
<th>Physics 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Take Test</td>
<td>% Pass Test</td>
</tr>
<tr>
<td>2015</td>
<td>409</td>
<td>22</td>
</tr>
<tr>
<td>2016</td>
<td>334</td>
<td>27</td>
</tr>
</tbody>
</table>
Figure 7

Advanced Placement (AP) STEM Success
AP Math and Science Passing Scores

The 3,558 AP exams taken in school year 2015–2016 represent a 6.4 percent increase in the number of exams taken from the previous school year. The passing and advanced scores (3, 4, and 5) also increased 7.2 percent—for a total of 1,282 passing students—from the previous year.
3. Actions Taken in School Year 2015–2016

This section includes a brief summary of actions taken by the Math and Science Advisory Council (MSAC), the Math and Science Bureau, and community stakeholder groups to improve student achievement in math and science.

3.1 Activities of the Math and Science Advisory Council

The MSAC duties are defined by New Mexico State Statute, Appendix A. From July 1, 2015 to June 30, 2016, there were 12 members who served on the MSAC. Selena Connealy and Zachary Leonard served as co-chairs.

**MSAC meeting dates**

- September 10, 2015
- November 5, 2015
- January 15, 2016
- March 3, 2016

**MSAC accomplishments**

- The MSAC also shared the STEM Strategic Framework with stakeholders, including district superintendents, charter school principals, higher education leaders, and representatives from business and industry;
- presented two STEM Strategic Framework workshop sessions at the 2016 STEM Symposium; and
- supported the PED Math and Science Bureau through participation in Making Sense of Science teacher professional development.

The members of the MSAC met on August 26, 2015 with Secretary Hanna Skandera to present the STEM Strategic Framework (see page 10).
3.2 Activities of the Math and Science Bureau

**Accomplishments Achieved with State Funding—Highlights**

**Making Sense of Science (MSS): Facilitation Academy and Teacher 5-day Summer Institutes**
A sustainable system of professional learning for science teachers in New Mexico has been created that integrates deep content in science learning and pedagogy with literacy skills in reading, writing, and discourse.
- New Mexico educators were trained by WestEd as facilitators for the Dynamic Earth teacher course. Teacher courses in Energy, Matter, and Dynamic Earth were offered in June, 2016.

**Making Sense of Student Work**
Follow-up training to MSS in formative assessment protocols that can be used in science and other subjects.

**Math Discussions**
A two-day, professional learning for grades 2–8 teachers to support CCSS-M and the Mathematical Practices.

**STEM Teacher Symposium**
A two-day conference exclusively for New Mexico teachers of math, science, engineering, and technology.
- STEM professional learning workshops and opportunities to network with STEM stakeholders were offered.

**NM STEM Partner Support**
The PED has partnered with other organizations to provide support for STEM programs. The PED has
- purchased science kits for the LANL ISEC program to expand to Chama Valley and Jemez Mountain Public Schools;
- provided stipends for STEM teachers to attend the New Mexico math and science teachers annual conference;
- partnered with the New Mexico Informal Science Education Network (ISE NET) and New Mexico EPSCoR to train ISE NET educators as MSS facilitators to support a week-long course for teachers in Alamogordo;
- provided scholarships to STEM teachers in the Masters of Science Teaching program at New Mexico Tech;
- provided funding for additional teachers needed for the Tech Trek summer camp for grade 8 girls; and
- provided funding to New Mexico MESA for STEM curriculum training of coaches.

**Accomplishments Achieved with Federal Funding—Highlights**

- **The Mathematics and Science Partnerships (MSP) program** is a federal formula grant program administered by the Math and Science Bureau at the PED. The MSP provided $1.2 million in funding during school year 2015–2016 to a collaborative partnership between Mathematically Connected Communities (MC²) at New Mexico State University (NMSU) and 20 high-need school districts in New Mexico.
  - MC² worked with 1,064 teachers in 20 school districts to provide professional learning during the summer and ongoing support during the school year.
  - Ongoing work with the Teacher Leader Cadre increased collaboration in designing and implementing professional learning across the state.

- **NASA GLOBE Grant—MISSION EARTH**: In partnership with WestEd, Boston University, Tennessee State University, NASA Langley Research Center, and the GLOBE Implementation Office, funding for five years was awarded to provide professional learning for teachers, equipment, and a part-time state coordinator. For school year 2016–2017, three pilot career technical education or early college high schools will be selected.
The 2016 New Mexico Legislature appropriation of $2.4 million provided support for teachers who teach science, math, engineering, and mathematics courses as follows.

### MATH AND SCIENCE PROFESSIONAL LEARNING

**Supported by Legislative Appropriations**

<table>
<thead>
<tr>
<th>Building Capacity Events:</th>
<th>Number of Teachers Impacted</th>
<th>Partners/Collaborators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Facilitator Trainings in Making Sense of Science</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy &amp; Matter (FY 15), Dynamic Earth (FY 16)</td>
<td>FY 14</td>
<td>FY15</td>
</tr>
<tr>
<td><strong>Science Standards Review</strong></td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td><strong>Teacher Scholarships</strong></td>
<td>0</td>
<td>51</td>
</tr>
<tr>
<td>NM Institute of Mining and Technology, MST degree</td>
<td>0</td>
<td>41</td>
</tr>
<tr>
<td><strong>MESA Regional Coaching Support</strong></td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td><strong>Facilitator Training in Making Sense of Student Work</strong></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Teacher Support Events:**

| Training Stipends for MESA STEM-E Curriculum                  | FY 14 | FY15 | FY 16 | NM MESA                                     |
|---------------------------------------------------------------|       |     |       |                                             |
| **Stipends** Storyteller Math                                 | 25    | 0    | 0     | MidSchool Math                              |
| **Stipends** Intensified Algebra 1                            | 4     | 0    | 0     |                                             |
| **Support** Teachers attending MC² Math Institutes            | 35    | 0    | 0     | Mathematically Connected Communities (MC²)  |
| **Scholarships** MidSchool Math Conference                   | 275   | 253  | 298   | MidSchool Math                              |
| **Summer Institute** Santa Fe Science Initiative              | 24    | 0    | 0     | Santa Fe Science Initiative                  |
| **STEM Symposium**                                            | 466   | 477  | 449   | NM school districts and charter schools      |
| **Math Discussions**                                          | 0     | 0    | 40    |                                             |
| **MSS Teacher Institutes**                                    | 0     | 225  | 187   | Albuquerque and Las Cruces Public Schools (APS)/(LCPS), LANL Foundation, NM EPSCoR, NM ISE NET |
| **Teacher Courses** Making Sense of Student Work             | 0     | 0    | 88    | APS, LCPS                                   |
| **Teacher Scholarships** NMCTM/NMSTA/EEANM Conference        | 0     | 78   | 62    | NMCTM, NMSTA, EEANM, CSTANM *               |

*Note: NMCTM = NM Council of Teachers of Mathematics; NMSTA = NM Science Teachers Association; EEANM = Environmental Education Association of NM; CSTANM = Computer Science Teacher Association of NM*
$1.2 million from Math and Science Partnership federal funding supports Mathematically Connected Communities (MC²). See below for an explanation of how those funds were spent.

