

**2009-2010 Math and Science Advisory  
Council Annual Report  
Public Elementary and Secondary  
Mathematics and Science  
Student Achievement**

**November, 2010**

**New Mexico Public Education Department  
([www.ped.state.nm.us](http://www.ped.state.nm.us))**

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## Executive Summary

During the 2007 New Mexico Legislative Session, Senate Bill 552 “The Math and Science Education Act” was passed and signed by Governor Bill Richardson. The Act created in statute [[22-15E-1](#) NMSA 1978] the Math and Science Bureau in the Public Education Department and a statewide Math and Science Advisory Council (MSAC). Section 22-15E-5, charges the Council to 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.

In 2006-2007, the Math and Science Advisory Committee, the precursor to the MSAC, developed a *Strategic Action Plan for Advancing Math and Science Education in New Mexico*. It is available on the Math and Science Bureau webpage:

[www.ped.state.nm.us/MathScience/index.html](http://www.ped.state.nm.us/MathScience/index.html)

The data in this *Annual Report* is intended to further the implementation of that plan. In January 2010, the Math and Science Advisory Council submitted to the Legislature and Education Secretary Dr. Veronica García *NM Project 2012 v2*, a detailed explication of the *Strategic Action Plan* also available at the website given above.

The *Annual Report* is divided into three parts: (1) a review of student data in New Mexico, (2) a list of major activities undertaken by the PED Math and Science Bureau and by the Math and Science Advisory Council from September 2009 to May 2010, and (3) a listing of key issues that need to be addressed.

The student data section of the *Annual Report* provides detail on the following topics:

- Results on the Math and Science portions of the New Mexico Standards Based Assessment (NMSBA) are showing steady progress at most grade levels, but in particular in 5<sup>th</sup> - 8<sup>th</sup> grades. Given the investment of federal and state money in middle-grade math teacher professional development over this time period, these data suggest that teacher improvement efforts can make a difference in student outcomes.
- Economically disadvantaged student groups have a lower rate of proficiency than the overall student population but show greater percent improvement in both math and science. Unfortunately, the achievement gap has only shown a very slight improvement over the past six years. More work is clearly needed.
- National Assessment of Education Progress (NAEP) results in 4<sup>th</sup> and 8<sup>th</sup> grades are also slowly improving, although New Mexico still scores behind most other states. In 8<sup>th</sup> grade New Mexico ranked 48<sup>th</sup> in Mathematics and 49<sup>th</sup> in Science with similar rankings in 4<sup>th</sup> grade.

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- About 64% of New Mexico high school seniors take the American College Testing (ACT) exam and about 6% take the Scholastic Aptitude Test (SAT). Scores have remained relatively steady over the last five years.
- Beginning with the 2008-09 academic year, statute required Algebra 1 to be offered in the 8<sup>th</sup> grade. About 20% of 8<sup>th</sup> graders took Algebra 1 in the 2009-10 school year, a significant increase from the 14% who took Algebra 1 in 2006-07 before the law was introduced. About 47% of the students who take Algebra 1 in 8<sup>th</sup> grade took a more advanced math course in 9<sup>th</sup> grade and about one-third retook Algebra 1 in high school. One in seven students (~15%) who took Algebra 1 in 8<sup>th</sup> grade did not enroll in any mathematics course in 9<sup>th</sup> grade.
- Most students took Algebra 2 in their junior year in high school, and 78% of high school seniors in 2009-10 had taken Algebra 2 or an equivalent course during their four-year high school journey.
- The most common science course taken in high school was Biology 1 in 2009-10 followed by Chemistry 1 and Physical Science. The most popular freshmen and sophomore science course was Biology 1. Chemistry 1 was the most popular course for juniors, and Anatomy/Physiology and Chemistry 1 were the most popular courses for seniors in high school.
- About the same percent of New Mexico students took Advanced Placement (AP) tests in 2010 as in 2009. The most popular AP courses in 2009-10 were Calculus AB, followed by Biology and Chemistry.
- Of students who graduated from New Mexico high schools in 2009 and went on to college in New Mexico, 37% had to take remedial math courses at the level of Algebra 1 or lower, compared to 40% the year before. This might suggest that there is a misalignment between high school course work and higher education expectations.

The second part of this report deals with major actions taken by the Math and Science Advisory Council and the Math and Science Bureau. The primary work of the Math and Science Advisory Council was to update *NM Project 2012*. The Council was also instrumental in ensuring the continuation of the summer institutes in math, science, and reading and establishing a database of science, math, and technology programs. Other activities of the Math and Science Bureau included administering the summer institutes and the Math and Science Partnerships program, sponsoring Math and Science Day at the legislature, providing feedback on the next generation science standards, and participating in the adoption of science instructional materials. In addition, the bureau worked to better align the state *Standards* and the Standards-Based math assessments.

In the final part of this report, the Math and Science Bureau and the Math and Science Advisory Council identify three critical needs. One focuses on the continuing poor performance of New Mexico students in math and science; the second, the number of students going on to postsecondary schools who have to take remedial courses; and third, the understaffing of the Math and Science Bureau and the problems this creates.

# 1. Student Data

## 1.1 Trends in Student Achievement Data

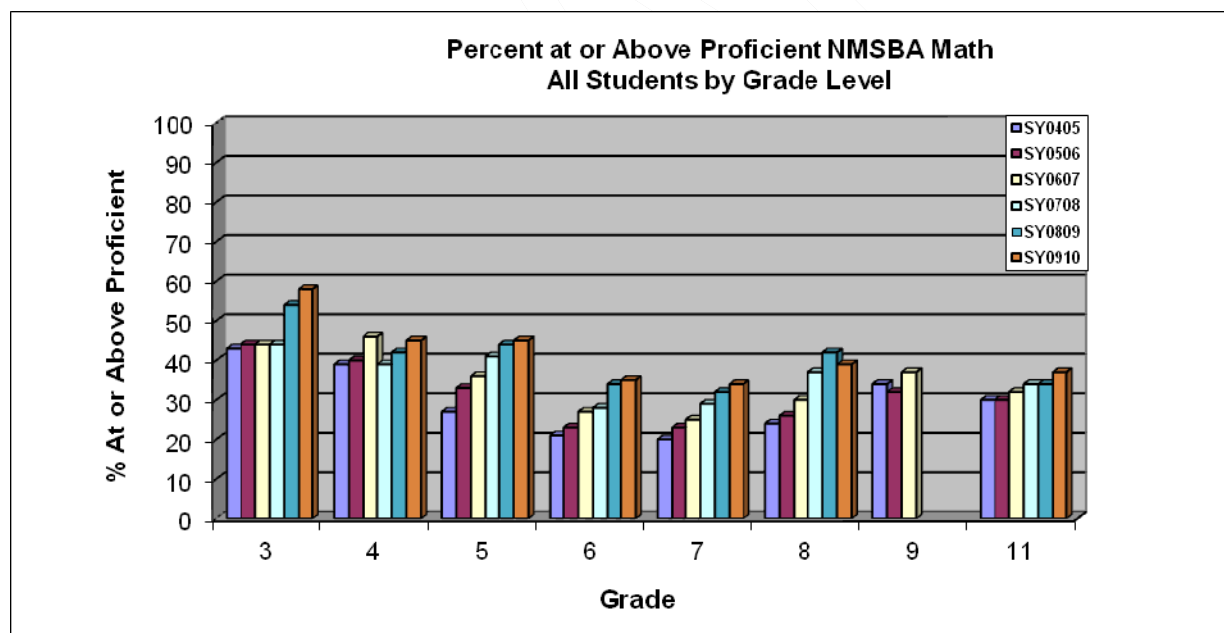
This report includes student achievement data as measured by the New Mexico Standards Based Achievement, the National Assessment of Educational Progress, and the ACT and SAT.

