

# **Background Report for the NM STEM Coalition Launch and Visioning Convening**

New Mexico STEM Coalition

*Final Draft  
August 2017*

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## Acknowledgements

Special thanks to Kathy Keith, Director, Los Alamos National Laboratory Community Partnerships Office; and Jenny Parks, CEO, Los Alamos National Laboratory Foundation. Their vision and guidance has been indispensable in this work.

The authors are grateful to Rick Scott, PhD; Angelo Gonzales, PhD; and Matt Fetrow who read early drafts of this report and provided substantive feedback and suggestions. Any errors that remain are the responsibility of the authors.

This work is funded by the National Science Foundation (NSF) award #IIA-1329470. Any opinions, findings, conclusions, or recommendations expressed in the material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

## Introduction

The purpose of this background report is to

- 1) provide a context for STEM education and workforce development in New Mexico
- 2) explain the rationale for the formation of the NM STEM Coalition, and
- 3) set the stage for the Launch and Visioning Convening (LVC) on August 29-30, 2017.

Section I of this report examines current trends in STEM student achievement, considers the lack of statewide vision and alignment, and explores the potential impact on economic development for New Mexico. Section II outlines a list of opportunities and possible actions to affect long-term change. Section III explores a STEM Coalition as a possible solution towards working collaboratively across sectors to move the needle in both education and economic development for New Mexico.

## Section I: What is the Problem?

### Student Achievement

New Mexico students rank well below the national average on measures of STEM achievement and readiness. In 2007, only 24% of New Mexico fourth grade students were proficient on the National Assessment of Educational Progress (NAEP) Mathematics exam compared to 39% for the nation. Eight years later, the 2015 data revealed only minimal improvement: 27% of New Mexico students were proficient compared to the national average of 40% proficiency. NAEP mathematics data for eighth grade students revealed similar large gaps between New Mexico students and the national average.

In Science, New Mexico fourth and eighth graders lag significantly behind their counterparts nationwide.<sup>1</sup> Only about 40% of all New Mexico students scored as proficient on the 2016 statewide science assessments for grade 4, grade 7, and grade 11, and data over the last decade has been relatively flat.<sup>2</sup> Data on the New Mexico statewide assessment for mathematics also shows low proficiency levels. Only 23% of fourth graders, 18% of seventh graders, and 10% of eleventh graders were proficient.<sup>3</sup> Additionally, the overall remediation rate in mathematics and English for NM high school graduates entering college in 2015 was 43%.<sup>4</sup>

According to Change the Equation, a national coalition of corporate partners, New Mexico lags behind the nation on virtually every student achievement measure: high school graduation rates, 2-year associate's degree graduation rate, and STEM certificates and degrees.<sup>5</sup>

Examined through an equity lens, less than 40% of Hispanic students and less than 25% of Native American students were proficient on the 2016 statewide science assessment, as compared to their white counterparts, more than 60% of whom were proficient. On

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<sup>1</sup> Nation's Report Card. (2015). Retrieved from [https://www.nationsreportcard.gov/science\\_2015/#?grade=4](https://www.nationsreportcard.gov/science_2015/#?grade=4)

<sup>2</sup> New Mexico Public Education Department. (2014). Math and science annual report. Retrieved from [http://ped.state.nm.us/ped/MathandScienceDocs/2014\\_Math\\_and\\_Science\\_Annual\\_Report\\_final.pdf](http://ped.state.nm.us/ped/MathandScienceDocs/2014_Math_and_Science_Annual_Report_final.pdf)

<sup>3</sup> New Mexico Public Education Department. (2016). Math and science annual report. Retrieved from [http://ped.state.nm.us/ped/MathandScienceDocs/2016\\_Math\\_and\\_Science\\_Annual\\_Report\\_final.pdf](http://ped.state.nm.us/ped/MathandScienceDocs/2016_Math_and_Science_Annual_Report_final.pdf)

<sup>4</sup> New Mexico Higher Education Department. (2015). College remediation. Retrieved from <http://www.hed.state.nm.us/researchers/college-remediation.aspx>