Math and Science Professional Learning
Supported by Federal Funding

Mathematically Connected Communities (MC²)

The partnership includes 6 mathematicians, 11 math educators/specialists, 3 universities—New Mexico State University (NMSU), Western New Mexico University (WNMU), University of New Mexico (UNM)—and 20 New Mexico school districts for school year 2015–2016.

The partnership is designed to support districts in the effective implementation of CCSS-Math, research-based instructional practices that lead to improved student learning in mathematics.

| New Mexico Partner Districts | 20 |
| New Mexico Educators Impacted | 1,064 |
| New Mexico Students Impacted | Approx. 32,000 |

**SUMMER 2015 MATHLAB™**

| Regional Locations | Artesia, Española, Gallup, Las Cruces, Los Lunas, Roswell |
| District/School Leader Participants | 68 |

**SUMMER 2015 MATH INSTITUTE**

| Location | Las Cruces |
| Participants | 71 |

**ONGOING SUPPORT DURING SCHOOL YEAR**

| Teacher Leader Cadre Members | 42 |
| Content Workshop Attendees | 165 |
| Collaborative Teaching and Learning Cycle Participants | 331 |
| Webinar Total Views | 473 |
Mathematically Connected Communities (MC²)

Impact on Teacher Professional Learning:
- Collaborative development of action plans addressed current district needs, resources, and initiatives.
- Professional learning was customized based on district and school/grade-level needs.
- The collaborative teaching and learning cycle (CTLC) provided a flexible process for addressing teacher-specific learning needs in authentic classroom settings.
- Teacher leader cadres increased collaboration in designing and implementing professional learning within schools/districts and across the state.
- Teachers in the CTLC showed positive, productive dispositions about mathematics teaching and learning.
- 349 teachers and 303 students (grades 2–10) participated in 2015 Summer MathLab.
- 473 educators viewed content webinars.

Impact on Student Learning
Center for Education Policy Research (CEPR) at University of New Mexico findings for 2014-2015 showed:
- Students in classrooms of teachers who participated in 2014 MC² summer institutes showed significantly greater gains in mathematics achievement from 2014 to 2015 on standardized state tests than an unbiased matched comparison group.
- Significant rise in PARCC student math scores was tied to more MC² teacher follow-up professional learning.

Students participating in an MC² MathLab activity
The 2016 MidSchoolMath National Conference brought over 650 educators together in Santa Fe in February of 2016, converging from 36 states and provinces. Thanks to the NM PED Math and Science Bureau’s scholarship program, 298 New Mexico K–12 STEM educators were able to attend the conference, taking a wealth of information and new math resources back to public schools throughout the state. Several teams of New Mexico educators also presented at the conference, sharing how they use interactive stories to engage students in the math classroom.

“The MidSchoolMath National Conference, 2016 has made me a better teacher! I feel empowered to teach math in new and exciting ways," noted a teacher from Mountain View Middle School in Roswell.

GLOBE Mission Earth aims to strengthen preparation for STEM careers, especially for underserved youth. Through field-based science, using rigorous research protocols, students collect environmental data, interact with scientists, carry out local projects, and connect with students throughout the world. Embedding this work into schools that specialize in career academies facilitates curriculum integration and coherence.

**NASA GLOBE Mission Earth Funding**

In partnership with WestEd, Boston University, Tennessee State University, NASA Langley Researcher Center, and the GLOBE Implementation Office, funding for five years was awarded to provide professional learning for teachers, equipment, and a part-time state coordinator in New Mexico. Three NM career technical education or early college high schools will be chosen in school year 2016–2017 as pilot schools.
A two-day conference exclusively for New Mexico teachers of math, science, engineering, and technology

Secretary Skandera volunteers to participate in Science Girl’s (Melissa Ober) presentation.

Students from West Mesa and Valley High Schools JROTC STEM teams prepare to launch weather balloons outside the symposium.

Highlights:
Over 470 teachers registered from NM school districts and charter schools.

Full day pre-sessions were offered in Algebraic Thinking, Computer Coding, and Weather and Math.

NM professional teacher associations held sessions.

Students’ teams launched and tracked weather balloons.

Sessions included many opportunities for teachers to improve their practice through hands-on experiences and collaborative activities.
THE NEW MEXICO INFORMAL SCIENCE EDUCATION NETWORK (NM ISE NET)

NM ISE NET has joined forces with the NM PED to support K-12 science teacher professional learning across the state. For the second year, NM ISE NET educators participated in a week-long facilitator training in preparation for summer teacher institutes in Albuquerque. The ISE NET educators helped facilitate the professional learning for the over 300 elementary and middle school teachers participating in week-long Making Sense of SCIENCE (courses in Energy and Matter).

NM ISE NET member, Tish Morris, leads teacher participants in Farmington, NM through a collaborative activity.

This effort is connected to the NM EPSCoR-funded energy teacher institutes that NM ISE NET members present in different communities around the state each summer. In July of 2015, 22 elementary and middle school teachers, representing three school districts gathered at the Farmington Museum for a five-day workshop to learn about energy and connections to literacy and assessment.

