The State of New Mexico
Math and Science Advisory Council
Public Elementary and Secondary Mathematics and Science Achievement
For School Year 2014–2015
Issued November 2015

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
Acknowledgements

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Members whose terms expired during the 2014–2015 school year:
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Malva Knoll, New Mexico Science Teachers Association board member; former Education Director, National Museum of Nuclear Science and History in Albuquerque; and past-President, NM Academy of Science
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Charles H. Walter, Executive Director, New Mexico Museum of Natural History; Principal Investigator (PI), EPSCoR NM Informal Science Education Network; PI, numerous NSF funded STEM education initiatives
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Executive Summary

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

- Continued investment of $2.0 million for the STEM (science, technology, engineering, math) Teacher Initiative appropriated by the legislature
- $1.2 million from Math and Science Partnership federal funding supports Mathematically Connected Communities
- $169,000 in robotics capital outlay funding from the New Mexico legislature’s appropriation
- Increased collaboration and partnerships within the PED, other state agencies, the New Mexico Informal Science Education Network, and other industry and community STEM stakeholders
- Nearly 1,500 STEM teachers were supported with research-based professional development
- Hiring of an additional Math Specialist
- Participation in the Partnership for Assessment of Readiness for College and Careers (PARCC) Operational Working Group, item and test review

Activities of the Math and Science Advisory Council

- Identified critical STEM education needs, goals and strategies (see below)
- Presentation of the STEM Strategic Framework to Secretary Hanna Skandera (see page 22)

Student Data for Math and Science

- Student data for math and science from the New Mexico Assessments have not yet been released at the time of the publication date of this report.
- In national tests—including NAEP for 4th and 8th graders, ACT, SAT, and AP exams for high school students—New Mexico scores are lower than those of the nation, except in ACT Science where they are nearly equal.

Critical Issues and STEM Needs Identified by the Math and Science Advisory Council (MSAC):

**Unified Statewide Vision for STEM Education**
A statewide vision for STEM education is needed to align state education policies and guide all partners toward the development of engaged citizens ready for the workforce.

**High Educational Performance for All Students**
There is an achievement gap at all grade levels for economic, ethnic, race, and gender sub-groups in math and science.

**High Academic Standards and Aligned Assessments**
New Mexico students rank lower than average on national and international benchmarks in STEM at all grade levels.

**Highly-Trained STEM Teachers for All Students**
New Mexico colleges and universities do not graduate sufficient numbers of qualified STEM classroom teachers. No mechanism exists to ensure pre K–12 and pre-service educators engage in continuous improvement practices.

**STEM Learning Opportunities for Students at All Grade Levels in the School Environment**
Curriculum materials and equipment are insufficient in STEM classes at all grade levels; elementary instructional time for science is insufficient.

**Out-of-School STEM Learning**
STEM learning is not only a K–12 responsibility. Significant STEM learning happens in after-school and in summer programs, at science centers, museums and natural environments, through media, competitions, and through informal experiences at home.

See page 8 for the full STEM Strategic Framework for New Mexico.
The prosperity and wellbeing of our country and the state of New Mexico depend on the innovative ideas and advanced skills of its population. Will this country maintain its leadership role in cutting-edge scientific and medical research? Will we be able to successfully address the challenges posed by climate change and population growth, to develop new materials, or to design new computers? How will we construct the bridges and new roads necessary to maintain our country’s infrastructure so that we remain globally competitive? And, will we maintain our leading role in science and technology—a necessity to ensure a sufficient number of high-paying jobs for our citizens?

The answers to these questions will be determined by the effectiveness of the education we provide to our children, especially in science, technology, engineering, and mathematics (STEM). Last year, the Math and Science Advisory Council (MSAC) identified several critical issues and developed a strategic framework for improving STEM education in New Mexico. As this report shows, the New Mexico Public Education Department (PED) and its Math and Science Bureau made notable progress in providing opportunities for teacher professional growth (e.g., STEM Symposia in 2014 and 2015, Middle School Math Conferences, etc.), in facilitating teacher focus groups evaluating new science standards based on the National Resource Council’s Framework for K–12 Science Education, and in fostering important community partnerships (e.g. MC² PED partnership). See Section 3.2, Activities of the Math and Science Bureau.

However, the student data from national assessments indicate that the major trends observed in the past remain: a large percentage of NM students of all socioeconomic groups is not proficient in math and science, and their performance continues to fall behind the national average level (see Section 2.1, Student Data). We could continue the usual path of making incremental improvements, but in today’s highly dynamic society, this approach would mean falling further behind. Thus, there is a compelling need to develop a strategic vision for improving STEM education in New Mexico.

As the first step, this report presents the strategic framework for such improvement. This strategic framework was developed in collaboration between the Math and Science Bureau of the New Mexico Public Education Department and the Math and Science Advisory Council (MSAC), and is designed to be 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 to develop a common vision of improved STEM education in New Mexico. In this framework, the partners will develop specific timelines and measurable goals to support the overall strategic vision.

The following sections provide an overview of the strategic framework, describe identified critical needs and issues and provide examples of proposed strategies 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!
1. Critical Issues to be Addressed and MSAC Recommendations

1.1 Vision for Improving STEM 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 conversation among interested STEM stakeholders throughout the state on ways to improve STEM education in New Mexico. The graphic format of the strategic framework is designed to provide a systematic and readily available reference to track the progress of STEM education improvement from the critical needs and issues through the developed 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.
1.2 STEM Strategic Framework for New Mexico

The Math and Science Advisory Council STEM Strategic Framework for New Mexico insert is included in the hard copy. For the digital copy of the report, please double click on the icon below to view the STEM Strategic Framework for New Mexico.