<sup>5</sup> Change the Equation. (2015). Vital signs: New Mexico. Retrieved from <http://vitalsigns.changetheequation.org/state/new-mexico/print>

the 2016 statewide mathematics assessment, less than 8% of Hispanic eleventh grade students and less than 5% of Native American eleventh grade students were proficient.<sup>6</sup>

## Lack of Statewide Vision and Alignment

A lack of a statewide vision and sustained coordination has impeded the efforts needed to move the state forward. Minimal cohesion among people and programs has resulted in an incoherent statewide STEM ecosystem. Most STEM stakeholders in New Mexico operate in relative isolation, hindering efforts toward a collective statewide STEM vision, clear policy adoption, the adoption of best practices, alignment of STEM activities, and coordinated advocacy. Furthermore, priorities and policies are susceptible to short-term political cycles which disrupt efforts to create and implement a long-term STEM vision for New Mexico.

Recently however, state government, including the New Mexico Public Education Department (NM PED), the New Mexico Higher Education Department (NM HED) and the New Mexico State Legislature have taken steps to bolster statewide STEM education efforts. NM PED initiatives include a STEM readiness measure in the school grading formula<sup>7</sup>, the Making Sense of Science Teacher Professional Development Institutes, and the Pathways to Mathematics Excellence Pilot Program. The NM State Legislature has included STEM degrees in the higher ed funding formula and provided funding for NMPED STEM efforts, though not at levels required to reach statewide need.

Improving STEM outcomes in NM cannot rest solely with government or the education sector. It must be a collective responsibility of the entire STEM community.

## Historical Context

New Mexico has a history of engaged public and private stakeholders including business and industry, state government, schools and districts, and nonprofit and philanthropic organizations that support many STEM programs. For an extensive list of partners, see Appendix B in the [2016 Math and Science Annual Report](#). In 2005, and again in 2012, the

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<sup>6</sup> New Mexico Public Education Department. (2016). Math and science annual report. Retrieved from [http://ped.state.nm.us/ped/MathandScienceDocs/2016\\_Math\\_and\\_Science\\_Annual\\_Report\\_final.pdf](http://ped.state.nm.us/ped/MathandScienceDocs/2016_Math_and_Science_Annual_Report_final.pdf)

<sup>7</sup> New Mexico Public Education Department. (2017). *New Mexico rising: New Mexico's state plan for the every student succeeds act*. Retrieved from [http://ped.state.nm.us/ped/ESSA\\_docs/04112017/NMStatePlan.pdf](http://ped.state.nm.us/ped/ESSA_docs/04112017/NMStatePlan.pdf)

NM Partnership for Mathematics and Science Education and NM First convened statewide town halls to develop consensus recommendations.

A number of concrete actions have resulted from consensus deliberations, including

- 2007 Mathematics and Science Education Act that established the Math and Science Bureau and the Math and Science Advisory Council at NM PED
- Project 2012: Math and Science Education for the Future Report
- 2013 NM STEM-H Connections website (<http://nmstemh.org/content/overview>)
- 2013-2017 Legislation efforts around teacher preparation, science standards, high school math credits, legislative appropriations for NMPED Math and Science Bureau
- 2014 Proclamation from the six major STEM Employers (Air Force Research Laboratory, Intel, Los Alamos National Laboratory, Northrop Grumman, PNM and Sandia Labs)
- 2016 STEM Strategic Framework, Math and Science Advisory Council

Despite this history and genuine efforts by many people and organizations, most consensus strategies have not been moved into sustained and coordinated action. Often, efforts have been limited to education sector stakeholders, and although they are vital to the equation, a more inclusive and coordinated strategy is needed.

## Importance of STEM Education to Economic Development

In 2016, the National Conference of State Legislatures (NCSL) published [No Time To Lose: How to Build a World Class Education System State by State](#) concluding that “We cannot ignore the reality that most state education systems are falling dangerously behind the world, leaving the United States overwhelmingly underprepared to succeed in the 21st economy.” For New Mexico, this lack of preparedness has severe economic consequences, not only as our overall levels of proficiency and graduation are markedly lower than the rest of the U.S., but also in the pervasive achievement gap between students of color and their white counterparts.