### 1.1.1 New Mexico Standards-Based Assessment

In March 2010, students in grades 3-8 and 11 took the New Mexico Standards-Based Assessment (NMSBA) in math and science. The NMSBA is a criterion-referenced test<sup>1</sup> aligned with the *New Mexico Math and Science Content Standards, Benchmarks, and Performance Standards*.<sup>2</sup> Administration of the NMSBA is required for compliance with the federal “No Child Left Behind” (NCLB) law and provides a measure of student achievement that is available to the state, districts, schools, teachers, students and parents in New Mexico.

Figure 1 shows the percentage of students who are proficient or advanced on the math portion of the NMSBA over the past six years. Note that the NMSBA is not administered in the 10<sup>th</sup> grade and has not been administered in the 9<sup>th</sup> grade since the 2006-07 school year.

Figure 1.



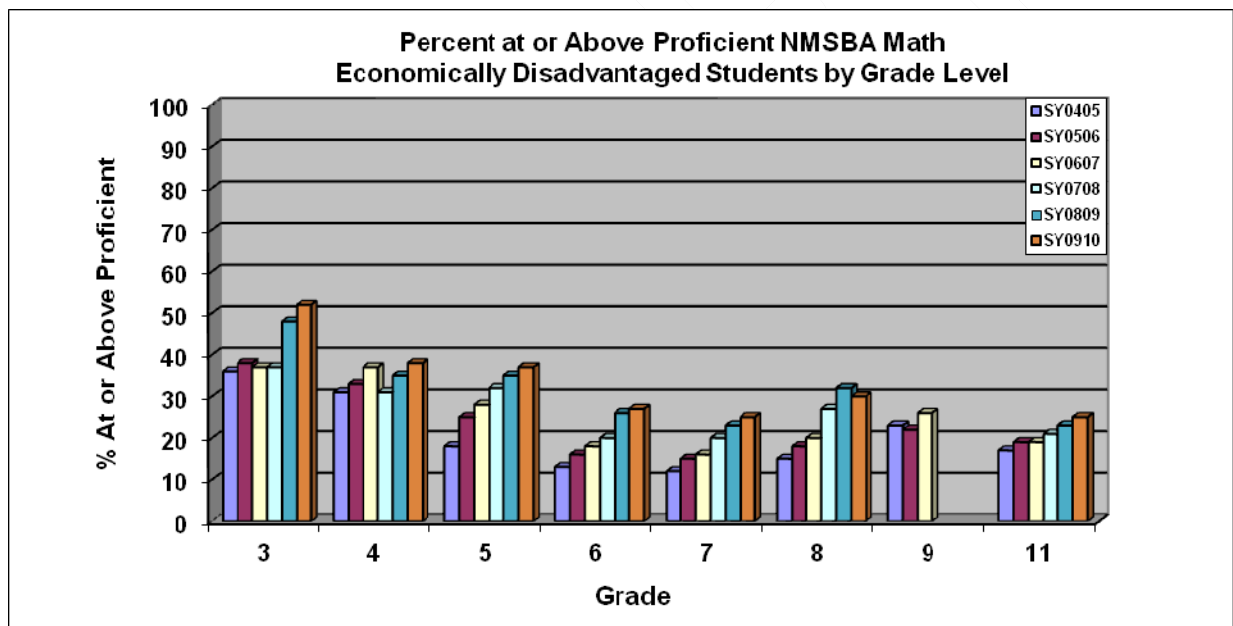
<sup>1</sup> A score on a criterion-referenced test indicates the level of mastery achieved for some specified set of concepts and skills, in this case, of the concepts and skills described in the New Mexico standards and benchmarks in math and science.

<sup>2</sup> The tests include both multiple-choice and open-ended items, each of which contributes about 50% to the total score. They have been developed and scored by Pearson with significant input from New Mexico educators. In 2008 testing in grade 9 was discontinued and science testing in grade 11 was begun.

Figure 1 shows significant improvements at each grade-level over the past six years with the strongest gains in the middle grades, where achievement has historically been lowest. Over this same time period, the state received significant federal funding for teacher professional development (PD) through the Math and Science Partnership program, and the legislature allocated additional money for teacher PD. It is noteworthy that the focus of the work funded through these monies was predominantly in middle school mathematics where the greatest gains in achievement are seen. Additionally, new curriculum materials were adopted across the state during this period, and work overseen by the Math and Science Bureau has been done on the state math standards, factors that may have also contributed to these observed improvements. However, the data indicate a need to continue to strengthen programs from Pre-K through high school.

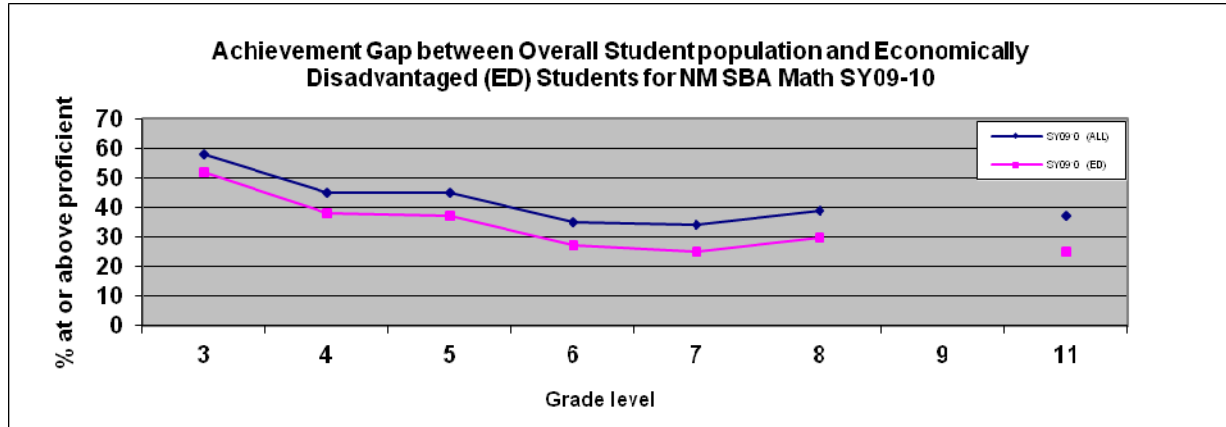
Figure 2 shows achievement on the Mathematics SBA for those students designated as economically disadvantaged (according to eligibility for free and reduced lunch programs). The percentage at or above proficiency increased in almost every grade level except in 8<sup>th</sup> grade for 2010.

Figure 2.



The data in Figure 2 show that the percent improvements are greater for economically disadvantaged students over this 6-year period than what is seen in the overall student population. Note that the percent of 5th, 6th, 7th, and 8th grade economically disadvantaged students proficient in math has approximately doubled over the last five years. While this trend is promising, there is still an achievement gap which needs continued attention (see Figure 3).

