

# Colorado Talent for an Innovation Economy

## Powered by STEM



THE  
COLORADO  
EDUCATION  
INITIATIVE

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# STEM

The Colorado STEM Education Roadmap



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*Through the leadership of Gov. John Hickenlooper’s administration, Colorado is on the path to becoming the most innovative state in the country. Key to achieving this standard of excellence is the leadership of Colorado’s private sector. With talent being a key driver of innovation, the public and private sectors in Colorado are focusing on growing local talent to ensure a strong, vibrant economic ecosystem. Strengthening science, technology, engineering, and math (STEM) education and experiences for all students is a critical component to supporting innovation. STEM competencies — often referred to as STEM literacy — prepare students to be critical thinkers, to persevere through failure to achieve success, to communicate and collaborate across real and perceived barriers, and to solve complex and ever-changing problems. (See Appendix A for a detailed description of learning in an innovation age and the importance of STEM education and STEM literacy.) Coloradans with these competencies will drive innovations and fuel our increasingly STEM-based economy.*



## Colorado’s STEM Challenge

Colorado is expected to see above national average growth in STEM occupations over the next decade as well as a rapid increase in the demand for STEM talent across non-STEM professions. However, Colorado’s students are not adequately prepared to compete for these jobs. Only 22 percent of 2009 high school graduates are on track to attain postsecondary credentials. And while Colorado does comparatively well in attaining postsecondary STEM degrees, national trends show that only about 50 percent of students who earn STEM credentials actually enter STEM fields. Further, while diversity of people and ideas drives innovation, the STEM pipeline in Colorado is notable for its lack of diversity. Females and Hispanics are vastly underrepresented in STEM occupations, yet females make up nearly half of the overall workforce, and Colorado’s Hispanic population is the fastest-growing population in the state. Coupled with an aging STEM workforce (over 16 percent of Colorado STEM workers are nearing retirement) and declining in-migration of talent, it will be increasingly difficult for Colorado to meet current and future skill demand. (See Appendix B for detailed information on national and local STEM trends and needs.)

Even as the economic imperative to improve the STEM competitiveness of our workforce is clear, there is a compelling social imperative as well. STEM education provides the building blocks to prepare students for success in an increasingly technological and complex global community. Financial, medical, environmental, and civic decisions all require higher levels of STEM literacy than ever before. STEM-literate citizens are foundational to a vibrant democracy. And because STEM occupations pay significantly more than non-STEM occupations, they are viewed as a vehicle to upward social mobility.

Colorado has a rich history of vibrant STEM programs and numerous stakeholders interested in STEM education, including economic development, K-12 education, postsecondary education, community-based partners, and workforce development organizations, each investing in different components of the ecosystem. However, the absence of a state-wide vision and strategy to coordinate, align, and amplify STEM education and experiences for all students is impeding Colorado’s ability to develop a strong local talent pipeline needed for an innovation economy.

Colorado has a unique opportunity to better leverage disparate but complementary assets to collectively mobilize change on behalf of the greater economic ecosystem. In response to this situation, The Colorado Education Initiative (CEI), a Colorado nonprofit focused on advancing K-12 public education through capacity building, innovation, and increased collaboration, facilitated the development of The Colorado STEM Education Roadmap (Roadmap). This plan will advance STEM education in ways that increase opportunities for all students, meet business needs, and attract new companies to the state.



The vision, theory of change, goals, and strategies that make up the Roadmap were developed through collaboration with hundreds of key stakeholders. (See Appendix C for an overview of some of the stakeholder engagement efforts.)

## Vision for STEM Education in Colorado

Colorado will be the most innovative state in the country in growing a local talent pipeline by ensuring all learners have the STEM education and experiences needed to succeed in an innovation economy.

## Theory of Change for STEM Education in Colorado

### If Colorado ...

- Builds community awareness and support for STEM, and fully coordinates and aligns STEM policies, practices, and partners to increase student interest, participation, and achievement in STEM
  - Focuses on ensuring all students achieve STEM literacy
    - Reduces its STEM talent and skills gap

... then it will lead the nation in STEM talent development.