NM State STEM Strategic Framework
1.3 Critical Issues

**Critical Issue #1 — Unified Statewide Vision for STEM Education**

A statewide vision for STEM education is needed to align state education policies and guide all partners toward the development of our students into engaged citizens ready for the workforce. This statewide vision will help provide direction to a myriad of New Mexico STEM education stakeholders and help ensure that genuine efforts on the part of many entities working toward the same goal support each other. A research-based approach is the collective impact model that brings groups of stakeholders together to develop a shared vision for New Mexico guided by research and best practices of other successful states and nations.

How can stakeholders be engaged to ensure that all STEM education efforts are aligned?

- Develop the STEM strategic plan & theory of change model and an implementation plan with key STEM stakeholders.
- Take advantage of opportunities to work with other state government agencies and to work across sectors (education, business, non-profit) to implement the STEM strategic plan.

**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. Although we recognize that the administration has taken steps to mitigate this, e.g. recruiting and retaining STEM teachers in high-needs areas, more needs to be done. This challenge must be tackled systematically.

What can be done to improve education policy in New Mexico to address the achievement gap?

- Use data to identify and promulgate the best practices in New Mexico high performing schools, districts, and from other states that directly address the achievement gap and could benefit all New Mexicans.

**Critical Issue #3 — High Academic Standards & Aligned Assessments**

New Mexico students rank lower than average on national and international benchmarks in STEM at all grade levels (ACT 2014; NAEP, 2014; SAT, 2014). Forty-six states adopted the Common Core State Standards (CCSS) (Common Core State Standards Initiative, 2014). The Common Core State Standards are significantly more rigorous than its predecessors. Teachers must have an understanding of the content and of pedagogical content knowledge in order to teach effectively (Coggshall, 2012a). Many teachers simply have not been trained to teach in this way and it will take deliberate action and significant effort to help teachers make the shift (Coggshall, 2012).

How can we ensure that all New Mexico students are held to high academic standards and receive CCSS aligned assessments, and that teachers are prepared to implement these standards and assessments?

- Use lessons learned from the implementation of the CCSS in other states to inform policy on curriculum, student assessment, teacher evaluation, and systems of support.
- The MSAC recommends the adoption of new science standards based on the National Research Council’s *Framework for K-12 Science Education* with a robust implementation plan and adequate resources.
Critical Issue #4 — Highly Trained STEM Teachers for All Students

New Mexico colleges and universities do not graduate sufficient numbers of classroom teachers who are qualified in STEM (Public Education Department, 2014). The research shows that states which have well developed teacher induction programs and have monitoring programs in place to measure outcomes outperform those that do not (Darling-Hammond, 2012). Characteristics of high quality teacher induction programs include a mentoring component, and direct links to teaching standards and professional development (Japuith, Mindich, Wei, and Darling-Hammond, 2010). Tucker (2011) reports that in Singapore the top teachers are recruited to mentor incoming teachers for two years, and they are released from their normal teaching contracts to do so. Currently in New Mexico, pre-service teachers are expected to complete student teaching for only one semester as a requirement for graduation. Unfortunately, the quality of those teaching experiences varies widely depending on the school district and the preparation program. New Mexico should consider adopting a more rigorous teacher induction program, as other states have done, to improve teacher quality.

No mechanism exists to ensure pre K–12 and pre-service educators engage in continuous improvement practices; this shift is necessary if implementation of the CCSS is to be a success. Although there are no easy answers, the research supports the claim that comprehensive systems of job-embedded professional learning with a focus on continuous improvement builds the capacity to improve the entire school system. (Barber & Moursched, 2007; Darling-Hammond, 2013; DuFour & Fullan 2013; DuFour & Mattos, 2013; Fullan, 2011, 2014; Hargreaves & Shirley, 2012; Hattie, 2015; Tucker, 2011). However, there is very little evidence of professional learning in our U.S. schools (Schmoker, 2006; Wie, Darling-Hammond, Andree, Richardson, & Orphanos, 2009). New Mexico has an opportunity to embrace research-based policies that will help support teachers, and improve the entire educational system as a whole.

How can teachers be supported within the teacher evaluation framework to engage in continuous improvement?

- Continue to build additional STEM teacher capacity through access to rich and authentic professional learning opportunities; sustain the professional learning opportunities with ongoing school site support.
- Ensure that job-embedded professional learning with a continuous improvement focus occurs in all schools.
- Ensure there is a mechanism within the system for all educators at every level, including administrators and college faculty, to engage in continuous improvement within the profession.
- Develop STEM teacher leaders within schools and districts.

Critical Issue #5 — STEM Learning Opportunities for Students at all Grade Levels

Although New Mexico has science standards in place for all grades K–12, and it is the expectation of the PED that all students will receive science instruction, there is little evidence that all K–6 students are receiving sufficient instruction. Additionally, curriculum materials and equipment are insufficient in STEM classes at all grade levels.

How can we ensure that all students have access to high-quality STEM instruction and rich curricula and materials?

- Ensure that science is taught in elementary schools across the state.
- Ensure that every student has a highly-qualified STEM teacher.
- Ensure that engineering and technology, including computer science, are taught in all schools.
Critical Issue # 6 — Out-of-School STEM Learning

STEM learning is not only a K–12 responsibility. Significant STEM learning happens in after-school and summer programs, at science centers, museums and natural environments, through media, competitions, and through informal experiences at home. Research shows that out-of-school STEM experiences help to “stimulate science interest, build learners’ scientific knowledge and skill, and—perhaps most importantly—help people learn to be more comfortable and confident in their relationship with science.” (Bell, et al, 2009). However, out-of-school STEM opportunities are not equitably distributed across geographic areas of the state, and significant economic barriers to full participation exist.

How can we ensure that all students have access to out-of-school STEM learning?

- Leverage existing state and federal funding to increase capacity of afterschool programs to provide STEM education.
- Strengthen linkages between schools and informal science education organizations.

References:


New Mexico Public Education Department (2014). The Educator Accountability Reporting System. Santa Fe, NM, PED.