Figure 3.



The NMSBA results for science shown in Figure 4 start much higher than math in 3<sup>rd</sup> grade, but by 8<sup>th</sup> grade are lower. Although 2010 data have shown a modest increase except for 4<sup>th</sup> and 6<sup>th</sup> grade, the results overall have not shown as much improvement over time as math. This is likely due to the fact that science is much less emphasized because it is not a part of school or district AYP rankings. Much anecdotal data indicate that many elementary schools have reduced instructional time available for science because of an increased emphasis on math and reading achievement to meet achievement targets set in response to NCLB requirements. Nonetheless, it is important to note the relatively strong within-grade improvements over the last six years.

Figure 4.

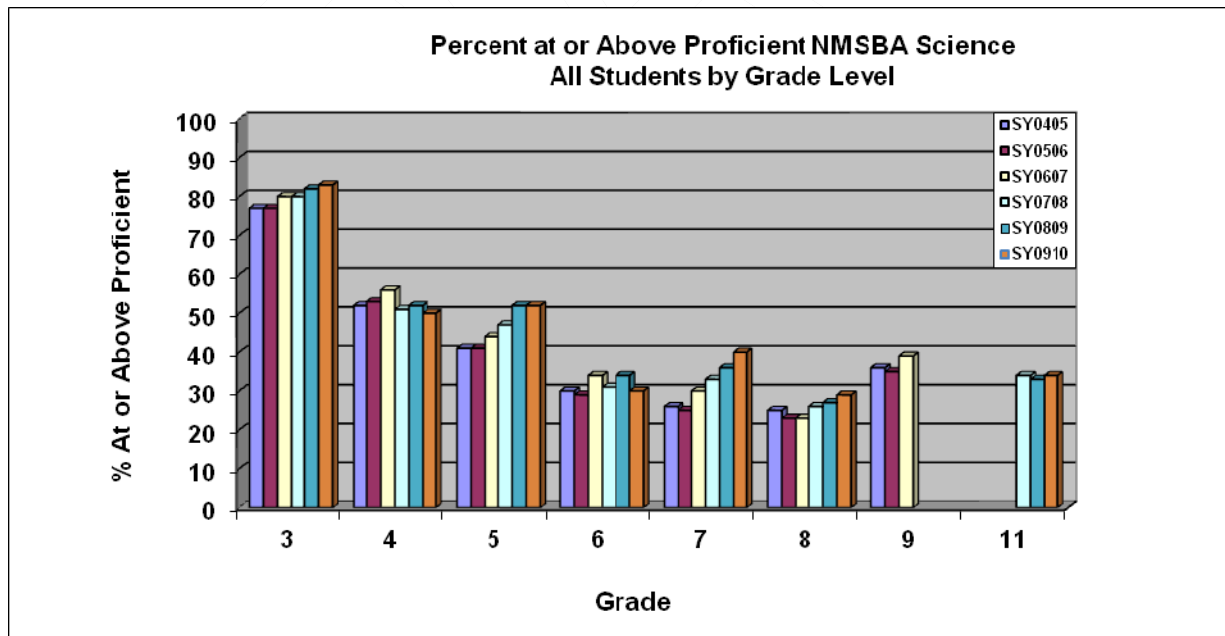


Figure 5 displays science achievement data for economically disadvantaged students. They show trends similar to the overall student population. As is the case in mathematics, an achievement gap in science persists between students designated as economically disadvantaged as compared with the overall student population (see Figure 6).

For economically disadvantaged students, in 2010 the percent at or above proficient has increased at every grade level with the exception of 4<sup>th</sup> and 6<sup>th</sup> grade. Fifth and 7<sup>th</sup> grade show substantial improvement rates over the last six years. As in the case for math, the within-grade percent improvement over the last six years is stronger than for the overall population.

Figure 5.

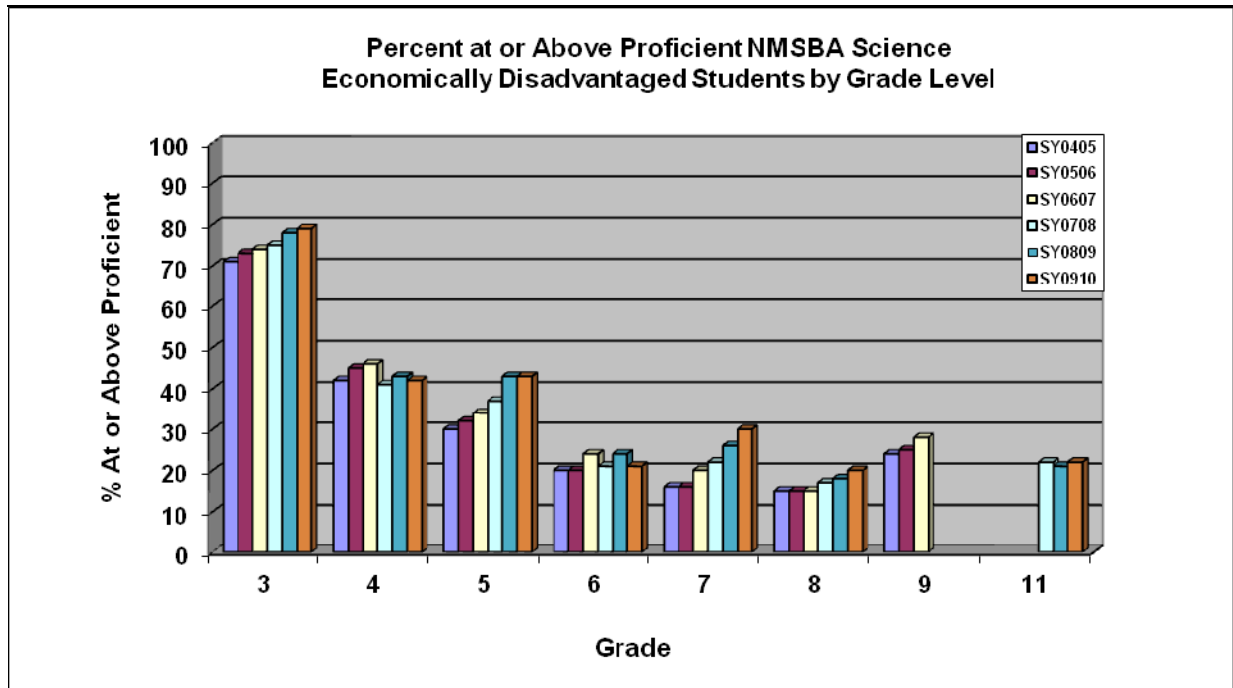
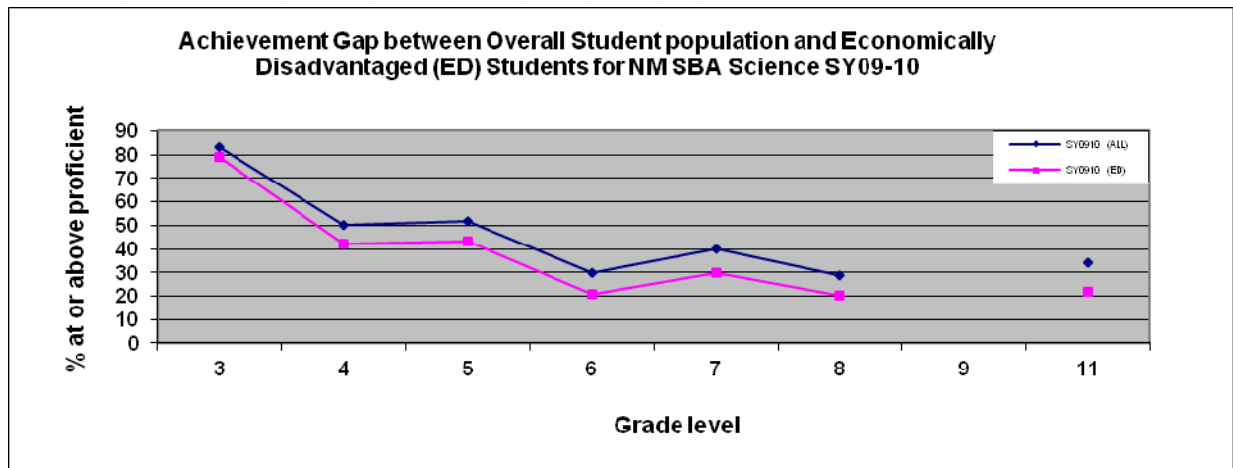