GOAL 1: Develop a state strategy to sustain and advance STEM education	GOAL 2: Support all students P-12 in achieving STEM literacy	GOAL 3: Build a local STEM-ready talent pipeline
<ul style="list-style-type: none"> <li>→ 1.1: Build a coalition of support</li> <li>→ 1.2: Define STEM</li> <li>→ 1.3: Identify and map existing and effective STEM efforts</li> <li>→ 1.4: Measure progress</li> <li>→ 1.5: Embed a system of continuous improvement</li> </ul>	<ul style="list-style-type: none"> <li>→ 2.1: Make STEM in the early grades a Colorado priority</li> <li>→ 2.2: Align STEM efforts to the development of competencies important in an innovation economy</li> <li>→ 2.3: Support STEM-ready educators and learning environments</li> <li>→ 2.4: Make access to STEM resources in rural Colorado a priority</li> </ul>	<ul style="list-style-type: none"> <li>→ 3.1: Focus on dramatically reducing the number of students needing to take remedial math courses</li> <li>→ 3.2: Increase the number and diversity of students entering postsecondary STEM pathways</li> <li>→ 3.3: Align workforce training resources with in-demand STEM skills</li> <li>→ 3.4: Excite and support females to enter STEM fields</li> </ul>

These goals and actions are not final — they are not intended to be. They represent current best thinking. A more detailed draft of these goals and strategies as well as the initial work to articulate partner roles and actions is included in Appendix D of this report.

## The Power of Public-Private Collaboration in Advancing STEM

Colorado has numerous assets which can and should be leveraged to advance a state-wide STEM agenda. In addition to the Gov. John Hickenlooper administration, key public partners include the Colorado Department of Education (CDE), the Colorado Department of Higher Education (CDHE), the Colorado Department of Labor and Employment (CDLE), the Governor’s Office of Economic Development (OEDIT), and the Colorado Workforce Development Council (CWDC). Each of these partners is making contributions to support a strong educational and economic ecosystem in Colorado. (See Appendix E for a description of the numerous state efforts supporting a strong educational and economic ecosystem.)

In addition to strong state partners, Colorado has key components of a vibrant STEM ecosystem already in place. The work of developing a comprehensive list of STEM assets is currently underway as a part of implementing the Roadmap. The following resources are examples of important components of the state’s STEM ecosystem.

- Colorado has one of the highest per capita concentrations of science, research, and engineering facilities in the nation, with 24 federally funded research labs.
- Colorado is a national leader in sector partnerships and career pathway legislation.
- Colorado is a charter member (one of 20 states) of STEMx, the newly developed multistate STEM network aimed at connecting state STEM networks to generate and share new knowledge, promote clear indicators of quality, develop high-quality tools, and connect innovative policies and practices across the country.
- The Hickenlooper administration is a member of 100Kin10, President Obama’s initiative to prepare 100,000 more STEM educators in 10 years.

The problem we face in Colorado in terms of STEM education is not one of inactivity. Colorado has a rich history of vibrant STEM programs and numerous stakeholders interested in STEM education, including economic development, K-12 education, postsecondary education, and workforce development organizations, each investing in different components of the ecosystem. While CEI is committed to working with key partners to increase coordination, alignment, quality, equity, and impact of STEM education efforts in Colorado, it is important to celebrate the important contributions of so many stakeholders currently underway. Numerous examples of these contributions are highlighted in this report.



### Get Engaged!

We can’t do this without you. Join us to ensure all learners have the STEM education and experiences needed to succeed in an innovation economy. Lend your unique talents, abilities, and resources to this important work. **Learn more at** [www.coloradoedinitiative.org/stem](http://www.coloradoedinitiative.org/stem) Click on the “Get Engaged” link to become a part of the evolving public-private efforts to advance STEM education in Colorado.