2.1 Student Data

2.1 Trends in Student Achievement Data

This report includes student achievement data as measured by the National Assessment of Educational Progress (NAEP), the American College Testing (ACT), and the Scholastic Aptitude Test (SAT). The data from the New Mexico Assessments will be added to this report when the final results are released.

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, which brought educators and other experts together to develop tests aligned to the higher standards, and provide a deeper level of information to teachers and parents to support students. PARCC replaces New Mexico’s previous annual test in math and ELA, the Standards Based Assessment (SBA). PARCC is based on the higher standards that students are being taught in the classroom, and prepares them for success in today’s world. The test moves away from fill-in-the-bubble questions and requires students to read complex text, develop well-organized written responses, answer real-world math problems, and describe and defend their reasoning. 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>PARCC</td>
</tr>
<tr>
<td>English Language Arts 3–11</td>
</tr>
<tr>
<td>Math 3–8</td>
</tr>
<tr>
<td>Algebra I <em>(may be given in grade 8)</em></td>
</tr>
<tr>
<td>Algebra II</td>
</tr>
<tr>
<td>Geometry <em>(may be given in grade 8)</em></td>
</tr>
<tr>
<td>Integrated Math I <em>(may be given in grade 8)</em></td>
</tr>
<tr>
<td>Integrated Math II</td>
</tr>
<tr>
<td>Integrated Math III</td>
</tr>
<tr>
<td>SBA</td>
</tr>
<tr>
<td>Science</td>
</tr>
<tr>
<td>Spanish Reading</td>
</tr>
</tbody>
</table>

* If student is taking the course

The New Mexico Assessments include the evaluation of student progress in the following areas: English Language Arts 3–11, Math 3–8, Algebra I *(may be given in grade 8)*, Algebra II, Geometry *(may be given in grade 8)*, Integrated Math I *(may be given in grade 8)*, Integrated Math II, Integrated Math III, Science, Spanish Reading, Reading for students with disabilities, Math for students with disabilities, and Science for students with disabilities. During school year 2014–2015, students in grades 3–11 were tested. The graphs in this report show the statewide percentage of students who are at or above proficiency as measured by the New Mexico Assessments. If the assessment results for the SY 2014–2015 are not shown in the report, they will be available in December of 2015 as an addendum.

The PARCC test measures more complex, real-world skills, and is more challenging than the SBA math assessment. PARCC is establishing a new, more accurate baseline from which progress can be measured moving forward. Because PARCC is different from the SBA, PARCC scores should not be directly compared to previous SBA scores.
Data from the New Mexico Assessments for math and science are not available at this time. The data from the New Mexico Assessments and the Math and Science Advisory Council's commentary will be incorporated into the final complete report.
2.1.2 National Assessment of Educational Progress (NAEP)

NAEP results are important because they 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).

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 U.S. 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. NAEP does not provide state-level results for 12th grade. Table 1 shows NAEP math results for New Mexico in grades 4 and 8 as well as average national (public) achievement data.

<table>
<thead>
<tr>
<th>Grade 4</th>
<th>New Mexico</th>
<th>Nation</th>
</tr>
</thead>
<tbody>
<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>
<thead>
<tr>
<th>Grade 8</th>
<th>New Mexico</th>
<th>Nation</th>
</tr>
</thead>
<tbody>
<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 since 2007 on the NAEP math results, they are still performing far below the national average.
Table 2a. Comparison of 4th Grade Students, Proficient or Advanced, on NAEP Science

<table>
<thead>
<tr>
<th>Subject</th>
<th>New Mexico</th>
<th>Nation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade 4</td>
<td>Grade 4</td>
</tr>
<tr>
<td>Science 2005</td>
<td>18%</td>
<td>18%</td>
</tr>
<tr>
<td>Science* 2009</td>
<td>24%</td>
<td>32%</td>
</tr>
<tr>
<td>Science* 2011</td>
<td>Only 8th grade tested this year</td>
<td></td>
</tr>
<tr>
<td>Science 2015</td>
<td>Not available</td>
<td>Not available</td>
</tr>
</tbody>
</table>

Table 2b. Comparison of 8th Grade Students, Proficient or Advanced, on NAEP Science

<table>
<thead>
<tr>
<th>Subject</th>
<th>New Mexico</th>
<th>Nation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade 8</td>
<td>Grade 8</td>
</tr>
<tr>
<td>Science 2005</td>
<td>27%</td>
<td>27%</td>
</tr>
<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>Not available</td>
<td>Not available</td>
</tr>
</tbody>
</table>

*State participation in the NAEP science assessment is voluntary. And while most states participated in the 2009 assessment, 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.


The data show that approximately one-quarter of New Mexico students in grade 8 were proficient or advanced in science in 2011, lagging slightly behind their counterparts nationwide. Unfortunately, the most recent 2015 data for science is unavailable until spring of 2016.
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 determine entrance requirements based on ACT and SAT scores.