Figure 6.



As with mathematics, the achievement gap between economically disadvantaged students and the overall student population in New Mexico has narrowed very slightly in the past six years, but progress is not satisfactory.

### 1.1.2 National Assessment of Educational Progress (NAEP)

NAEP results are important because they provide us a way to compare student achievement across states and to 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 sixties, 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 at the 4<sup>th</sup>, 8<sup>th</sup> and 12<sup>th</sup> grade levels. Once voluntary, states now must participate as part of NCLB. 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 SBAs, the NAEP exams have both multiple-choice and extended-response items. NAEP does not provide state level results for 12<sup>th</sup> grade. Table 1 shows NAEP results for New Mexico in 4<sup>th</sup> and 8<sup>th</sup> grades as well as average national achievement data.

**Table 1. New Mexico Students Proficient or Advanced on NAEP Math**

|           | New Mexico |         | Nation  |         |
|-----------|------------|---------|---------|---------|
|           | Grade 4    | Grade 8 | Grade 4 | Grade 8 |
| Math 2003 | 17%        | 15%     | 32%     | 29%     |
| Math 2005 | 19%        | 14%     | 36%     | 30%     |
| Math 2007 | 24%        | 17%     | 39%     | 32%     |
| Math 2009 | 26%        | 20%     | 39%     | 34%     |

Both New Mexico and the nation as a whole are improving on the NAEP mathematics results. The gains in New Mexico in 2009 are encouraging; NM scores are increasing at a faster rate than the nation's. Encouragingly, a recent alignment study shows that 93% of the NAEP grade 4, 94% of the NAEP grade 8, and 80% of NAEP grade 12 standards are largely addressed by the original New Mexico grade 9-12 standards. In addition, 77% of NAEP grade 12 assessment standards are well covered by the revised grade 9-12 New Mexico standards. Table 2 shows NAEP results in science.

**Table 2. New Mexico Students Proficient or Advanced on NAEP Science**

|              | New Mexico |         | Nation  |         |
|--------------|------------|---------|---------|---------|
|              | Grade 4    | Grade 8 | Grade 4 | Grade 8 |
| Science 2003 | 17%        | 27%     | 20%     | 30%     |
| Science 2005 | 18%        | 27%     | 18%     | 27%     |

The results for science show no improvement for either New Mexico or the nation as a whole. Southwest REL in 2007 did an alignment study comparing New Mexico Science *Standards* with NAEP and in general found that the alignment was “fairly” close.<sup>3</sup>

<sup>3</sup> The Southwest REL (Regional Educational Lab) is doing a study of the alignment of the New Mexico Math *Standards* with NAEP.

Nationally, there has been some concern that proficiency rates on state assessments are much higher than they are on NAEP (<http://nces.ed.gov/nationsreportcard/pubs/studies/2010456.pdf>) because they are often less rigorous. However, the close alignment of the NMSBA with NEAP means that this may not be the case for New Mexico. Indeed, New Mexico's changes in student achievement from 2005 to 2007 in NMSBA scores were corroborated by NAEP results in mathematics for both 4<sup>th</sup> grade and 8<sup>th</sup> grade. For 4<sup>th</sup> grade math, New Mexico had the 12<sup>th</sup> highest "NAEP score equivalent" nationwide, and for 8<sup>th</sup> grade math, New Mexico had the 8<sup>th</sup> highest "NAEP score equivalent" nationwide.

### 1.1.3 ACT and SAT

ACT and SAT scores are another proxy measure of overall student achievement, although only for the subset of students who take these tests. The tables below indicate average scores and participation rates. Footnotes below give the source for Tables 3 and 4 and the source for Table 5.

**Table 3. ACT Math Scores<sup>4</sup> from 2004 to 2010 (Top Score is 36)**

| ACT Math | New Mexico  |         |              | Nation       |         |              |              |
|----------|-------------|---------|--------------|--------------|---------|--------------|--------------|
|          | School Year | Average | # of Seniors | % of Seniors | Average | # of Seniors | % of Seniors |
|          | 04-05       | 19.4    | 11,858       | 61%          | 20.7    | 1,186,251    | 38%          |
|          | 05-06       | 19.6    | 11,539       | 60%          | 20.8    | 1,206,455    | 38%          |
|          | 06-07       | 19.7    | 11,663       | 61%          | 21.0    | 1,300,599    | 40%          |
|          | 07-08       | 19.8    | 11,951       | 61%          | 21.0    | 1,421,941    | 44%          |
|          | 08-09       | 19.6    | 12,434       | 65%          | 21.0    | 1,480,469    | 45%          |
|          | 09-10       | 19.7    | 12,679       | 64%          | 21.0    | 1,568,835    | 47%          |

**Table 4. ACT Science Scores<sup>4</sup> from 2004 to 2010 (Top Score is 36)**

| ACT Science | New Mexico  |         |              | Nation       |         |              |              |
|-------------|-------------|---------|--------------|--------------|---------|--------------|--------------|
|             | School Year | Average | # of Seniors | % of Seniors | Average | # of Seniors | % of Seniors |
|             | 04-05       | 20.1    | 11,858       | 61%          | 20.9    | 1,186,251    | 38%          |
|             | 05-06       | 20.1    | 11,539       | 60%          | 20.9    | 1,206,455    | 38%          |
|             | 06-07       | 20.2    | 11,663       | 61%          | 21.0    | 1,300,599    | 40%          |
|             | 07-08       | 20.2    | 11,951       | 61%          | 20.8    | 1,421,941    | 44%          |
|             | 08-09       | 20.0    | 12,434       | 65%          | 20.9    | 1,480,469    | 45%          |
|             | 09-10       | 20.2    | 12,679       | 64%          | 20.9    | 1,568,835    | 47%          |

<sup>4</sup> [www.act.org/news/data/10/pdf/profile/NewMexico.pdf?utm\\_campaign=cccr10&utm\\_source=profilereports&utm\\_medium=web](http://www.act.org/news/data/10/pdf/profile/NewMexico.pdf?utm_campaign=cccr10&utm_source=profilereports&utm_medium=web)