NM ISE NET members at MSS Earth Systems’ facilitator training at the New Mexico Museum of Natural History and Science (NMMNHS) in Albuquerque. Back row: Tish Morris, NMMNHS; Selena Connealy, NM EPSCoR; Rachael Cutrufello, National Museum of Nuclear Science & History; Deb Novak, NMMNHS. Front row: Marcia Barton, NM PED; Eric Meyer, Explora; Kim Hanson, Las Cruces Museum of Nature and Science. Not pictured: Jayne Aubele, NMMNHS.
**Making Sense of Science Teacher Courses**

**What is Making Sense of Science?**
The NM PED contracted with WestEd’s Making Sense of Science (MSS) project in 2015 and 2016 to train accomplished New Mexico teacher leaders and staff developers to facilitate five-day MSS teacher courses on Energy, Matter, and Dynamic Earth. The project’s approach emphasizes teachers experiencing the same inquiry-based science they are teaching their students and focuses on science understanding, classroom practice, literacy proficiency, and pedagogical reasoning.

The project’s effectiveness has previously been demonstrated through federally funded randomized controlled trials studying the achievement results from students of comparable teachers who did and did not receive MSS professional learning (Heller, Daehler & Shinohara, 2003; Heller, Daehler, Wong, Shinohara & Miratrix, 2012)

**Who attended?**
Elementary teachers and middle school science teachers from 32 school districts and eight (8) state charter schools attended the MSS courses in Albuquerque and Las Cruces during June, 2016. Below is a list of the participating districts.

<table>
<thead>
<tr>
<th>Alamogordo Public Schools</th>
<th>Eunice Public Schools</th>
<th>Roswell Independent School District</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuquerque Public Schools</td>
<td>Farmington Municipal Schools</td>
<td>Roy Municipal Schools</td>
</tr>
<tr>
<td>Artesia Public Schools</td>
<td>Gadsden Independent Schools</td>
<td>Ruidoso Municipal School District</td>
</tr>
<tr>
<td>Belen Consolidated Schools</td>
<td>Gallup-McKinley County Schools</td>
<td>Santa Fe Public Schools</td>
</tr>
<tr>
<td>Bernalillo Public Schools</td>
<td>Hobbs Municipal Schools</td>
<td>Silver City Consolidated Schools</td>
</tr>
<tr>
<td>Bloomfield School District</td>
<td>Las Cruces Public Schools</td>
<td>Socorro Consolidated Schools</td>
</tr>
<tr>
<td>Central Consolidated School District</td>
<td>Los Alamos Public Schools</td>
<td>State Charter Schools (8)</td>
</tr>
<tr>
<td>Cuba Independent School District</td>
<td>Los Lunas Public Schools</td>
<td>Tularosa Municipal Schools</td>
</tr>
<tr>
<td>Deming Public Schools</td>
<td>Magdalena Municipal Schools</td>
<td>West Las Vegas Schools</td>
</tr>
<tr>
<td>Des Moines Municipal Schools</td>
<td>Pojoaque Valley Public Schools</td>
<td>Zuni Public School District</td>
</tr>
<tr>
<td>Española Public Schools</td>
<td>Rio Rancho Public Schools</td>
<td></td>
</tr>
</tbody>
</table>

**Teachers’ science content knowledge gains were substantial.**
Of the participating teachers, 100 percent believed that the MSS courses strengthened their understanding of science content with 78 percent strongly agreeing. The pre- and post-test administered in each Matter, Energy, and Dynamic Earth course supports the teachers’ belief, showing that teachers made significant gains in content knowledge. The strongest gains were made in the Energy and Dynamic Earth courses, with a gain of approximately one standard deviation. Teachers’ gains in the Matter course were less pronounced, as teachers started with a stronger knowledge base, but the gains were still statistically significant.
The table below summarizes gains teachers made in content knowledge in each course.

<table>
<thead>
<tr>
<th>Course</th>
<th>Pre-Test (Mean % Correct)</th>
<th>Post-Test (Mean % Correct)</th>
<th>Mean Gain (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>56</td>
<td>74</td>
<td>17</td>
</tr>
<tr>
<td>Dynamic Earth</td>
<td>47</td>
<td>59</td>
<td>12</td>
</tr>
<tr>
<td>Matter</td>
<td>76</td>
<td>82</td>
<td>6</td>
</tr>
</tbody>
</table>

**Teachers agreed—the training strengthened their ability to integrate literacy and science.**

Of participating teachers, 99 percent felt that the MSS teacher course strengthened their own understanding of how to support literacy in a science classroom. Of every four teachers, three (78%) strongly agreed that the MSS course strengthened their understanding of how to integrate literacy and science.

“Because I was not a science major in school, I struggle with some of the concepts I have not worked with for nearly 40 years. However, this course is down and dirty—makes the content easy to grasp, teaches me about student misconceptions that can form if I’m not confident or directly teaching the concepts (inquiry model), and gives me tools to use directly in my classroom (literacy content)." Teacher MSS participant

**Teachers articulated that the MSS professional learning was better than prior professional learning experiences in their career.**

Of participating teachers, 96 percent stated that MSS was a stronger-than-average professional learning experience; two of every three teachers (66%) stated that it was “among the best of my professional development experiences.”

“Teachers who are "afraid" of science now understand it is not a different subject but a new way of accessing reading, writing, and speaking." Teacher MSS participant

**References**


**Making Sense of Science Facilitator Training**

The New Mexico Museum of Natural History and Science (NMMNHS) provided a perfect setting for the WestEd five-day facilitation academy in the MSS Dynamic Earth course. As part of an initiative to build capacity within the state to deliver high-quality professional learning to teachers, 24 science educators from around New Mexico were selected to attend the facilitation academy.

Participants in the facilitation academy experienced the Dynamic Earth course firsthand, made sense of vexing science concepts, explored the practice of teaching, and considered how to support students’ literacy needs in science.

**Participants in the 2016 MSS Dynamic Earth Facilitation Academy at the NMMNHS.**


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**Presidential Awards for Excellence in Mathematics & Science Teaching**

Congratulations to the 2013 Presidential Awardees:

- **Math:** Marco Martínez-Leandro
- **Science:** Karen Temple Beamish

Congratulations to the 2015 State Science Finalists:

- Kathleen Boerigter, Kevin Gant, Krystal Irby, Cindy Lee

The Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) are the highest honors bestowed by the United States government specifically for K–12 mathematics and science teaching. Recipients of the national award receive a certificate signed by the President of the United States; a paid trip for two to Washington, DC, and a $10,000 award.