<table>
<thead>
<tr>
<th>ACT Math</th>
<th>New Mexico</th>
<th>Nation</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Year</td>
<td>Average</td>
<td># of Seniors</td>
</tr>
<tr>
<td>2010–11</td>
<td>19.5</td>
<td>13,599</td>
</tr>
<tr>
<td>2011–12</td>
<td>19.6</td>
<td>13,792</td>
</tr>
<tr>
<td>2012–13</td>
<td>19.7</td>
<td>13,423</td>
</tr>
<tr>
<td>2013–14</td>
<td>19.7</td>
<td>12,945</td>
</tr>
<tr>
<td>2014–15</td>
<td>19.8</td>
<td>13,393</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>ACT Science</th>
<th>New Mexico</th>
<th>Nation</th>
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<tbody>
<tr>
<td>School Year</td>
<td>Average</td>
<td># of Seniors</td>
</tr>
<tr>
<td>2010–11</td>
<td>20.0</td>
<td>13,599</td>
</tr>
<tr>
<td>2011–12</td>
<td>20.0</td>
<td>13,792</td>
</tr>
<tr>
<td>2012–13</td>
<td>20.1</td>
<td>13,423</td>
</tr>
<tr>
<td>2013–14</td>
<td>20.1</td>
<td>12,945</td>
</tr>
<tr>
<td>2014–15</td>
<td>20.3</td>
<td>13,393</td>
</tr>
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<table>
<thead>
<tr>
<th>SAT Math</th>
<th>New Mexico</th>
<th>Nation</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Year</td>
<td>Average</td>
<td># of Seniors</td>
</tr>
<tr>
<td>2010–11</td>
<td>529</td>
<td>1,354</td>
</tr>
<tr>
<td>2011–12</td>
<td>546</td>
<td>2,371</td>
</tr>
<tr>
<td>2012–13</td>
<td>545</td>
<td>2,303</td>
</tr>
<tr>
<td>2013–14</td>
<td>543</td>
<td>2,316</td>
</tr>
<tr>
<td>2014–15</td>
<td>528</td>
<td>1,684</td>
</tr>
</tbody>
</table>

Participation rates in New Mexico for the ACT are much larger than those for the SAT. In 2014–2015, 33% of New Mexico students who took the ACT met the math benchmark for college and career readiness, and 30% met the science benchmark for college and career readiness. Overall, 59% of New Mexico students who took the SAT met the benchmark for college and career readiness, though math, college and career readiness was not calculated separately by the College Board.
### 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 6 shows the percentage of students taking Algebra 1 in grade 8. In the 2010–2011 school year, about 18 percent of New Mexico students in grade 8 were enrolled in Algebra 1 for high school credit (course 2031, STARS Vol. 2) and in the 2013–2014 school year, approximately eight percent took Algebra 1. The percentage of students in grade 8 taking Algebra 1 for high school credit has been holding steady since SY 2011–2012.

In SY 2010–2011 Algebra 1 courses were separated into two separate courses: course 2028 (Algebra 1, grade 8) and course 2031 (Algebra 1, grades 9–12 which can be taken in grade 8 for high school credit), which may account for the difference in the percentage of students in grade 8 taking Algebra 1 for high school credit.

Table 6. Percentage of students in grade 8 taking Algebra 1 (course 2031) in years 2010–11 to 2014–15 for high school credit

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Students</th>
<th>Percentage of all students in grade 8</th>
<th>Total number of students in grade 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>SY 2010–11</td>
<td>4,577</td>
<td>18</td>
<td>25,116</td>
</tr>
<tr>
<td>SY 2011–12</td>
<td>2,508</td>
<td>10</td>
<td>25,118</td>
</tr>
<tr>
<td>SY 2012–13</td>
<td>2,251</td>
<td>9</td>
<td>25,898</td>
</tr>
<tr>
<td>SY 2013–14</td>
<td>2,407</td>
<td>9</td>
<td>25,745</td>
</tr>
<tr>
<td>SY 2014–15</td>
<td>1,997</td>
<td>8</td>
<td>25,116</td>
</tr>
</tbody>
</table>

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

Table 7. Percentage of students in grade 8 taking Algebra 1 (course 2031) in years 2010–11 to 2014–15 for high school credit who repeated Algebra 1 in Grade 9

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Number</td>
<td>%</td>
<td>Number</td>
<td>%</td>
<td>Number</td>
<td>%</td>
<td>Number</td>
<td>%</td>
<td>Number</td>
<td>%</td>
</tr>
<tr>
<td>Algebra 1</td>
<td>1,788</td>
<td>43.3</td>
<td>1,848</td>
<td>40.3</td>
<td>609</td>
<td>24.2</td>
<td>547</td>
<td>24.3</td>
<td>536</td>
<td>22.3</td>
</tr>
</tbody>
</table>

In SY 2014–15, 22.3 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. This is down two percent from 2013–2014.
Current requirements for high school science dictate that students must take three units of science, two of which must contain a laboratory component. No specific courses or course sequences are identified in statute, though high schools often require a life science lab and physical science lab.

Figure 1

Science Courses Taken by NM Students, by Category

- % earth systems and space science students
- % physical science students
- % life science students
- % other/integrated science students

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% earth systems</td>
<td>7%</td>
<td>7%</td>
<td>7%</td>
<td>13%</td>
<td>11%</td>
</tr>
<tr>
<td>% physical science</td>
<td>37%</td>
<td>37%</td>
<td>36%</td>
<td>35%</td>
<td>38%</td>
</tr>
<tr>
<td>% life science</td>
<td>38%</td>
<td>38%</td>
<td>38%</td>
<td>34%</td>
<td>38%</td>
</tr>
<tr>
<td>% other/integrated</td>
<td>18%</td>
<td>18%</td>
<td>19%</td>
<td>18%</td>
<td>12%</td>
</tr>
</tbody>
</table>
New Mexico school districts offer a large variety of high school science courses, as is evident from the table above. The science statewide assessment is administered in 11th grade and a student will be tested on content that he or she completed up to two years earlier or on content that he or she would not be taking until 12th grade. 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 are taking those courses, which 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 give students 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 grades 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 9 and 10 give the AP results for the various math and science tests.

Table 9. Results from Math Advanced Placement 2011 to 2015

<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>2011</td>
<td>746</td>
<td>45</td>
<td>230</td>
<td>70</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>
</tbody>
</table>

Table 10. Results from Science Advanced Placement 2011 to 2015

<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>2011</td>
<td>573</td>
<td>39</td>
<td>401</td>
<td>31</td>
<td>140</td>
<td>45</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>
</tbody>
</table>

¹ A revised exam in Chemistry was given 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 10b. 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>
</tbody>
</table>
3. Actions Taken in School Year 2014-2015

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

MSAC duties are defined by New Mexico State Statute, Appendix A. During July 1, 2014–June 30, 2015, there were 15 members who served on the MSAC. Selena Connealy and Zachary Leonard served as co-chairs.