**Table 5. SAT Math Scores<sup>5</sup> from 2004 and 2010 (Top Score is 800)**

| SAT Math | New Mexico |              |              | Nation  |              |              |
|----------|------------|--------------|--------------|---------|--------------|--------------|
|          | Average    | # of Seniors | % of Seniors | Average | # of Seniors | % of Seniors |
| 04-05    | 539        | 1,542        | 8%           | 508     | 1,017,483    | 33%          |
| 05-06    | 545        | 1,514        | 8%           | 508     | 957,538      | 30%          |
| 06-07    | 532        | 1,361        | 7%           | 505     | 1,001,667    | 31%          |
| 07-08    | 539        | 1,353        | 7%           | 505     | 1,027,551    | 31%          |
| 08-09    | 534        | 1,215        | 6%           | 505     | 1,016,606    | 31%          |
| 09-10    | 549        | 1,186        | 6%           | 505     | 1,028,492    | 31%          |

The ACT and SAT data are perhaps more difficult to translate because of the differences in participation rates. One of the most interesting results may be that although the ACT math scores have improved more than the science scores, the science scores are closer to the national results. Perhaps this is due to a lower overall classroom exposure to science nationwide. It may also be worth noting that participation rates for the ACT are much larger than those for the SAT. One explanation for this phenomenon might be the fact that ACT test is more common in the middle of the country and the SAT is more common on the two coasts.

## 1.2 Student Course-taking Patterns

### 1.2.1 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 8<sup>th</sup> grade. In the 2006-2007 school year, about 14% of New Mexico 8<sup>th</sup> graders were enrolled in Algebra 1, and in the 2009-10 school year approximately 20% took Algebra 1. Many middle schools that do not formally offer Algebra 1 use the *Connected Math Program* (CMP) series; some claim that the 8<sup>th</sup> grade CMP materials are equivalent to Algebra 1.

**Table 6. Percent of 8<sup>th</sup> graders taking Algebra 1 in years 2006-07 to 2009-10**

|         | 40-day Count | Percent of all 8 <sup>th</sup> Graders |
|---------|--------------|--|
| 2006-07 | 3517         | 14%                                    |
| 2007-08 | 4807         | 19%                                    |
| 2008-09 | 4797         | 19%                                    |
| 2009-10 | 4871         | 20%                                    |

Note: Students who took Algebra 1 in 7<sup>th</sup> grade in 2009-10 are not counted in the above table.

<sup>5</sup> [http://professionals.collegeboard.com/profdownload/NM\\_09\\_03\\_03\\_01.pdf](http://professionals.collegeboard.com/profdownload/NM_09_03_03_01.pdf) and <http://professionals.collegeboard.com/data-reports-research/ap/data>

It is important to look at what courses students take in 9<sup>th</sup> grade after taking Algebra 1 in 8<sup>th</sup> grade. Of the 4,797 students who took Algebra 1 in 8<sup>th</sup> grade in 2008-09, 85% (4,090) of them were enrolled in at least one mathematics course in 9<sup>th</sup> grade in 2009-10 (indicating that 15% did not enroll in any math class at all). Table 7 shows the distribution of those courses. Courses marked with an asterisk (\*) are presumed to have content at or below Algebra 1.

**Table 7: Grade 9 Courses Taken by Students who Took Algebra I in Grade 8**

| Course Names in G9                 | Number of Students enrolled in G9<br>who took Algebra I in G8 |              |
|------------------------------------|---|--------------|
|                                    | 2008-09   | 2009-10      |
| Geometry                           | 2184  | 2192 (45.2%) |
| Algebra I*                         | 1791  | 1706 (35.2%) |
| Interactive Mathematics Program 1* | 343   | 45 (.9%)     |
| Algebra 2                          | 109   | 45 (.9%)     |
| Interactive Mathematics Program 2  | 106   | 10 (.2%)     |
| Algebra 1 Part 1*                  | 84  | 2 (.04%)     |
| Resource Center Math*              | 73  | 16 (.3%)     |
| Mathematics*                       | 70  | 13 (.3%)     |
| Algebra 1 Part 2*                  | 66  | 44 (.9%)     |
| Pre Algebra*                       | 41  | 13 (.3%)     |
| Other                              | 136   | 59 (1.2%)    |

Note: 707 (14.7%) of 9<sup>th</sup> grade students who had taken Algebra 1 in 8<sup>th</sup> grade did not enroll in any math course in 9<sup>th</sup> grade.

Geometry was the most common math course taken after Algebra 1 in 8<sup>th</sup> grade. However, about half of the students who took Algebra 1 in 8<sup>th</sup> grade either repeated Algebra 1 or took some lower-level course. There is no state policy on whether or not Algebra 1 taken in the 8<sup>th</sup> grade should receive high school credit so that students do not have to repeat it. Another dilemma (mentioned above) concerns students who use the *Connected Math* series in 8<sup>th</sup> grade. One possible response to all these issues would be a statewide Algebra 1 “End of Course (EOC) exam” for all Algebra 1 courses. Such an EOC exam could help ensure the quality and transferability of Algebra 1 courses. However, challenges to implementing a statewide Algebra 1 EOC exam include:

- Development or purchase costs;
- Lack of consensus on what constitutes knowledge, skills and dispositions for Algebra I (the MSB has a draft of a document out for review that suggests which of the grades 9-12 Math *Standards* might be in an Algebra I course);
- The need for multiple versions of an EOC exam so that it can be given statewide at the end of each semester and summer school session; and
- Need for very quick turn-around time for the grading.

### 1.2.2 Algebra 2 Enrollments in High School

While the majority of students take Algebra 2 during their junior year, a total of 18% of the total high school student count was enrolled in Algebra 2 during 2009-10, (including all grade-levels).

This count, however, includes students who have dropped out or moved to another state. Tables 8-10 show Algebra 2 enrollments for the past three years.

**Table 8. Algebra 2 Enrollments by Grade Level for 2007-08**

| School Year | Grade | Algebra 2 | Algebra 2 / Trigonometry | Total Counts for Algebra 2 and Algebra 2 / Trigonometry | Percent of total student count per grade level |
|-------------|-------|-----------|--------------------------|---|--|
| 07-08       | 9     | 651       | 20                       | 671   | 2%   |
| 07-08       | 10    | 4478      | 251                      | 4729  | 18%  |
| 07-08       | 11    | 9712      | 170                      | 9882  | 43%  |
| 07-08       | 12    | 3653      | 38                       | 3691  | 19%  |

**Table 9. Algebra 2 Enrollments by Grade Level for 2008-09**

| School Year | Grade | Algebra 2 | Algebra 2 / Trigonometry | Total Counts for Algebra 2 and Algebra 2 / Trigonometry | Percent of total student count per grade level |
|-------------|-------|-----------|--------------------------|---|--|
| 08-09       | 9     | 524       | 27                       | 551   | 2%   |
| 08-09       | 10    | 4134      | 245                      | 4379  | 16%  |
| 08-09       | 11    | 9708      | 165                      | 9873  | 44%  |
| 08-09       | 12    | 3940      | 56                       | 3996  | 18%  |

**Table 10. Algebra 2 Enrollments by Grade Level for 2009-10**

| School Year | Grade | Algebra 2 | Algebra 2 / Trigonometry | Total Counts for Algebra 2 and Algebra 2 / Trigonometry | Percent of total student count per grade level |
|-------------|-------|-----------|--------------------------|---|--|
| 09-10       | 9     | 435       | 49                       | 484   | 2%   |
| 09-10       | 10    | 3799      | 333                      | 4132  | 16%  |
| 09-10       | 11    | 9175      | 265                      | 9440  | 44%  |
| 09-10       | 12    | 3344      | 48                       | 3392  | 16%  |

### 1.2.3 High School Science Enrollments for 2009-10

Current requirements for high school science are that students must take three units of science, two of which contain a laboratory component. No specific courses or course sequences are identified in statute. Districts offer a large variety of science courses, and as is evident from Table 11 below, students pursue varying course sequences. This may have an impact on student performance on the grade 11 NMSBA in science, since the courses taken may not overlap well with the NMSBA test content. Again, end-of-course (EOC) exams might be a way to address this issue.