The achievement gap between students of color and white students in the United States has the same economic consequences as a national recession. It is estimated that if the U.S. closed this achievement gap to the level of Finland and Korea, the U.S. GDP would increase by \$1.3 to \$2.3 trillion.<sup>8</sup> Addressing this gap is specifically tied to STEM

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<sup>8</sup> [http://mckinseysociety.com/downloads/reports/Education/achievement\\_gap\\_report.pdf](http://mckinseysociety.com/downloads/reports/Education/achievement_gap_report.pdf)

education and intimately tied to New Mexico as 54% of our students identify as other than white. A 2013 US Census Bureau report found that nationally, Hispanics make up a mere 7% of the STEM workforce.<sup>9</sup> This statistic is especially compelling in New Mexico, where Hispanics are nearly 50% of our population.<sup>10</sup>

The top five industry sectors expected to see the largest growth in total employment and demand over the next ten years are healthcare services, innovation and technology services, education services, and finance services.<sup>11</sup> The projected demand for New Mexico mirrors these national projections.<sup>12</sup> Many of the jobs in these sectors are not only intimately tied to skills associated with STEM education, they also tend to be spread across both urban and rural locations – an important issue in a state like New Mexico.

Nationally, the number of STEM occupations are projected to grow by 17%, compared to 9.8% growth for non-STEM related occupations. Moreover, STEM workers command higher wages, earning 26% more than their non-STEM counterparts.<sup>13</sup> In New Mexico, although the growth of STEM jobs (8%) is predicted to grow at a faster rate than non-STEM jobs (6%) in the state, our state is far outpaced by other western states like Colorado (23%) and Utah (25%).<sup>14</sup>

Harnessing the STEM trend for New Mexico can change the trajectory of our economic reality. A highly skilled workforce will impact job growth and sector development. Attracting companies to New Mexico in fields that include intelligent manufacturing, cybersecurity, computer animation, social media, and big data relies on a skilled workforce. Cultivating small business entrepreneurs and a healthy portfolio of industry in New Mexico also depends on a skilled workforce that is agile, collaborative, and creative.

Investing in, and advocating for, a STEM education ecosystem that develops New Mexican talent is not simply an altruistic endeavor; it provides a foundation for all

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<sup>9</sup> Landivar, Liana Christin. 2013. "Disparities in STEM Employment by Sex, Race, and Hispanic Origin," American Community Survey Reports, ACS-24, Washington DC: U.S. Census Bureau.

<sup>10</sup> U.S. Census Bureau. (2013). Disparities in STEM Employment by Sex, Race, and Hispanic Origin. Retrieved from <https://www.census.gov/library/publications/2013/acs/acs-24.html>

<sup>11</sup> [Bureau of Labor Statistics, 2017](#)

<sup>12</sup> NM Dept of Workforce Solutions, [2017](#)

<sup>13</sup> [STEM Jobs Report, Bureau of Labor Statistics, 2014](#)

<sup>14</sup> Change the Equation. (2015). Vital signs: New Mexico. Retrieved from <http://vitalsigns.changetheequation.org/state/new-mexico/print>

workforce development, not just those traditionally associated with science, technology, math, or engineering. In fact, 80% of all jobs in the future will require some level of skills that are attained through STEM education.<sup>15</sup> A strong STEM education will determine the success of a more robust economy over time.

As such, a STEM education ecosystem needs to be strategically organized in tandem with New Mexico's economic development plan, linked to industry requirements, and as part of a collective solution.

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<sup>15</sup> <http://greatercincystem.org/about-stem>



## Section II: Opportunities for Action

Although the statistics paint a dire picture, there is hope for the future. Groups such as the Math and Science Advisory Council, the New Mexico Partnership for Mathematics and Science Education, and The New Mexico Business Roundtable have identified numerous opportunities and potential actions that will have a direct and positive impact on STEM education, workforce, and economic development in New Mexico. The list of actions below represent consensus ideas and starting points for future discussions, organized into policy actions, advocacy actions and activities alignment.