MSAC meeting dates
- September 11, 2014
- November 6, 2014
- February 6, 2015
- March 19, 2015
- May 12, 2015

MSAC Accomplishments
- Completed and approved a STEM Strategic Framework (page 8), a roadmap for the implementation of a statewide strategic plan to improve STEM achievement for all New Mexico students.

- Met on August 26, 2015 with Secretary Hanna Skandera to present the STEM Strategic Framework and MSAC recommendations.
• Continued recommendation for fully-supported adoption and implementation of NGSS (see Appendix D).

• Coordinated efforts with the New Mexico Partnership with Mathematics and Science Education and STEM Collective Impact Team.

• Supported the PED Math and Science Bureau through participation in
  o Science Standards Focus Groups
  o 2015 STEM Symposium
  o Making Sense of Science teacher professional development

*Dr. John Bellum with teachers at the Science Standards Focus Groups.*
3.2 Activities of the Math and Science Bureau

Highlights

- The continued investment of $2.0 million for the STEM Teacher Initiative appropriated by the New Mexico legislature was utilized to build local capacity within the state for delivering research based professional development and to support 1,470 teachers with professional development opportunities.
- $1,198,936.00 from the Math and Science Partnership federal funding supports Mathematically Connected Communities (MC²) through NMSU.
- $168,999.90 in robotics capital outlay bond funding appropriated by the New Mexico legislature.
- Increased collaboration within the PED and with other state agencies. K-3 Plus program collaborated financially to provide MC² Math Labs (math professional learning) to 160 teachers and mathematics enrichment to 160 2nd and 3rd grade students.
- An additional Math Specialist was hired.
- Participation in the PARCC Operational Working Group, item and test review.
- Strengthened partnerships with New Mexico Informal Science Education Network and other key stakeholders.
- Continued support for the MSAC.

Detailed Report

The 2015 New Mexico legislature appropriated $2.0 million to provide support for teachers who teach science, math, engineering, and mathematics courses.

To recruit and retain STEM teachers, $829,375.00 was awarded to 135 teachers in 32 school districts and charter schools:

- Artesia Public Schools
- ASK Academy
- Aztec Municipal Schools
- Bernalillo Public Schools
- Carrizozo Municipal Schools
- Central Consolidated Schools
- Chama Valley Independent Schools
- Christine Duncan Heritage Academy
- Clayton Municipal Schools
- Cloudcroft Municipal Schools
- Corona Public Schools
- Cuba Independent Schools
- Estancia Valley Classical Academy
- Farmington Municipal Schools
- Gallup-McKinley County Schools
- Hatch Valley Public Schools
- Hobbs Municipal Schools
- Jemez Mountain Public Schools
- Lovingston Municipal Schools
- Magdalena
- McCurdy Charter School
- Mission Achievement and Success Charter School
- Native American Community Academy (NACA)
- Peñasco Independent Schools
- Pojoaque Valley Public Schools
- Questa Independent Schools
- South Valley Academy-APS
- South Valley Preparatory School
- Springer Municipal Schools
- Taos Academy Charter School
- Taos Integrated School of the Arts
- Tierra Adentro

$130,439.00 of the funds awarded to districts and charters was not spent and $68,045.20 was reverted to the general fund; $62,384.77 was re-allocated for math and science classroom support materials.
Another $996,699 provided 1,470 teachers with additional STEM professional learning opportunities.

<table>
<thead>
<tr>
<th>Building Capacity:</th>
<th># of Teachers</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making Sense of Science (MSS) Energy and Matter Facilitator Trainings</td>
<td>40</td>
<td>$155,364</td>
</tr>
<tr>
<td>Science Standards Review including Teacher Travel</td>
<td>51</td>
<td>$93,025</td>
</tr>
<tr>
<td>New Mexico Institute of Mining and Technology Masters of Science for Teacher Scholarships</td>
<td>86</td>
<td>$50,000</td>
</tr>
<tr>
<td>MESA Regional Coaching Support</td>
<td>166</td>
<td>$10,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Support:</th>
<th># of Teachers</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEM Symposium, including Teacher Travel</td>
<td>477</td>
<td>$215,884</td>
</tr>
<tr>
<td>Making Sense of Science (MSS) Energy and Matter Teacher Institutes</td>
<td>225</td>
<td>$197,426</td>
</tr>
<tr>
<td>Support for MC² Math Labs training for teachers and 40 students</td>
<td>40</td>
<td>$135,000</td>
</tr>
<tr>
<td>MidSchool Math Conference</td>
<td>253</td>
<td>$95,000</td>
</tr>
<tr>
<td>NMCTM/NMSTA/EEANM Conference Teacher Scholarships</td>
<td>132</td>
<td>$5,000</td>
</tr>
<tr>
<td>Total</td>
<td>1,470</td>
<td>$996,699</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-Professional Development Activities</th>
<th>Total Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials for STEM Classrooms</td>
<td>$135,558</td>
</tr>
<tr>
<td>Total</td>
<td>$135,558</td>
</tr>
</tbody>
</table>

**Mid School Math National Conference**

“I gained insights into new captivating ways to teach math that require students to think on much deeper levels than any text book.”

“I walked in hopeful and walked out energized.”

The Math and Science Bureau provided registration scholarships to 253 New Mexico teachers to attend the MidSchoolMath National Conference in February of 2015.
There were 477 teachers from 71 school districts and 17 charter schools registered for the 2015 STEM Symposium.

“I am already recommending the STEM Symposium to my colleagues for next year.”

“I was able to experience the workshops as a student would experience, and see the value of immediate hands on and team spoken interaction.”
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 2014–2015.

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.