## GOAL 1: Develop a state strategy to sustain and advance STEM education in Colorado

Colorado faces many and varied challenges to sustain and advance STEM education. For example, there is no common way to define STEM occupations, which makes it difficult to accurately determine STEM skill demand. Further, quality in STEM education has not been defined, which results in uneven returns on the investment of scarce resources. At the same time, there is no way to measure and demonstrate the impact of various efforts on key indicators in Colorado STEM education, leading to an inability to measure progress over time. Finally, there is a lack of focus on ensuring STEM education efforts are actually relevant to Colorado's economy, which translates into ineffective, out-of-date, and ill-fitting approaches to education and workforce development efforts.

A state strategy to sustain and advance STEM education through coordination, alignment, equity, transparency, and evaluation of impact is crucial to ensuring Colorado develops a local talent pipeline representative of the diversity of Colorado's communities able to meet the needs of an innovation economy. The private sector is advancing key efforts that, if aligned and strategically leveraged, will support the development and implementation of such a strategy.



### JPMorgan Chase: Defining Middle-Skill STEM Occupations

There are many definitions of STEM occupations at the federal and state level — with no apparent coherence or rationale. Traditional definitions of STEM occupations are based on titles of occupations rather than the skills required within occupations, and leave out numerous high- and middle-skills occupations that require STEM skills such as medical doctors and advanced manufacturing jobs. Yet, middle-skill STEM jobs are crucial to Colorado's economy and to social upward mobility for low- to moderate-income Coloradans. These jobs make up 50 percent of the nation's STEM jobs and require less than a four-year degree. And these jobs are growing and offer a 10 percent wage premium over occupations requiring similar educational requirements without some STEM knowledge.

With support from JPMorgan Chase, CEI initiated a process to identify STEM occupational definitions that are relevant to and representative of Colorado's economy. CEI collaborated with the Brookings Institute, which developed an occupational definition for STEM. The Brookings methodology and the focus on defining STEM occupations based on STEM skill requirements make the Brookings definition relevant and allow for the development of strategies to close skill gaps that are based on transparently defined skills. As a result of this work, the Colorado Department of Higher Education is producing a report with STEM skill supply and demand projections that use both the traditional and more representative Brookings STEM occupational definitions to better inform strategies that will strengthen Colorado's local talent pipeline.

### McKinstry: Building Cross-State STEM Partnerships

McKinstry, a Seattle-based firm offering consulting, construction, and facilities services with offices in Golden, partnered with CEI to convene state and company leaders from Colorado and Washington to share key strategies and tactics for improving STEM education in Colorado. McKinstry CEO Dean Allen was integral to the STEM movement in the state of Washington, helping to found and currently serving as the Board Chair of Washington STEM. Seventeen Colorado leaders, including representatives from the Governor's Office, ULA, Gay & Lesbian Fund for Colorado, and Colorado Technology Association (CTA), traveled to Washington for two days in April to learn about Washington STEM's successes and best practices. Specifically, stakeholders worked collaboratively to develop a cross-state partnership, strategize successful creation and implementation of a state STEM plan, and discuss the role of industry partners in supporting STEM. The meeting greatly increased visibility of Colorado's STEM effort and led to the development of the State STEM Advisory Committee.

### Colorado Technology Association: Supporting STEM Education

Continual learning and skill development are essential in a vibrant STEM economy. To meet this challenge, CTA is working to engage employers in meaningful partnerships with education to fill the talent pipeline for Colorado's technology economy. CTA is a state-wide organization representing more than 10,000 companies employing over 140,000 workers, as well as 95,000 information technology (IT) professionals across all industries. The association recently formed the Colorado Technology Foundation to catalyze a service-friendly marketplace between employers and educators to amplify and sustain connections that ultimately attract, train, and place more Colorado students into a growing number of technology professions. Focus areas include helping small- to medium-sized businesses open project-based internship opportunities; supporting teachers in their lifelong learning of technology; and engaging companies to host on-site exploration events for students. Concurrently, CTA leads the IT Sector Partnership aligned with the Colorado Workforce Development Center and the Office of Economic Development and International Trade to capture employer needs that will shape educational curriculum and programs to best align with industry needs.