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2013 PAEMST National Awardees at the National Science Foundation

Marco Martinez, 2013 PAEMST Math Awardee and Claudia Ahlstrom, PED Math Specialist, at the MidSchoolMath Conference
3.3 Highlights of K–12 Math and Science Community Stakeholders

New Mexico is home to several STEM initiatives that have proven exemplary in promoting interest and achievement in STEM areas. Some examples are highlighted below.

American Association of University Women (AAUW)—Tech Trek
The AAUW selected 60 New Mexico girls going into grade 8 to stay on the campus at New Mexico Tech in Socorro, June 19–25, 2016 for the Tech Trek camp. Workshops included Nanotechnology; Photonic Cooking; Ozobots!; Explore Coding through Mini-Robotics; All about the Bass: Make Music with Raspberry Pi; The Social Life of Pennies; Weather or Not: Forecasting Hazardous Weather Events; What Do Electricity and Magnetism Have to Do with Each Other?; Rocks and Fossils of New Mexico; CSI/DNA; Physiology in Motion; Light, Color & Sparkles; Science Writing—More than Lab Reports; and Water Beneath Our Feet. There were also field trips to the Very Large Array and the Mineral Museum.

Inquiry Science Education Consortium (ISEC), Los Alamos National Laboratory Foundation
The Inquiry Science Education Consortium (ISEC) is a Los Alamos National Laboratory Foundation (LANLF) initiative that addresses challenges in STEM education. ISEC delivers a research-based program model that is dependent upon curriculum, professional learning, and materials management. Currently, this program serves over 12,000 students, 570 teachers, and 44 schools in northern New Mexico, with an annual budget of $2 million. Teachers attend a summer institute and are offered continued support throughout the year, with follow-up coaching, modeling, and further professional learning in topics of advanced content and pedagogy, such as formative assessment, academic discourse and accountable talk, notebooking, argumentation, modeling, and visual literacy. Science kits are delivered and picked up from each school and refurbished after a 12-week cycle. Students in the program are 83 percent Hispanic/Latino and 55 percent have been designated English learners. The percentage of students who are designated as economically disadvantaged stands at 85 percent.

Mathematically Connected Communities (MC2), New Mexico State University
The MC2 project, a partnership between three (3) universities and 20 school districts, annually receives approximately $1.2 million from US ED Math and Science Partnership funds. Through the MC2 project, mathematicians, math educators, researchers, teachers, and school administrators collaborate to build the capacity of partner school districts in the state to effectively implement Common Core State Standards for Mathematics (CCSS-M). The MC2 partnership provides structures and processes for professional learning in three areas: (1) building teacher mathematics content knowledge of CCSS-M and developing pedagogical skills in the implementation of Math Practices to improve students’ mathematics learning through summer math labs and math institutes; (2) building leadership capacity to establish and support high quality mathematics instruction and coherent K–12 math programs in districts/schools; and (3) providing on-site support including district-wide professional learning for mathematics teachers, school-based professional learning communities, and classroom-based follow-up to ensure students’ mathematics learning and achievement. Approximately 20 school districts and over 1000 teachers participate in MC2 professional learning opportunities.

New Mexico EPSCoR (Experimental Program to Stimulate Competitive Research)
The NM EPSCoR program is funded through the National Science Foundation and includes a broad range of learning and research experiences, both formal and informal, across educational levels and age groups. The ISE NET is an EPSCoR program that provides opportunities and resources for informal educators to work together to impact science teaching, science learning, and science awareness throughout the state of New Mexico. EPSCoR also funds Energize New Mexico, a professional learning program for elementary educators, and participated in the WestEd MSS initiative by providing a week-long course to teachers in the Alamogordo area, based on the MSS Energy course.
New Mexico MESA
New Mexico Mathematics, Engineering, Science Achievement, Inc. (NM MESA) prepares middle and high school students for college majors and careers in mathematics, engineering, science, and related fields. NM MESA supports programs throughout the state, where students participate in activities such as field trips, speaker presentations, workshops, academic competitions, community service, and leadership development.

Northern New Mexico Math and Science Academy (MSA), Los Alamos National Laboratory
The Los Alamos National Laboratory (LANL) Math and Science Academy is in its 16th year of delivering professional learning to northern New Mexico teachers. MSA is an intensive and comprehensive professional learning program designed to support continuous improvement of teaching and learning mathematics and science. The MSA accomplishes its goals through the following:

- Summer Institute—a summer institute at which teachers learn about best practices in instruction, assessment, student engagement, brain-based learning, and STEM education content
- Ir-Rational Number Institute—six Saturdays during the school year in which math content training is provided
- Coaching and Support—school-year classroom support in math and science content and instruction and the development of teachers into instructional leaders and future administrators
Appendices

Appendix A: Statutory Requirements

This section describes the laws and rules that apply to the Mathematics and Science Education Act in relevant part as follows:

This act [Chapter 22, Article 15E NMSA 1978] may be cited as the "Mathematics and Science Education Act".

As used in the Mathematics and Science Education Act:
A. "bureau" means the mathematics and science bureau;
B. "chief" means the chief of the bureau; and
C. "council" means the mathematics and science advisory council.

A. The "mathematics and science bureau" is created in the department. The secretary shall appoint the chief as provided in the Public Education Department Act [9-24-1 NMSA 1978].
B. The bureau shall:
   (1) administer the provisions of the Mathematics and Science Education Act;
   (2) provide staff support for and coordinate the activities of the council;
   (3) work with the council to develop a statewide strategic plan for mathematics and science education in the public schools and coordinate education activities with other state agencies, the federal government, business consortia and public or private organizations or other persons;
   (4) ensure that school districts' plans include goals for improving mathematics and science education aligned to the department's strategic plan;
   (5) recommend funding mechanisms that support the improvement of mathematics and science education in the state, including web-based mathematics and science curricula, mentoring and web-based homework assistance;
   (6) promote partnerships among public schools, higher education institutions, government, business and educational and community organizations to improve the mathematics and science education in the state;
   (7) develop and evaluate curricula, instructional programs and professional development programs in mathematics and science aligned with state academic content and performance standards; and
   (8) assess the outcomes of efforts to improve mathematics and science education using existing data.
History: Laws 2007, ch. 44, § 3; 2007, ch. 239, § 3.