The most popular science courses were Biology 1, Chemistry 1, and Physical Science. The highest enrollments in grades 9 and 10 were in Biology 1, the highest enrollments in grade 11 were in Chemistry 1, and the highest enrollments in grade 12 were in Anatomy and Physiology or Chemistry 1.

**Table 11. Science Enrollment by Grade Level for 2009-10**

| Course Name                | Grade 9 | Grade 10 | Grade 11 | Grade 12 | Total Enrollment |
|----------------------------|---------|----------|----------|----------|------------------|
| AP Science                 | 30      | 200      | 806      | 947      | 1983             |
| Anatomy and Physiology     | 48      | 366      | 1505     | 1331     | 3250             |
| Astronomy                  | 33      | 232      | 789      | 483      | 1537             |
| Biology 1                  | 10126   | 9767     | 2477     | 862      | 23232            |
| Biology 2                  | 351     | 972      | 600      | 287      | 2210             |
| Biology Other              | 57      | 209      | 395      | 293      | 954              |
| Chemistry 1                | 395     | 6043     | 4634     | 1320     | 12392            |
| Chemistry 2                | 5       | 250      | 451      | 109      | 815              |
| Chemistry Other            | 7       | 322      | 324      | 180      | 833              |
| Earth and Space Sciences   | 1284    | 869      | 1342     | 767      | 4262             |
| Environmental Science      | 250     | 1116     | 927      | 692      | 2985             |
| Forensic Science           | 14      | 133      | 626      | 502      | 1275             |
| General Science            | 1800    | 239      | 314      | 211      | 2564             |
| Geology                    | 23      | 118      | 365      | 198      | 704              |
| IB Science Courses         | 25      | 50       | 14       | 2        | 91               |
| Integrated/Unified Science | 3988    | 948      | 375      | 220      | 5531             |
| Physical Science           | 6277    | 1079     | 859      | 531      | 8746             |
| Physics 1                  | 357     | 865      | 2404     | 1056     | 4682             |
| Physics 2                  | 36      | 9        | 61       | 98       | 204              |
| Physics Other              | 0       | 1        | 6        | 11       | 18               |
| Other                      | 97      | 116      | 267      | 228      | 708              |
| Total                      | 25203   | 23904    | 19541    | 10328    | 78976            |

Note: All student counts were obtained from the 60 day (snapshot) count of SY09-10

### 1.2.4 Examining the Four-year Math and Science Journey of 2010 Seniors

Table 12 shows the cumulative math and science credits for high school seniors in 2009-10. The data show that 86% of them had taken 3 or more math classes, and 78% of students had taken Algebra 2 or an equivalent course. It is encouraging that 54% of students have taken four or more math courses. Note that beginning with the class of 2009, all graduating seniors must complete four years of math.

**Table 12. Math and Science Courses Taken from 2006-07 to 2009-10**

|                              | Percent of students from 2006-07 to 2009-10 |
|------------------------------|---|
| Algebra 2 or equivalent      | 78%   |
| 3 or more Math classes in HS | 86%   |
| 4 or more Math classes in HS | 54%   |
| 3 or more Science credits    | 77%   |

Note: Students with 2 or fewer mathematics courses and/or students with 1 or fewer science courses taken over the course of four years were eliminated in the above calculations and were considered as having moved or transferred in or out of New Mexico or having dropped out. The student count for four year longitudinal study was 18,667.

The data seem to suggest that about 23% of all students over the course of four years had taken fewer than 3 science classes in high school, while statute requires 3 science classes to graduate.

However, the current STARS data system does not indicate if schools have completed the Alternative Credit process which allows elective courses, such as Agriculture Science, to be counted for graduation credit. Another possible limitation of these data is that incoming students from out of state do not have their out of state credits captured in STARS. Verifying that students have met state graduation requirements is a school district responsibility.

### 1.2.5 Advanced Placement (AP)

Since success on 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\*\*
- \*Qualified to receive college credit or advanced placement
- \*\* No recommendation to receive college credit or advanced placement

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

**Table 13. Results from Math Advanced Placement 2007 to 2010**

|      | Calculus AB |             | Calculus BC |             | Computer Science A |             | Computer Science AB |             | Statistics |             |
|------|-------------|-------------|-------------|-------------|--------------------|-------------|---------------------|-------------|------------|-------------|
|      | Take Test   | % Pass Test | Take Test   | % Pass Test | Take Test          | % Pass Test | Take Test           | % Pass Test | Take Test  | % Pass Test |
| 2007 | 811         | 49%         | 267         | 74%         | 31                 | 48%         | 10                  | 50%         | 237        | 48%         |
| 2008 | 722         | 54%         | 224         | 72%         | 42                 | 60%         | 8                   | 50%         | 255        | 51%         |
| 2009 | 795         | 50%         | 244         | 72%         | 40                 | 35%         | 13                  | 62%         | 246        | 48%         |
| 2010 | 737         | 48%         | 283         | 74%         | 50                 | 48%         | N/A                 | N/A         | 280        | 45%         |

**Table 14. Results from Science Advanced Placement 2007 to 2010**

|      | Biology   |             | Chemistry |             | Environmental Science |             | Physics B |             | Physics C: Elec. & Mag. |             | Physics C: Mechanics |             |
|------|-----------|-------------|-----------|-------------|-----------------------|-------------|-----------|-------------|-------------------------|-------------|----------------------|-------------|
|      | Take Test | % Pass Test | Take Test | % Pass Test | Take Test             | % Pass Test | Take Test | % Pass Test | Take Test               | % Pass Test | Take Test            | % Pass Test |
| 2007 | 479       | 52%         | 383       | 37%         | 130                   | 29%         | 310       | 52%         | 65                      | 74%         | 94                   | 77%         |
| 2008 | 468       | 45%         | 296       | 40%         | 89                    | 29%         | 261       | 48%         | 48                      | 71%         | 69                   | 81%         |
| 2009 | 460       | 41%         | 338       | 36%         | 161                   | 34%         | 273       | 48%         | 33                      | 73%         | 44                   | 77%         |
| 2010 | 554       | 39%         | 309       | 32%         | 154                   | 36%         | 226       | 48%         | 40                      | 55%         | 54                   | 74%         |

Overall, student success on most of the AP exams has not changed significantly over the last four years. Computer science courses have experienced the greatest variability in passing rates, but enrollment in these courses is quite low. The percentage of students passing the biology exam