### United Launch Alliance: Preparing Students in STEM

United Launch Alliance (ULA) is sparking excitement in STEM education through the Intern Rocket Program. ULA, in partnership with Ball Aerospace, provides valuable hands-on learning experiences for K-12 and college students. In just eight to 10 weeks, participating college interns construct rockets and payloads — onboard instruments and experiments — and quickly gain experience with new design concepts, manufacturing techniques, and launch procedures. Elementary, middle, and high school students work with these college interns, learning basic rocket concepts, payload designs, and payload integration with the rockets.

ULA believes in contributing time, talent, and resources at all levels to support Colorado communities. A key thought partner and funder in advancing the statewide strategy to improve STEM education, ULA is a critical champion in engaging business and industry, with a special emphasis on the aerospace sector, to excite and prepare the workforce of the future. While ULA's contributions are impressive, many more companies will need to commit to this effort to ensure all students are excited and prepared to participate in and lead Colorado's innovation economy.

Learn more at [www.coloradoedinitiative.org/stem](http://www.coloradoedinitiative.org/stem).



## Mile High United Way: Targeting the Skills Gap

Mile High United Way partners with hundreds of local nonprofits, government agencies, policymakers, and businesses to collectively solve communitywide problems. In a recent effort to organize community efforts and inspire action, Mile High United Way launched Mobilize Mile High, an initiative that identifies shared goals and measures to improve education, economic, and health well-being throughout the community. Mobilize Mile High has hosted two meetings with representatives from the education, nonprofit, and business communities to examine the skills gap that exists between the education system and the local workforce. During these sessions, community leaders identified common language, pinpointed root problems, and developed collective solutions. Additional sessions are planned, culminating in a GradNation Summit in the spring of 2015.



## The Colorado Education Initiative: Defining Quality

Colorado employers invest substantial amounts of time, talent, and financial resources to support STEM education. However, their ability to measure the impact of these investments is limited. CEI is convening a work group of company and school leaders to define quality in employer engagement in STEM education. Several companies, including Accenture, Ball Aerospace, Noble Energy, and United Launch Alliance, are joining with educators from Denver Public Schools, Englewood Schools, St. Vrain Valley Schools, and other districts to collaboratively define components of quality public-private partnerships between schools and companies. The work group will produce recommendations for schools and companies to increase the value and impact of partnerships.

## Comcast and Comcast Spotlight: Understanding the Importance of STEM

To raise awareness about the need for STEM skills, Comcast and Comcast Spotlight are providing \$1 million in financial and in-kind support over three years to develop critical STEM resources and opportunities for Colorado's students. This effort will include developing public service announcements about the importance of STEM to students, companies, and Colorado's innovation economy.

## Future Forward Colorado: Raising Awareness of Skill Demand

Colorado companies know quite well that the global economy is constantly evolving and requires vastly different skills from its employees. They also know that to remain competitive, Colorado's schools must prepare high school graduates with the knowledge and problem-solving skills necessary to meet the rising demands of postsecondary education and the 21st century workplace. As a coalition of company leaders, Future Forward Colorado educates the broader, statewide community about this demanding new reality and the critical role that higher expectations, quality, aligned assessments, and STEM education play in ensuring that Colorado's kids are prepared for Colorado's jobs.

Future Forward's goal is to raise awareness and understanding of the real-world skills needed to succeed in today's highly skilled workforce. The coalition, which includes 10 business organizations with thousands of members, was created to show the business community's support of high expectations, transparency, and accountability for students, educators, and schools. To help businesses learn about this issue and what they can do to get involved, the coalition has developed educational materials and resources, including a website, videos, and infographics at [www.futureforwardcolorado.org](http://www.futureforwardcolorado.org).