Mathematically Connected Communities (MC\(^2\))

$1.2 million from Math and Science Partnership federal funding supports Mathematically Connected Communities (MC\(^2\))

The Components of MC\(^2\):
- Summer Math Labs with students
- Summer Math Institute for teachers
- Leadership Academies for principals and administrators
- On-site Professional Learning with teachers
- One- and two-day sessions for customized professional learning

“Doing math was very helpful. It helped me visualize what my class should look like during math lessons.”

“We were given tools and strategies that we could immediately take back and use in our classroom.”

MC\(^2\) staff with Secretary Skandera
In collaboration with PED, educators from six New Mexico Informal Science Education Network (NM ISE Net) institutions supported the 2015 Energize New Mexico Teacher Professional Development Institute in Farmington in June. Twenty-two elementary and middle school teachers representing three school districts (Farmington, Bloomfield, Ch'oooshgai Community School) gathered at the Farmington Museum for a five-day workshop to learn about energy and connections to literacy and assessment. The course was based on WestEd's Making Sense of Science Energy course with some additional material about New Mexico's energy resources. NM ISE Net is supported by NM EPSCoR, an NSF-funded Research Infrastructure and Improvement program.

**The six NM ISE Net organizations are:**
- New Mexico Museum of Natural History and Science, Albuquerque
- Explora, Albuquerque
- National Museum of Nuclear Science and History, Albuquerque
- Bradbury Science Museum, Los Alamos
- E3 Children's Museum, Farmington
- NM EPSCoR

**Robotics Funding**

The $168,999.90 legislative appropriation through bond funding provided grants for robotics programs in 15 New Mexico schools.
Making Sense of Science Facilitator Training

The Math and Science Bureau is working to build science leadership capacity in the state. Forty (40) facilitators including teachers, informal science partner presenters, and university faculty from around New Mexico were trained in the spring to provide Making Sense of Science Matter and Energy Teacher Institutes in June, 2015.

“Not only did I increase my own science and science literacy knowledge, I feel confident that I can help teach New Mexico teachers from this model.”

Matter Facilitation Academy participant

Making Sense of SCIENCE (MSS) is an approach to teacher learning that focuses on science understanding, classroom practice, literacy proficiency, and pedagogical reasoning. At the heart of this approach is the idea that the key to students’ success in science is well-prepared teachers. Inquiry-based science and pedagogy are interwoven, giving teachers opportunities to not only investigate complex science as adult learners, but also to make the critical connections to their own classrooms that are necessary to teach students effectively.

WestEd’s Making Sense of Science includes a strong literacy component which complements the learning of science concepts in 3rd through 8th grade.

I thought… I did… Now I know…

“Reading and summarizing an article was enough to put reading literacy into science.”

“All of the reading investigation pieces throughout the week.”

“New and more concrete ideas to incorporate reading strategies into science.”
Making Sense of Science Teacher Institutes

There were 225 teachers who received training in Making Sense of Science (MSS) Matter and MSS Energy during the summer of 2015. The five-day MSS Teacher Institutes were offered in Santa Fe, Albuquerque, and Las Cruces.

“This inquiry-based learning is what is needed in our state to increase education levels.”

“I was totally immersed in science…it pushed me to grow both professionally and intellectually.”

Reflection from a teacher at the end of the training:

I thought… I did… Now I know…

“I used to think a lab report was a good assessment.” “Strategies for developing scientific explanations.” “I now believe that having the students make a claim, show evidence, reasoning, is a better way.”

Teachers from 41 school districts and five state charter schools attended the Making Sense of Science trainings in June

Alamogordo Public Schools Los Alamos Public Schools
Albuquerque Public Schools Los Lunas Public Schools
Artesia Public Schools Loving Municipal Schools
Belen Consolidated Schools Moriarty-Edgewood School District
Bernalillo Public Schools Pecos Independent School District
Bloomfield Schools Pojoaque Valley School District
Carlsbad Municipal Schools Quemado Independent School District
Central Consolidated Schools Reserve Independent School District
Clovis Municipal Schools Rio Rancho Public Schools
Cuba Independent Schools Roswell Independent School District
Deming Public Schools Santa Fe Public Schools
Des Moines Municipal Schools Silver Consolidated Schools
Dexter Consolidated Schools Socorro Consolidated Schools
Dulce Independent Schools State Charter: Albuquerque School of Excellence
Española Public School District State Charter: Cottonwood Classical Preparatory
Gadsden Independent School District State Charter: La Resolana Leadership Academy
Gallup-McKinley County Schools State Charter: North Valley Academy
Grant Cibola School District State Charter: School of Dreams Academy
Hatch Valley Public Schools Taos Municipal Schools
Hobbs Municipal Schools Truth or Consequences Schools
Jemez Mountain School District Tularosa Municipal Schools
Jemez Valley Public Schools Wagon Mound Public Schools
Las Cruces Public Schools West Las Vegas Schools

“Making Sense of SCIENCE challenged me in many ways, but especially in content. I feel more confident to teach science!”
Science Standards Teacher Focus Group

The Teacher Focus Group completed a comparative analysis of the Next Generation Science Standards and the New Mexico Science Standards and made recommendations to Secretary Skandera (see Appendix E for the Teacher Focus Group letter to Secretary Skandera).

Teachers from 30 districts, state charters, and STEM stakeholder organizations participated in an orientation about the Next Generation Science Standards (NGSS) on January 6–7, 2015. The meeting informed participants about the historical contexts of standards and engaged participants in tasks that mirror the innovations of NGSS.

On February 9–10, 2015 public school science education teachers met to analyze the New Mexico Science Standards and compare these to the NGSS. In particular, the February meeting engaged the science teachers in an analysis of the opportunities, challenges, and benefits of adopting the NGSS.