22-15E-4. Mathematics and science advisory council; created; members; terms; vacancies.
A. The "mathematics and science advisory council" is created, composed of twelve members. Members of the council shall be appointed by the secretary for staggered terms of four years; provided that for the initial appointments, four members shall be appointed for two years, four members shall be appointed for three years and four members shall be appointed for four years. Members shall serve until their successors have been appointed and qualified. A vacancy shall be filled by appointment by the secretary for the unexpired term.
B. Using a statewide application process, the secretary shall appoint members from throughout the state so as to ensure representation of the state's demographics, including geographic distribution, gender and ethnic diversity and as follows:
   (1) four members from public schools, including at least two mathematics and science teachers and a school district administrator with experience in mathematics and science curricula;
   (2) three members from public post-secondary educational institutions with expertise in mathematics or science education;
   (3) four members from the private sector, including the national laboratories, museums and science- and engineering-based businesses; and
   (4) one member who represents the New Mexico partnership for mathematics and science education.
C. Members of the council shall elect a chair from among the membership. The council shall meet at the call of the chair not less than quarterly.
D. Members of the council are entitled to receive per diem and mileage pursuant to the provisions of the Per Diem and Mileage Act [10-8-1 NMSA 1978] but shall receive no other compensation, perquisite or allowance.

The council shall:
A. advise the bureau on implementation of the bureau's duties pursuant to the Mathematics and Science Education Act;
B. make recommendations to the bureau and the department regarding the statewide strategic plan for improving mathematics and science education and advise on its implementation and incorporation into the department's five-year strategic plan for public elementary and secondary education in the state;
C. advise the bureau, the department and the legislature regarding appropriations for mathematics and science education, administration, resources and services, including programs for public school students and staff;
D. work with the bureau to determine the need for improvement in mathematics and science achievement of public school students and make recommendations to the department on how to meet these needs; and
E. produce an annual report on public elementary and secondary mathematics and science student achievement to be submitted to the department, the governor and the legislature no later than November 30 of each year.

22-15E-6. Mathematics and science proficiency fund; created; purpose; annual reports.
A. The "mathematics and science proficiency fund" is created as a non-reverting fund in the state treasury. The fund consists of appropriations, gifts, grants, donations and income from investment of the fund. Disbursements from the fund shall be made by warrant of the secretary of finance and administration pursuant to vouchers signed by the secretary of public education or the secretary's authorized representative.
B. The fund shall be administered by the department, and money in the fund is appropriated to the department to provide awards to public schools, school districts, public post-secondary educational institutions and persons that implement innovative, research-based mathematics and science curricula and professional development programs. The department shall promulgate rules for the application and award of money from the fund, including criteria to evaluate innovative, research-based mathematics and science programs and professional development programs.
C. Each award recipient shall provide an annual report to the bureau that includes a detailed budget report, a description of the services provided and documented evidence of the stated outcomes of the program funded by the mathematics and science proficiency fund and that provides other information requested by the bureau.

History: Laws 2007, ch. 44, § 4; 2007, ch. 239, § 4


Appendix B: STEM Learning Opportunities for K–12 Students and Their Families

This information was compiled, in part, from the University of New Mexico’s STEM-H STEM database: http://nmstemed.org/ and is not meant to be an exhaustive list.

Academy of Young Scientists
The Southern New Mexico Academy for Young Scientists (AYS) provides opportunities to spark the interest of students in STEM.

The Albuquerque Astronomical Society (TAAS)
TAAS throws star parties throughout the school year, both in and outside the classroom. The UNM campus observatory is open to the public every Friday night during the fall and spring semesters, and TAAS members run telescopes.

Albuquerque Bernalillo County Water Authority (ABCWA)
The ABCWA provides classroom presentations, tours of the Southside Water Reclamation Plant, and the Rio is Ours field trip for all APS fourth-grade students.

Albuquerque BioPark
The BioPark, including the zoo, aquarium, botanic garden and Tingley beach, offers a variety of day camps and classes throughout the year, aquarium overnights, evening programs, a teen volunteer program, and family festivals.

American Association of University Women—Tech Trek
A week-long STEM summer camp for girls going into eighth grade. The girls attend a daily math or science class, participate in workshops and hands-on activities, attend a field trip, and meet female STEM role models.

American Chemical Society (ACS)—Central New Mexico
The ACS works to recognize several outstanding NM students as part of the ACS Chemistry Olympiad Program and also administers Project SEED to involve economically disadvantaged students in a summer research program.

Anderson Abruzzo Albuquerque International Balloon Museum (AAAIBM)
AAAIBM is a museum dedicated to the worldwide history, science, and art of all types of ballooning and lighter-than-air flight and offers guided tours and activities for students.

Asombro Institute for Science Education—Desert Science in the Classroom
Dedicated to increasing scientific literacy by fostering an understanding of the Chihuahuan Desert, more than 13,000 K–12 students and 500 teachers in southern New Mexico participate in science education programs each year.

Audubon—Randall Davey Audubon Center and Sanctuary
Audubon NM offers nature walks, family events, summer camps, and school outreach programs. Summer campers explore 135 acres of mountain wilderness and a variety of diverse habitats.

Bosque Ecosystem Monitoring Program (BEMP)
The BEMP is long-term, ecological research using volunteers (mainly K–12 teachers and their students) to monitor key indicators of change in the Middle Rio Grande riparian forest—the bosque.

Bioregional Outdoor Education Program (BOEP)
BOEP promotes understanding and appreciation of the Colorado Plateau Bioregion through core-based, place-based, outdoor education for grades K–8.
Bosque del Apache National Wildlife Refuge
Refuge staff and volunteers provide environmental education in the new education wing of the visitor center. The refuge also offers workshops, tours, hikes, and family programs, including the Festival of the Cranes.

Bradbury Science Museum
In addition to about 40 interactive exhibits that trace the history of the Manhattan Project and Los Alamos National Laboratory, the museum offers the travelling Science on Wheels van, the Science Fest, and High Tech Halloween.

Central New Mexico Science and Engineering Research Challenge
A regional middle and high school student competition of science and engineering projects in Bernalillo, Sandoval, Valencia, and Torrance counties, winners go to the State Science Fair and possibly to the International Science Fair.

E3 Children's Museum and Science Center—Simply Science
This Farmington museum and science center introduces children to science through hands-on exhibits and special programs, including a Tots Turf for children under five.

Environmental Education Association of New Mexico—Project Learning Tree
Project Learning Tree® (PLT) is an award-winning, multi-disciplinary, environmental, education program for educators and students in pre-K through grade 12. PLT is a program of the American Forest Foundation.