## GOAL 2: Support all P-12 students in achieving STEM literacy

Increasingly, STEM literacy is a requirement for success in life. Making informed life choices, including health decisions, civic participation, and financial investments, all require consumers to analyze and synthesize vast and various amounts of information. All require a base-level competence in STEM literacy. A 2014 report of the National Network of Business and Industry Associations concludes that included within the skills all employees need, no matter where they work, is the ability to apply knowledge in mathematics, science, technology, and critical thinking.

Focusing on STEM education in the early grades is critical to achieving STEM literacy. Students begin to identify as being "bad at science" as early as second grade. Compelling and growing evidence shows that mastering early math concepts is the strongest predictor of future academic success. Quality science education and STEM experiences allow students to develop numeracy skills by engaging in the world around them while developing science concepts. Yet, in Colorado, the time spent on science in elementary school has decreased from 2.9 hours per week in 1993-1994 to 1.6 hours per week in 2011-2012, landing Colorado in the bottom five states in terms of time spent on science in the early grades.

Students learn science by actively engaging in the practices of science. While 97 percent of Colorado schools have 8th-grade science labs, only 73 percent of schools with high percentages of minority populations have 8th-grade science labs — one of the starkest disparities in this regard in the country.

Effective educators are important to student success. And while it is difficult to track the number and availability of STEM-ready educators in Colorado, numerous interviews with district and BOCES (Boards of Cooperative Educational Services) administrators indicate that rural communities often simply do not have access to qualified STEM-ready educators.

STEM education and opportunities are simply not available to far too many Colorado students. Hispanic, female, and rural populations are often underserved or unrepresented in STEM educational opportunities.

Undoubtedly considerable work needs to be done to ensure all students achieve STEM literacy. But the news is not all bad. New and exciting partners are leading the effort to advance STEM education.

## LASER: Advancing STEM in the Early Grades

The LASER program, an elementary inquiry-based science program, has decades of evidence demonstrating its effectiveness in increasing student achievement in multiple disciplines for all learners, including English Language Learners. The Blair and Kristin Richardson Foundation is providing seed money and coordinating investments from both nonprofit and for-profit stakeholders that recognize the value and need for a strong, inquiry-based science program. This support will allow 12 schools to participate in the LASER program in Colorado beginning in 2014-2015.

The participating schools in the four-year pilot represent public, private, and charter schools, and a diverse population of students. In the first year, this opportunity will reach about 5,600 students. While this is an ambitious effort, it will reach less than 1 percent of Colorado's nearly 600,000 public K-8 students. That's not enough. Every elementary school student in Colorado deserves a quality STEM education. To reach more students, CEI is working with partners to map existing efforts to embed science in elementary school, better understand the quality of these efforts, target gaps where no efforts exist, and expand support to ensure all students receive quality STEM instruction throughout their elementary years.



### Colorado Legacy Schools: Supporting AP Curriculum

The CEI-administered Legacy Schools program, the Colorado version of the National Math and Science Institute’s Advanced Placement (AP) model, is generating high returns in terms of student participation, engagement, and success in rigorous AP course work in Colorado. For example, in their first year of program implementation, the 23 Colorado Legacy Schools demonstrated a:

- 70 percent increase in the number of qualifying scores earned on AP math, science, and English exams.
- 78 percent increase in the number of qualifying scores earned by female students on AP math and science exams.
- 106 percent increase in the number of qualifying scores earned by African American and Latino students on AP math, science, and English exams.
- 118 percent increase in the number of qualifying scores earned on AP science exams.
- 233 percent increase in the number of qualifying scores earned on AP Computer Science Exams in 2013-2014.

This is important because postsecondary remediation drops dramatically as a result of exposure to AP - only 28 percent of students who take just one AP class need remediation compared to over 68 percent remediation rates for students with no AP. Further, students who pass at least one AP exam (as opposed to those who do not) are 31 percent more likely to earn a postsecondary degree.