### Policy Actions

#### **Adopt Computer Science Education Legislation (SB 134)**

As a first step toward expanding access to computer science and technology courses, SB 134 was introduced in 2017 by Senators Candelaria and Sarinana and would allow a computer science credit to count for a math or science credit towards high school graduation requirements. Though ultimately vetoed by the governor, the bill received overwhelming bipartisan support from legislators, business groups, teachers' unions, school districts, and educational organizations.

#### **Adopt Next Generation Science Standards (NGSS)<sup>16</sup>**

Support the adoption of new science standards through administrative rule change by NM PED, and advocate for a comprehensive roll-out strategy including teacher and administrator training, ongoing professional learning, curriculum support, and science materials and equipment.

#### **Promote STEM Teacher Mentoring and Induction Programs**

New Mexico colleges and universities do not graduate sufficient numbers of STEM classroom teachers to fill the needs of the K-12 system (Public Education Department, 2014). The STEM teacher pipeline and teacher shortages are already having significant impacts, especially in rural districts.

#### **Adopt Math Teacher Competencies aligned to NM Common Core State Standards**

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<sup>16</sup> Next Generation Science Standards. (2013)

The NM math teacher competencies were last updated in 2001 and are not aligned with NM Common Core State Standards (NM CCSS). These competencies can be updated through a change in the NM Administrative Code, and will provide a clear signal to teacher preparation programs.

### **Establish Elementary Mathematics Endorsement**

Establishing an elementary level mathematics endorsement would lead to more effective practices in teaching foundational elementary mathematics and set students on a path to success in more advanced mathematics.

## **Advocacy Actions**

### **Advocate for Funding for STEM Education**

STEM education is vastly underfunded as compared to literacy. For example, in the State's FY 17-18 budget, the early reading initiative was appropriated \$12.5 million while STEM for grades K-12 was appropriated \$1.9 million (HB 2, 2017). New sources of funding from public and private sources are required, along with identifying opportunities to leverage existing funding to support STEM education.

### **Promote STEM Education**

It is unclear that the general public (or even state policymakers) appreciate the importance of STEM education for the future of the state's economy and job prospects for today's students. State policymakers? For example, the New Mexico Legislative Jobs Council Final Report (2013) limits discussion of improving the state's workforce to just one STEM-specific idea: "Fund a physics early-education pilot program for middle schools".<sup>17</sup>

### **Ensure Systems of Support for Teachers**

K-12 teachers need support 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.

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<sup>17</sup> New Mexico Legislative Jobs Council (2013), p.14. Final Report. Retrieved from <http://nmdashboard.thecelab.org/files/IJC%20Final%20Report%202013.pdf>

- Ensure there is a mechanism for all educators at every level, including administrators and college faculty, to engage in continuous improvement within the profession.
- Develop STEM teacher leaders and school leaders within schools and districts.
- Develop comprehensive systems of professional learning

## Activities Alignment Actions

### **Enhance Student Internship Programs and Implement Apprenticeship Programs**

Coordinated support for business and industry to provide internships and apprenticeships for high school and undergraduate students would help build the workforce pipeline.

### **Ensure access to high quality STEM programs for students across New Mexico**

STEM opportunities for students are concentrated along the Rio Grande corridor and rarely available for students in rural areas. Alliances with sectors with strong ties to rural communities, (e.g., agriculture and energy) would help promote STEM opportunities for all.

### **Align workforce training resources with in-demand STEM jobs**

This activity is critical in order grow the STEM workforce to meet the demand of the state's current business and industry, and to attract new business and industry.

## Section III: Envisioning a New Way to Work Together: NM STEM Coalition

A statewide, independent and nonpartisan STEM coalition can realize the vision described above, catalyzing action and coordinating efforts.

### Collective Impact

A STEM Coalition will be based on a framework of collective impact, the “commitment of a group of important actors from different sectors to a common agenda for solving specific social problems”.<sup>18</sup> Successful collective impact initiatives have a common agenda, common progress measures, mutually reinforcing activities, strong communication, and a backbone organization. Collective impact is not a typical partnership of two or three organizations but instead involves all stakeholders in setting an agenda and working collectively to effect change.