NGSS incorporates reading, writing, oral languages and mathematical skills into their everyday teaching allowing teachers to work together for collaboration of student needs and achievement.”
from NGSS Teacher Focus Group analysis report to Secretary Skandera

“The standards incorporate engineering practices from grades K–12 which is a significant shift from current standards. This mirrors the current workforce demands and aligns well with the strengths of New Mexico higher education.”
from NGSS Teacher Focus Group letter to Secretary Skandera

Brett Moulding, Director of Partnership for Effective Science Teaching and Learning explaining the intersection of science and engineering practices, cross cutting concepts and disciplinary core ideas.

Teachers exploring a science activity based on the “Framework for K-12 Science Education” guidelines.
New Mexico is home to several curricular and out-of-school STEM initiatives that have proven exemplary in promoting interest and achievement in STEM areas. Some examples are highlighted below.

**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 with a research-based program model dependent upon curriculum, professional development, and materials management. Currently, this program serves over 11,000 students, 443 teachers, and 37 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 development 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% Hispanic/Latino and 55% designated English Language Learners (ELL). The percentage of students who are designated economically disadvantaged stands at 85%.

**La Luz Academy, Air Force Research Laboratory (AFRL)**
In partnership with New Mexico Tech, the AFRL La Luz Academy provides outreach programs for students in grades 5–12 on topics such as engineering, rocketry, weather and Mars. They also host a teacher institute.

**Mathematically Connected Communities (MC²), New Mexico State University**
The MC² project, a partnership between three universities and 20 school districts, annually receives approximately $1.2 million from U.S. Department of Education Math and Science Partnership funds. Through the MC² project, mathematicians, math educators, researchers, teachers, and school administrators partner 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 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 development for mathematics teachers, school-based professional learning communities, and classroom-based follow-up to ensure students' mathematics learning and achievement. Approximately 60 school districts and over 1000 teachers participate in MC² professional learning opportunities.

**New Mexico Afterschool Alliance (NMASA) STEM Committee**
This committee works to integrate STEM activities into the core work of the network of policymakers, educators, childcare providers, youth development leaders, and other stakeholders to increase the quantity and quality of afterschool educational 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 Informal Science Education Network (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 development program for elementary educators.
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, in which students participate in activities such as field trips, speaker presentations, workshops, academic competitions, community service, and leadership development.

New Mexico Partnership for Mathematics and Science Education (NMPMSE)
The New Mexico Partnership for Math and Science Education (NMPMSE) is a statewide membership organization representing institutions and projects involved in STEM education. NMPMSE convened a STEM Summit in 2012 that brought together diverse STEM stakeholders to make recommendations for improving STEM education in New Mexico. Since that time, the Collective Impact Team has worked to implement STEM Summit recommendations, provide policy recommendations and report progress on voluntary STEM achievement targets established by 2014 Senate Memorial 38, NM STEM Education Week.

New Mexico Private-Sector STEM Partners
In 2015 Senate Memorial 30 and House Memorial 21, NM Private-Sector Education Partnerships, recognized the contribution of private-sector STEM partners (Air Force Research Laboratory, Intel, Los Alamos National Laboratory, Northrop Grumman, PNM, and Sandia Labs) and the importance of STEM education to the intellectual and economic future of New Mexico.

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 15th year of delivering professional development to northern New Mexico teachers. MSA is an intensive and comprehensive professional development program designed to support continuous improvement of teaching and learning mathematics and science. The MSA accomplishes its goals through the following:

- Summer Institute – a three-week 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 – four Saturdays a semester of math content training.
- 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.

Project Growing Up Thinking Scientifically (GUTS), Santa Fe Institute
Participants in Project GUTS, an afterschool computing program, come to understand that STEM is integral to everyday life and can be used to study, and potentially solve, local community problems in fields such as ecology, biology, social sciences, resource management, and public health.

Sandia National Laboratories
Since 1986, Sandia National Laboratories (SNL) has focused on introducing underrepresented students and their families to STEM careers and currently provides opportunities for more than 25,000 students per year. More than 600 SNL employees serve as classroom presenters, judges, tutors and mentors in local schools. Engaging young children and their families is the focus of its bilingual Family Science Nights and Family Math Nights. Middle and high school programs focus on providing more in-depth career exploration through workshops led by diverse STEM professionals, competitions such as the NM Electric Car Challenge and DOE Science Bowls, and the STAR High School Fellowship program.
STEM Outreach Center, New Mexico State University
The center supports teacher professional development through programs such as the Scientifically Connected Communities (SC2); the Science, Engineering, Mathematics, and Aerospace Academy (SEMAA); the Digital Media Academy (DiMA); and others that support student achievement and participation in STEM fields. In the 2013–14 school year, 20 different events provided professional development for over 1200 teachers.

STEM-H Center for Outreach, Research, and Education, University of New Mexico
The STEM-H Center advances K–12 STEM-H teaching and learning through outreach, research and education activities in Central New Mexico and beyond. Activities include Regional Research Challenge, Regional Science Olympiad, SW Region Junior Science & Humanities Symposium, Resource Center/Lending Library, STEM-H Educator Professional Development, and Student Researcher workshops. The STEM-H Center manages the NM STEM-H Connection website, www.nmstemh.org, a statewide, collaborative website with resources for NM students, teachers, parents, counselors, and administrators as well as higher education faculty/staff and community members interested in the promotion of STEM-H education in New Mexico.
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.

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

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.

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 has 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 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.

**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 Albuquerque Public School fourth-grade students.

**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.

**BEMP—Bosque Ecosystem Monitoring Program**
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 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.

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.

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).

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 development 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
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 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
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—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 and includes family festivals, the Aerospace Engineering Lab, and Science Olympiad.

Pajarito 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 of 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 development 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 about wildlife using live animals. Hosts the Next Generation Conservationists Career Fair.

U.S. 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.