Expanding Your Horizons (EYH) Conferences
Dedicated to providing gateway STEM experiences to middle and high school girls that spark interest in STEM careers, EYH conferences take place in Albuquerque, Carlsbad, Las Cruces, Santa Fe, Los Alamos, and Silver City.

Explora! Museum—Classes for Home Schoolers, Outreach Programs, and Seasonal Camps
Hands-on innovative museum that offers interactive opportunities for discovery learning. Seasonal camps and a semester of weekly, hour-long, experiential science, technology, and art programs are facilitated by Explora!.

Farmington Museum at Gateway Park
A wide variety of permanent and traveling exhibits relate the diverse history of the area’s cultures. Lecture series, performances, workshops, art shows, and special demonstrations are offered year round.

4-H
Supported by the NMSU Cooperative Extension Service, 4-H provides STEM programs for students in biological sciences, environmental science, engineering, agricultural science, health, and nutrition.

Fractal Foundation—First Friday Fractals
This is a monthly, full-dome planetarium show at the New Mexico Museum of Natural History that dramatically showcases the beauty of algebra and the connections between math and nature.

Girl Scouts of New Mexico Trails
Girl Scouts introduces girls of every age to STEM experiences relevant to everyday life. STEM experiences are framed within the three Girl Scout processes of girl-led, learning by doing, and cooperative learning.

HMTech
This is a summer STEM program provided by the Black Leadership Committee at Sandia National Laboratories for middle and high school students to explore a variety of STEM careers.
Las Cruces Museum of Nature and Science
Guided tours, Family Science Saturdays, Science Cafés, spring break, and summer camps are offered at this museum.

Learners Chess Academy
An Albuquerque-area organization promoting before- and after-school chess clubs and chess camps to inspire an appreciation for chess and a deeper understanding of how to analyze, interact socially, and lead.

Los Alamos National Laboratory (LANL)—Education Programs
LANL is committed to providing a positive and sustainable impact on our region by leveraging direct and indirect community investments to enhance educational opportunities in STEM education.

Los Alamos National Laboratory (LANL)—New Mexico Hazmat Challenge
An annual training event for regional hazmat response teams. The event is hosted by the LANL Emergency Operations Division and the Emergency Response Group. Up to 15 high school students can participate.

Maker Faire ABQ
A family-friendly showcase of invention, creativity, and resourcefulness, this is a place where people show what they are making and share what they are learning. The aim is to entertain, inform, connect, and grow this community.

Math Snacks
Short animations, games, and inquiry-based lessons that engage learners in actively building a conceptual understanding of mathematical ideas were developed through the NMSU Learning Games Lab (mathsnacks.org).

Mathcounts
Mathcounts is a national enrichment, coaching, and competition program that promotes middle school mathematic achievement and is supported by the National Society of Professional Engineers.

Maxwell Museum of Anthropology, UNM
Museum educational programs include check-out kits for Southwest archaeology, biological anthropology, Native American ethnology, and Hispanic ethnology. Additionally, the museum hosts summer camps for youth, ages 8–12.

Memorial Middle School Agricultural Extension and Education Center, Las Vegas
A youth science center emphasizing inquiry-based learning and experiential education.

Mesalands Dinosaur Museum, Tucumcari
10,000 square feet of exhibits feature the Age of Dinosaurs with fossils from tiny footprint casts to the 40' long skeleton Torvosaurus, a rare carnivore relative of Tyrannosaurus rex which hails from the Jurassic period.

National Museum of Nuclear Science and History—Nuclear Science Education Programs
The museum offers classroom programs, science demonstrations, educator workshops, kids' camps, lectures, and partners with YWCA TechGYRLS to host NanoDays at the museum. Nuclear Science Week is celebrated in October.

New Mexico Academy of Science (NMAS)
The NMAS promotes student research and participation in science fairs with a research paper competition. NMAS also sponsors two students to participate in a three-week science camp in West Virginia.
New Mexico Computer Science for All
The Santa Fe Institute, with other partners, coordinates this comprehensive teacher professional learning program to prepare middle and high school STEM teachers to be computer science teachers.

New Mexico Department of Game and Fish—Project WILD and Project WILD Aquatic
Project WILD is a wildlife education program to develop awareness, knowledge, skills, and commitment that results in informed decisions, responsible behavior, and constructive actions concerning wildlife and the environment.

New Mexico FFA Association (formerly Future Farmers of America)
Students in the FFA develop leadership, public speaking, and STEM skills, and compete in Career Development Events in agriculture, forestry, entomology, and veterinary science at regional, state and national levels.

New Mexico FIRST LEGO® League
Sponsors FIRST LEGO® League, FIRST Robotics Championships, and FIRST Tech Challenge for K–12 students.

New Mexico Museum of Natural History and Science (NMMNHS)
In addition to exhibits about New Mexico’s natural history, NMMNHS provides many educational programs for school groups and family visitors as well as an extensive summer camp program.

New Mexico Museum of Space History, Alamogordo
The NMMSH offers exhibits and programs related to the history, science, and technology of space. Their summer camp program, Space Academy, offers students the opportunity for hands-on learning, teamwork, and imagination.

New Mexico Project Lead the Way, NMSU
PLTW prepares students to be innovative and productive leaders in science, technology, engineering and mathematics (STEM) and to make meaningful, pioneering contributions to our world.

New Mexico State Parks
NMSP offers 35 outdoor classrooms across the state with a wide variety of cultural and natural resources. The Kids ‘n Parks program provides grants to teachers for buses to transport students to the state parks.

New Mexico State University—Computer Science Outreach
NMSU offers a multi-dimensional program to facilitate a mentor-lead pipeline for NM students into computer science.

NM MESA, Inc.—NM MESA Program (math, engineering, science achievement)
NM MESA is a pre-college program for grades 6 through 12 with an emphasis on STEM. The NM MESA mission: Empower and motivate New Mexico's culturally diverse students with STEM enrichment.

NM PBS (Public Broadcasting Station)—SciGirls and Summer Learning Day
NM PBS offers training in facilitating SciGirls, a PBS program for girls in grades 5–8 that has the goal of changing how girls think about STEM through inquiry-based investigations and half-hour TV episodes.