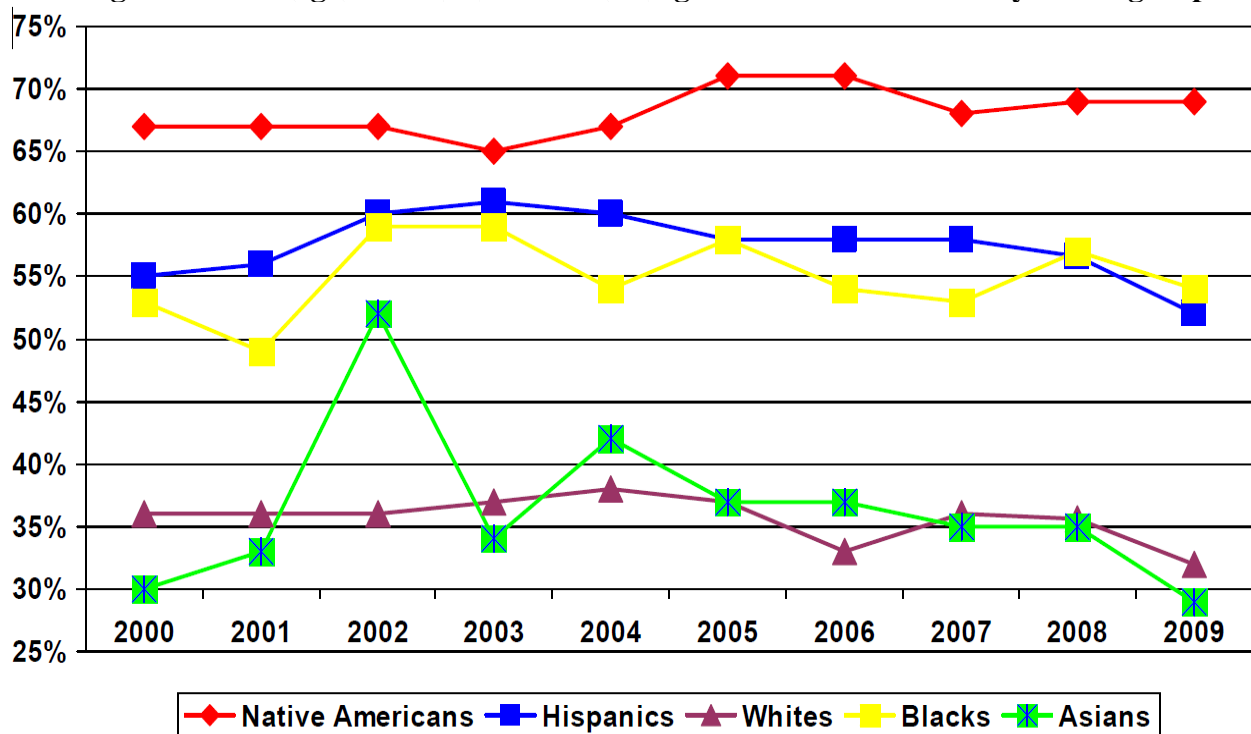
has decreased noticeably while the number taking the test has increased. We must be cautious that as we increase the number of students taking the AP tests we do not lower the quality of the courses.

### 1.2.6 Remedial Course Taking in College

The Office of Educational Accountability (OEA) in the New Mexico Department of Finance and Administration (DFA) published *Ready for College Study 2009: A Report on New Mexico High School Graduates Who Take Remedial Classes in New Mexico Colleges and Universities* ([education.nmdfa.state.nm.us/](http://education.nmdfa.state.nm.us/)). They reported that about 37% of New Mexico high school graduates in 2009 who went on to attend college in New Mexico had to take a remedial math course. Remedial math is defined as a math course that does not receive regular college credit. The courses are therefore at the Algebra 1 level or lower. Intermediate Algebra, which is fairly equivalent to high school Algebra 2, receives regular college credit so is not included in the remedial study.

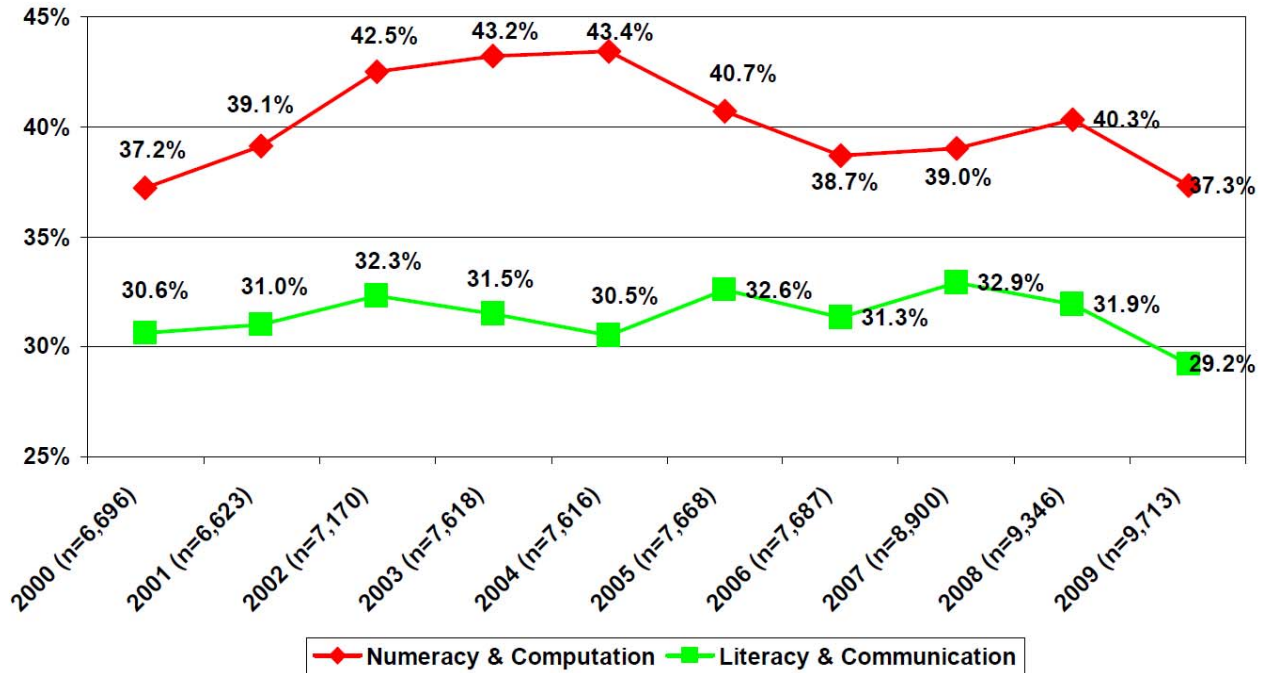
The results of this initial study found that nearly half (47%) of New Mexico’s public high school graduates took remedial coursework in reading and/or mathematics when beginning their higher education, with a substantial difference in remediation rates between ethnic groups (see Figure 7). The study also revealed significant variance by high school in higher education remediation rates (excluding alternative schools and charter schools), with a low of 8% of students requiring remediation, to a high of 89%. Follow-up studies conducted in 2009 have found no substantive improvement in overall remediation rates. There may be a misalignment between high school course work and higher education expectations.

**Figure 7: NM High School Graduates taking remedial coursework by ethnic group**



The research also found that an extensive achievement gap exists between reading and math, with substantially more students being required to participate in remedial math courses than in literacy courses, as illustrated in Figure 8.