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<sup>18</sup> Kania, J., & Kramer, J. (2011, Winter). Collective impact. *Stanford Social Innovation Review*, p. 2. Retrieved January 1, 2013, from [http://www.ssireview.org/articles/entry/collective\\_impact](http://www.ssireview.org/articles/entry/collective_impact)

A draft Theory of Change to support this framework is below.

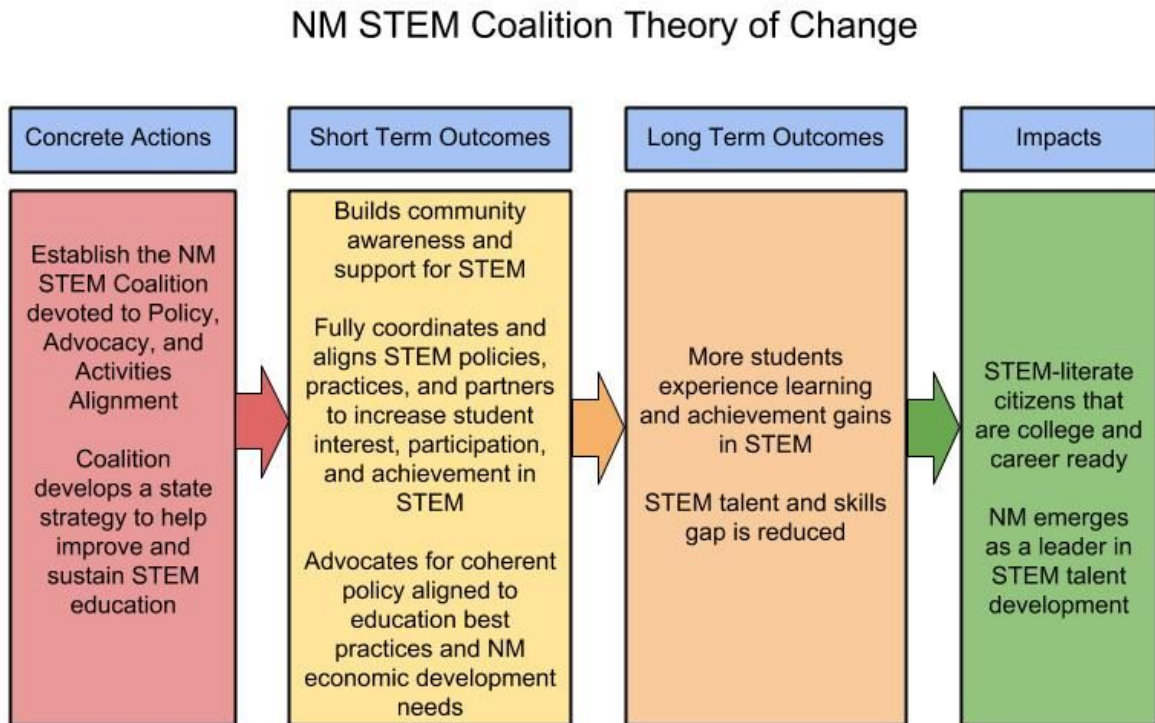


Figure 1: NM STEM Coalition Theory of Change

## Models for Continuous Improvement and Sustained Action

Creating a relevant, qualified pipeline of talent is only possible with sustained coordination that includes data analysis, feedback loops involving industry, and strong advocacy for innovative education systems. Sustained action has been the Achilles heel in New Mexico, hindered by changes in political leadership, the state's economy, and individual agendas. A New Mexico STEM Coalition can create the conditions for sustained action. Other statewide initiatives provide excellent models for this work, including [Colorado STEM](#), [Washington STEM](#), and [Idaho STEM Action Center](#), as well as national efforts like the [STEM Education Coalition](#) and [STEMx](#).

## Conclusion

Now is the time to envision a more prosperous future for our children and for our state to ensure that ALL New Mexico students have access to strong STEM education and an opportunity to gain the skills they need to succeed in jobs and in life.