NMSU Computer Science—Young Women in Computing
The Young Women in Computing program (YWic) is an outreach initiative developed with the vision to increase the exposure of, and participation in, computer science activities for all students in NM.

NMSU STEM Outreach—Academy of Young Scientists—From Stone Age to Space Age
The Southern New Mexico Academy for Young Scientists (AYS) provides opportunities to spark the interest of students in STEM in the Las Cruces area.
NMSU STEM Outreach—Southern New Mexico Science, Engineering, Mathematics, and Aerospace Academy (SNM SEMAA)
SNM SEMAA is an outreach project to increase participation in, and retention of, historically underrepresented K–12 youth in the STEM fields. It sponsors family festivals, the Aerospace Engineering Lab, and Science Olympiad.

Pajaroito Environmental Education Center (PEEC), Los Alamos
Nature walks, Nature Playtime, Take Wings Family Events, summer adventure programs, lectures, classes, and field science curriculum are offered by this nature center on the Pajarito Plateau.

Project GUTS (Growing Up Thinking Scientifically)
A nationally recognized after-school science, technology, engineering and math (STEM) program for middle school students based in Santa Fe, New Mexico

River Source, Inc.—Watershed Watch and Resilient Water Future Programs
River Source focuses on STEM education at all NM schools by teaching cutting-edge, watershed monitoring using several physical, chemical, and biological measurements.

Riverside Nature Center, Farmington
The wetlands serve as a wildlife refuge with guided bird tours, dragonfly walks, one-to-two-mile strolls, and special events.

RiverXchange
A free, year-long program for fifth-grade students that integrates water resource topics with computer technology, student writing, and a hands-on curriculum.

RoboRAVE International
An annual team robotics competition for K–16 teams of two to four kids (big kids too) in Roboquerque, NM. Robot competitions range from introductory to advanced to provide an opportunity for every age and every level.

Sandia Mountain Natural History Center—Ecology Field Program
The Ecology Field Program is a free, statewide program for students in 3rd through 8th grades. It is a place-based, hands-on program that introduces students to ecosystems through a 2.5 hour hike and other activities.

Sandia National Laboratories—Adventures in Science and Knowledge (ASK), K–12 Education Partnerships
Sandia Labs offers programs to support the development of the next generation of scientists and engineers, including three unique programs for American Indian students, African American students, and Hispanic students.

Santa Fe Alliance for Science—Santa Fe Alliance for Science (SFAS)
SFAFS is an organization of more than 100 STEM professional volunteers in the Santa Fe area who work with students and teachers to help improve K–14 math and science education.

Santa Fe Science Cafés for Young Thinkers—Santa Fe Alliance for Science
Held six times each academic year, the purpose of this program is to introduce middle and high school students to interesting topics in science and technology.

Santa Fe Botanical Garden—Family Programs and Community Days
Outdoor classrooms, family mornings, and field trip programs are available for pre K–12 youth at the three sites: the Museum Hill garden, the Leonora Curtin Wetland Preserve, and the Ortiz Mountains Educational Preserve.
**Santa Fe Children's Museum**
Informal science learning opportunities are offered through interactive exhibits, school field trips, outreach to schools and community centers, overnight camp-ins, the Youth Apprenticeship Program, and community festivals.

**Santa Fe Institute / GUTS y Girls Program—GUTS y Girls Summer Workshops**
GUTS y Girls helps girls explore new concepts and careers. During the summer workshop, participants learn about complex systems science through hands-on activities and computer simulations.

**Science Education Alliance—Science Advisors Program**
The Science Advisors (SCIAD) Program services teachers and students K–12 with local STEM community resources for support with STEM instruction and activities.

**Science Education Solutions—Café Scientifique**
Conversations with scientists, engineers, and inventors take place in an informal and relaxed setting for young teens, helping them explore the latest ideas in science and technology.

**Southern New Mexico Academy for Young Scientists (AYS)**
The AYS program for students in 5th, 6th, and 7th grade in the Las Cruces area emphasizes hands-on science field trips and participation in after-school space and science programs.

**Southwest Center for Microsystems Education (SCME) at the UNM Manufacturing Training and Technology Center**
SCME offers professional learning and educational materials to excite and engage secondary and post-secondary students in the field of microsystems (MEMS) technology.

**Supercomputing Challenge**
Dedicated to increasing interest in science and math among 6th through 12th grade students. During the academic school year, teams of students complete computational science projects.

**Talking Talons Youth Leadership**
Provides on-site and outreach programs using live animals to educate audiences about wildlife. Hosts the Next Generation Conservationists Career Fair.

**US Forest Service—Nature Walks, Junior Ranger Programs**
The More Kids in the Woods program helps high school students re-establish a connection with their environment. The USFS is also a key partner in the online program Climate Change Live.

**University of New Mexico—STEM Education Outreach Programs**
The Central NM Science and Engineering Research Challenge, the Central NM Science Olympiad, the STEM Teacher Professional Development Workshop series, and the Student Research Workshop(s) are held each year.

**UNM-PNM Statewide Mathematics Contest**
The two rounds of exams are designed to test mathematical potential and ingenuity as well as formal knowledge. It is open to all students in grades 7–12 as well as interested students in lower grades.

**Valle de Oro National Wildlife Refuge, Albuquerque**
This urban wildlife refuge offers environmental education opportunities on 431 acres of land along the Rio Grande.
Valles Caldera National Preserve—Student Forest Restoration Monitoring
Students learn about forest health, restoration, and management through hands-on data collection and field work. Collected data will be used by the trust to evaluate the condition of forests and restoration projects on the preserve.

Western Heritage Museum, Hobbs
This regional museum focuses on southeastern NM from prehistory to present. The museum’s collections range from archeological artifacts, to pioneer household items, to modern tools from the oilfield.

Whitfield Wildlife Conservation Area, Belen
Visitors can take guided nature walks and hikes on trails that lead through several different habitats and plant zones, ranging from meadows and grasslands to riparian woodland. The visitor center is open on Fridays and Saturdays.

Wildlife Center, Española
On-site programs involve raptors, a tour of the 30-plus resident animals, games, and activities. The center offers summer science day camps, three-day Explore Your Watershed programs, and community science nights.

Wildlife West Nature Park, Edgewood
Five-day Junior Zookeepers summer day camps are offered for children ages 9–12 at the 122-acre site. Field trips and bird handling classes are also available.