**Figure 8: New Mexico Public High School Graduates Remediation Rates 2000-2009**



## 2. Actions taken in 2009-10

This section includes a brief summary of actions taken by the Math and Science Advisory Council and the Math and Science Bureau to improve student achievement in math and science.

### 2.1 Activities of the MSAC

#### 1. New Mexico Project 2012 v.2

The Council's primary work in 2009-2010 was revising and updating *NM Project 2012 v1* based on feedback from stakeholders, new information from national organizations, and progress towards achieving its goals. *NM Project 2012 v2* was published in January of 2010 and distributed to all New Mexico legislators. Both this document and the *Strategic Action Plan* on which it is based are available at <http://www.ped.state.nm.us/MathScience/index.html>.

#### 2. Summer Institutes

The Council was instrumental in ensuring that the summer institutes in math, reading, and science (FY11) were again funded by the New Mexico legislature. \$164,000 was set aside for these teacher development programs.

#### 3. Database of Programs

The Council achieved a long-held goal by establishing a database of math, science, and technology programs around the state. The database will be housed at EPSCoR under the direction of Mary Jo Daniel. Jamai Blivin, Innovate+Educate, and Ed Spivak, New Mexico Optics Industry Association, also have databases that can be added to the one Mary Jo Daniel has established.

#### 4. Promoting Student Recognition

The Council has begun conversations with the New Mexico Athletics Association to find ways that the association can promote and recognize students' achievement in science, math, and technology at a level comparable to that available for athletes.

#### 5. Adding Science Goals to the EPSS

The Council's recommendation to the PED that science goals be added to the EPSS (Education Plan for Student Success) is under consideration by the PED.

### 2.2 Activities of the Math and Science Bureau

#### 1. Reading, Math & Science Summer Institutes

Since 2006, the NM Legislature has appropriated funds for Reading, Math & Science Summer Institutes to provide professional development for New Mexico teachers. For FY11, \$164,100 was appropriated, and 3 projects were funded following *Guidelines for Requesting Funding* issued for FY2011. The FY11 appropriated amount represents a 94% decrease to the FY10

appropriated amount due to the State's budget crisis. Evaluation data from the FY2010 Summer Institutes indicate that teachers report that participation in these professional development activities has been valuable and will contribute to improving their instructional practices.

## 2. Math and Science Partnerships (MSP)

The MSP has been funded by the U.S. Department of Education since 2003. The NM funding targets middle and high school math teachers. One statewide project, Mathematically Connected Communities (MC<sup>2</sup>), is currently funded through New Mexico State University with partners spanning much of the state. The grant award for 2010 is \$1.4 million.

## 3. Assessment

Yearlong work in math with Item Review, Data Review, Range Finding and Standard Setting helps ensure close alignment between the *Standards* and the Standards-Based Assessments.

## 4. Financial Literacy

HB53, which was signed by the Governor, provides for the inclusion of a financial literacy course as one of the four high school math credits. This financial literacy course is a one-year math course, which must align to the NM 9-12 math standards.

## 5. Common Core Standards for Math

NM has adopted the Common Core State Standards (CCSS) for both mathematics and English language arts. For the full and final adoption of the CCSS, NM brought together a variety of stakeholders including school administrators, classroom teachers, higher education representatives, members of the business community, parents and others. States were permitted to add up to 15% to the CCSS. For math, the stakeholders decided to adopt the CCSS without additions.

## 6. Science Instructional Material Adoption for FY2012

In August, the Math and Science Bureau provided training on the RFP (Request for Proposal) requirements of the publishers' participation in the adoption review and the alignment to the New Mexico science content standards. In May of 2011, publishers, reviewers and facilitators will participate in the Adoption Review Institute. By August of 2011, publishers will be informed of the status of their submissions as adopted or non-adopted.

## 7. Adoption for next generation science standards

The National Research Council's (NRC) Committee on "A Conceptual Framework to Develop New Science Education Standards," developed a draft framework. MSB has sent recommendations for the framework, generated by a panel of stakeholders in New Mexico, to the NRC committee which has begun the process of summarizing and revising the framework for the next generation science standards. The framework report will be finalized and released to the

public by early 2011. MSB is paying close attention to the development of the next generation science standards and anticipates at least partial adoption of these science standards in New Mexico as soon as FY2013.

#### 8. Revision of entry level competencies for mathematics teachers

A committee that reviews and revises the Entry Level Competencies for Teachers of Mathematics has completed a further revision of these competencies to align with the Common Core State Standards. The finalized revision will be aligned to the Council of Chief State School Officers' (CCSSO) Model Core Teaching Standards.

#### 9. Math and Science Day at the Legislature

The third annual Math and Science Day at the Legislature was held on Wednesday, February 10, 2010. Twenty-eight schools were recognized for their achievement on their SBA. This ceremony always elicits a lot of excitement and pride, and this year was no exception. In addition, the sunflower prize winner and the presidential awardees were recognized. The Math and Science hands-on displays were particularly well received.

#### 10. Establishing Statewide Common Course Titles

HB163 (Introduced by Rep. Janice Arnold Jones), "An act relating to public schools; requiring school districts to align all mathematics and science courses under the same course titles as those used by the student data management system in the student-teacher accountability reporting system; requiring standardized course content," was tabled by the House Rules & Order of Business Committee.

#### 11. Establishing Support for Mandatory Yearly Professional Development

HJM21 (Introduced by Rep. Janice Arnold Jones), "A joint memorial expressing support for mandatory yearly professional development for kindergarten through twelfth grade mathematics and science teachers and school administrators," was tabled in the House.

#### 12. Support for Development of a Staged, Multiyear Plan to Improve High School Laboratory Facilities

HJM22 (Introduced by Rep. Janice Arnold Jones), "A joint memorial expressing support for the development of a staged, multiyear plan to improve high school science laboratory facilities, as described in New Mexico Project 2012," was passed unanimously by the Senate. A progress report (from the PED and the Public School Facilities Authority) is due December 10, 2010.

### 3. Critical Issues to be Addressed

The Math and Science Bureau and the Math and Science Advisory Council have identified some of the state's pressing educational needs. These needs are exacerbated by the state's severe financial crisis and certainly cannot be adequately addressed in the 2011 legislative session. However, they still need to be highlighted so that state education and political leaders are aware of the implications of past and future budget cuts:

1. Although there has been some improvement, overall New Mexico's students continue to lag well behind students in other states. Pockets of success show that New Mexico schools can help our students perform at high levels, but these high performing schools and districts have not been replicated across the state.
2. The number of students graduating from New Mexico high schools and attending New Mexico postsecondary institutions who have to take remedial math courses is still far too high. This indicates that some students are not attaining adequate knowledge from their high school course work.
3. The understaffing of the Math and Science Bureau keeps the bureau from fully meeting its responsibilities. For example, there is no science coordinator to lead the review of items on science assessments or to participate in the science instructional materials adoption that is coming up. Also, there is no Bureau person to provide input and direction into the new science standards being developed. Local districts and schools — and ultimately students — will be significantly negatively affected by the lack of these key services from the state.

The first two issues require long-term, coordinated efforts from LEAs, IHEs, PED and HED. The support of the Math and Science Bureau is critical in this effort, so that if the third of these items is not addressed soon, the first two will not improve. Unless we can make headway on these critical issues, math and science education in New Mexico will not progress.