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.
Valle de Oro National Wildlife Refuge, Albuquerque
This urban wildlife refuge offers environmental education opportunities on 431 acres of land along the Rio Grande.

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 afterschool 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.
## Appendix C: Glossary and Acronyms

<table>
<thead>
<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 University</td>
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<tr>
<td>eDEAR</td>
<td>Electronic Data Editing and Reporting</td>
</tr>
<tr>
<td>EoC</td>
<td>End-of-Course (exam)</td>
</tr>
<tr>
<td>EPSCoR</td>
<td>Experimental Program to Stimulate Competitive Research, a National Science Foundation funded grant</td>
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<tr>
<td>HED</td>
<td>Higher Education Department</td>
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<tr>
<td>IDEAL-NM</td>
<td>Innovation Digital Education and Learning in New Mexico</td>
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<tr>
<td>MESA</td>
<td>Mathematics, Engineering, and Science Achievement</td>
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<td>MSAC</td>
<td>Math and Science Advisory Council</td>
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<tr>
<td>MSB</td>
<td>Math and Science Bureau of the Public Education Department</td>
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<tr>
<td>NGSS</td>
<td>Next Generation Science Standards</td>
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<tr>
<td>NMPSE</td>
<td>New Mexico Partnership for Math and Science Education</td>
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<td>NNMC</td>
<td>Northern New Mexico College</td>
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<tr>
<td>NMSU</td>
<td>New Mexico State University</td>
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<tr>
<td>NSF</td>
<td>National Science Foundation</td>
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<tr>
<td>PARCC</td>
<td>Partnership for Assessment of Readiness for College and Career. PARCC assessments are given 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</td>
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<tr>
<td>PED</td>
<td>New Mexico Public Education Department</td>
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<tr>
<td>PNM</td>
<td>Public Service Company of New Mexico</td>
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<tr>
<td>SBA</td>
<td>New Mexico Standards Based Assessment for science. This report refers to SBA science assessments only.</td>
</tr>
<tr>
<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 12 public education system. Volume 2 has reference materials including all approved course descriptions.</td>
</tr>
<tr>
<td>STEM</td>
<td>Science, Technology, Engineering, and Mathematics</td>
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<tr>
<td>SWD</td>
<td>Students with Disabilities</td>
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<tr>
<td>SY</td>
<td>School year</td>
</tr>
<tr>
<td>UNM</td>
<td>University of New Mexico</td>
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</tbody>
</table>
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
1 June 2015

Secretary of Education Hanna Skandera
Jerry Apodaca Education Building
300 Don Gaspar
Santa Fe, NM 87501

Dear Secretary Skandera:

The NGSS Teacher Focus Group strongly supports adoption of the Next Generation Science Standards (NGSS). The NGSS will enhance science education in New Mexico and prepare our students for college and career in an increasingly competitive global marketplace for the following reasons:

• The standards are designed to produce well prepared, scientifically literate citizens through a multidimensional approach involving higher level thinking and connections to real world applications.
• The standards are based on current scientific and pedagogical research.
• The Performance Expectations, as standards, demand a higher level of student engagement.
• The standards clearly align with the New Mexico Common Core State Standards.
• The standards incorporate engineering practices from grades K-12 which is a significant shift from current standards. This mirrors the current workforce demands and aligns well with the strengths of New Mexico higher education.
• The standards provide a clear progression of learned science content and practices across K-12.

For these reasons, we support the adoption of the NGSS as written in its entirety.
The Focus Group recommends the following ideas for implementation of NGSS:

- An adjusted timeline that addresses the varied needs for the different grade bands based on teacher concerns for the transition from middle school to high school as well as alignment concerns in middle school and high school, as seen in the table below.

<table>
<thead>
<tr>
<th>SCHOOL YEAR</th>
<th>2016-17</th>
<th>2017-18</th>
<th>2018-19</th>
<th>2019-20</th>
<th>2020-21 Accountability</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRADES K–8</td>
<td>PROFESSIONAL DEVELOPMENT</td>
<td>IMPLEMENTATION</td>
<td>IMPLEMENTATION</td>
<td>Bridge Grades 4 and 7 SBA</td>
<td>NEW Grades 6, 7, 8 EOC</td>
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<td>Grades K-2</td>
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<td>NEW 4/7 SBA</td>
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<td>GRADES 9–12</td>
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<td>IMPLEMENTATION</td>
<td>Bridge 9-12 EOCs</td>
<td>NEW Grade 11 SBA</td>
<td>NEW EOC 9-12 Science</td>
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</tbody>
</table>

- A restructuring of course sequence alignment for secondary science. The reason for this alignment is to provide a more cohesive match between assessments and standards. The Focus Group recommends science courses whereby state graduation requirements cover the expanse of NGSS.
- Professional Development recommendations:
  - Professional Development that is systematic organized, fully funded, ongoing and rigorous.
  - Professional Development that includes content and pedagogy with particular focus on engineering practices.
  - Administration, at school and district level, included in NGSS orientation so they are not only familiar with the standards but also are able to properly evaluate teachers in the classroom.
  - Continuous vertical and horizontal alignment which includes scope and sequence across grade bands.
- Teacher Preparation recommendations (Pre-Service Teachers):
  - Alignment between methods courses and NGSS practices
  - More relevant and robust, content-based science exposure at university
- Curriculum/Materials recommendations:
  - Consistent and continuing funding for science materials and equipment
  - A proper balance between technology and hands-on materials/texts
The implementation of an online database which provides teachers with resources to support State science connections to NGSS. (Currently addressed in NM State Science Standards, Strand III)

Clearly there is a significant amount of work that needs to be done. There is great concern from teachers about alignment of assessments during the implementation process and their impact on student graduation and teacher evaluations. We recommend leveraging the work of and with other states during the implementation process.

We are grateful for being given a voice in this process and we hope that teachers will continue to have a meaningful role in the implementation of NGSS.

Sincerely,

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