YWCA —TechGYRLS
This is an after-school program in select schools in Albuquerque and an overnight summer camp. The goals are to give girls ages 9–14 the skills and confidence they need to pursue careers in STEM.
<table>
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<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>CCSS</td>
<td>Common Core State Standards</td>
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<tr>
<td>CNM</td>
<td>Central New Mexico Community College</td>
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<td>eDEAR</td>
<td>Electronic Data Editing and Reporting</td>
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<td>EoC</td>
<td>End-of-course (exam)</td>
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<tr>
<td>EPSCoR</td>
<td>Experimental Program to Stimulate Competitive Research, a National Science Foundation funded grant</td>
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<td>HED</td>
<td>Higher Education Department</td>
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<td>IDEAL-NM</td>
<td>Innovation Digital Education and Learning in New Mexico</td>
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<td>MESA</td>
<td>Mathematics, Engineering, Science Achievement, Inc.</td>
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<td>MSAC</td>
<td>Math and Science Advisory Council</td>
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<td>MSB</td>
<td>Math and Science Bureau of the Public Education Department</td>
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<td>NGSS</td>
<td>Next Generation Science Standards</td>
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<td>NMPSE</td>
<td>New Mexico Partnership for Math and Science Education</td>
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<td>New Mexico State University</td>
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<td>NSF</td>
<td>National Science Foundation</td>
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<td>PARCC</td>
<td>Partnership for Assessment of Readiness for College and Career. PARCC assessments are administered in English language arts and in math (grades 3–8), Algebra I (may be given in grade 8), Algebra II, Geometry, Integrated Math I, Integrated Math II, Integrated Math III. This report refers to PARCC math assessments only.</td>
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<tr>
<td>PD</td>
<td>Professional development/ professional learning</td>
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<td>PED</td>
<td>New Mexico Public Education Department</td>
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<td>PNM</td>
<td>Public Service Company of New Mexico</td>
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<tr>
<td>SBA</td>
<td>New Mexico Standards Based Assessments are provided for a number of content areas not assessed by PARCC. This report refers to SBA science assessments only.</td>
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<td>STARS</td>
<td>Student Teacher Accountability Reporting System (STARS) catalogs. Volume 1 provides a standard data set framework for each student in the Pre K-grade through 12 public education system. Volume 2 has reference materials including all approved course descriptions.</td>
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<tr>
<td>STEM</td>
<td>Science, technology, engineering, and mathematics</td>
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<td>SWD</td>
<td>Students with disabilities</td>
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<tr>
<td>SY</td>
<td>School year</td>
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<tr>
<td>UNM</td>
<td>University of New Mexico</td>
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Appendix D: Letter to Secretary Skandera from MSAC Regarding New Science Standards

August 26, 2015

Hanna Skandera
New Mexico Public Education Department
300 Don Gaspar
Santa Fe, NM 87501

Dear Secretary Skandera,

The Math and Science Advisory Council (MSAC) recommends the adoption of the Next Generation Science Standards (NGSS) by the New Mexico Public Education Department. Adopting NGSS is an essential step to ensure that all New Mexico students have access to high-quality science curricula and instruction and will become STEM literate citizens that are college and career ready.

On November 12, 2013, MSAC unanimously passed a motion to support PED adoption of NGSS. This recommendation was reflected in MSAC 2014 annual report, and it still stands, nearly two years later. We recommend that the standards be adopted as written without any modifications. Additionally, MSAC recommends implementation with significant resources and support for teacher and administrator professional development, curriculum, and equipment and materials. We recommend a one-year planning period with extensive teacher and stakeholder input and a phased-in rollout over several years. The National Science Teachers’ Association (NSTA) and states that have already adopted NGSS support this plan of action.

Adopting NGSS will require that teachers deliver instruction in dramatically different ways; a big shift must be made from how we currently teach science as guided by the NM State Science Standards. Under NGSS, students will be assessed on performance expectations that weave together science content with science and engineering practices and cross-cutting concepts. This shift will require students to learn science and engineering in a deeper and more conceptual way, and require them to engage in the doing of science – learning only science facts will not be sufficient. This is a significant change from past practices, and therefore, it is imperative that adequate funding for materials and equipment, and strong professional development support for teachers and administrators accompany the adoption of NGSS.

The recommendation to adopt NGSS comes as New Mexico is still in the beginning stages of implementing the Common Core State Standards (CCSS) in English Language Arts and Mathematics. The NGSS are aligned with the CCSS and the overlap is meaningful, as science content becomes the subject for analysis in math lessons and the subject for reading and writing exercises. With NGSS adoption, teachers can integrate the core content and students will benefit from reinforcement of concepts in every discipline.

MSAC is pleased to support the PED as it considers adopting NGSS. Coupled with the necessary support, it is the right thing to do to ensure that New Mexico students are prepared for the future.

Sincerely,

Selena Connealy
MSAC Co-Chair

Zachary Leonard
MSAC Co-Chair
Math and Science Advisory Council
Co-chairs:
Selena Connealy, Education and Outreach Coordinator, NM EPSCoR and NM Informal Science Education Network
Zachary Leonard, Teacher Professional Development, Math and Science Academy, Los Alamos National Laboratory

Members:
Karl Agar II, High School Math and Science Teacher, MESA Advisor, Santa Rosa High School
Phyllis Baca, Chemical Engineer, Professor and Chair of Computer and Information Technologies Program, and Director of STEM Initiatives, Santa Fe Community College; American Competitiveness Initiative
Nathaniel Evans, Middle School Math and Science Teacher, Taos Charter School
Joe Hastings, Executive Director, Explora
Suzanne Johnson, STEM Instructional Manager, Albuquerque Public Schools
Karen Kinsman, Director, STEM-H Center for Outreach, Research and Education, UNM
Alexei A. Pevtsov, PhD, Astronomer, National Solar Observatory/Sacramento Peak; former program scientist in the Science Mission Directorate at NASA Headquarters
Hy Tran, PhD, Senior Scientist/Engineer and Project Lead for Length/Mass/Force metrology at Sandia National Laboratories; former mechanical engineering professor at the University of New Mexico
Nader Vadlee, PhD, Engineering Professor at Southwestern Indian Polytechnic Institute (SIPI); former project director of NASA PURSUE and NASA MURED PAIR at UNM