These statistics are impressive, particularly considering that the Colorado Legacy Schools program is engaging a diverse array of students – many of whom typically do not enter AP courses. Often, however, these students lack the cultural capital needed to navigate complex postsecondary and career options and professional life choices. To address this need, CEI is partnering with Ball Aerospace, Battelle, McKinstry, Thoughtbot, Quick Left, and Xcel Energy, to ensure students have STEM professionals as mentors. These mentor experiences are elevating students’ ideas about their own potential.

There are 34 high schools participating in the Legacy Schools AP program impacting 500 teachers and 10,000 students. While this represents a significant increase in traditionally underserved students with access to AP, this number represents a mere 4 percent of Colorado public high school students. Much needs to be done to ensure every student has access to rigorous course work and meaningful mentorships, particularly students who face greater disadvantages and barriers to success.

### Gay & Lesbian Fund for Colorado: Expanding STEM Opportunities for All

The opportunity gap created by underserving key segments of the student population, as well as the underrepresented Hispanic and female populations in high-wage, high-demand STEM occupations, is attracting the attention of the Gay & Lesbian Fund for Colorado. As the initial foundation supporting this work, the Gay & Lesbian Fund served as the catalyst for increasing equity and access to high-quality STEM education in ways that increase financial literacy and critical thinking, and prepare traditionally underserved populations for success in an innovation economy.

### GOAL 3: Build a local STEM-ready talent pipeline

Improving STEM education is critical to ensuring Colorado is able to meet current and future talent demands. Nationally and locally we see growing gaps between labor market demands and knowledge and competencies that the education system was designed to produce. While there is sufficient evidence to understand this to be true, is it also important to consider why it is true.

Colorado has one of the highest skilled workforces in the country and is expected to experience above national demand for STEM-skilled workers. Yet Coloradans are not prepared to compete for these jobs – a trend commonly called the Colorado Paradox.

Specifically, Colorado is not preparing Coloradans to compete for high-demand, high-wage occupations. Further, there is a lack of diversity in the STEM workforce. While 48 percent of the workforce is female, STEM occupations only employ 23 to 31 percent of females (percentages vary depending on the STEM occupational definition). And while Hispanics make up 16 percent of the workforce, they only hold 6 percent of STEM occupations. Considering that women make up half the population and the Hispanic population is the fastest-growing population in Colorado, these trends do not bode well for meeting the state’s future STEM skill demand.

Another fact: Colorado is emerging from the recent economic downturn with impressive resilience, yet key populations of Coloradans still lack the skills to fill in-demand jobs, and many suffer from long bouts of unemployment. Leaving these populations behind will inhibit the state’s ability to meet the current and growing demand for skilled labor.

Many Colorado companies, districts, and state partners are pitching in to build a local STEM-ready talent pipeline.

**Share your STEM!**

Are you already doing great work in STEM? Let us know! CEI is committed to working with partners to highlight successes, amplify impact, and support continuation of existing effective STEM efforts.

Tell us about your projects, the reach of your efforts, and the impact of your work: <https://www.surveymonkey.com/s/P33SBML>.

Together, we can achieve great results for Colorado students, our communities, and our economy.

### IBM: Supporting District Innovation

IBM partners with St. Vrain Valley School District (SVVSD) to create innovative student programs aligned with industry needs. Among these programs is the Innovation Academy for a Smarter Planet, a two-week camp at IBM where students explore sustainable and innovative solutions to buildings, banking, water, food, and transportation systems. Students work directly with IBM engineers and scientists, University of Colorado professors, Skyline STEM Academy students and other agencies. To date approximately 500 students have participated in the program.

IBM was also instrumental in attracting additional funding for SVVSD by matching 20 percent of the Investing in Innovation and Race to the Top federal grants, resulting in over \$20 million in federal dollars to advance STEM education in SVVSD. The grants are supporting efforts to engage students in real-world learning experiences that emphasize connections among school, business, and the global community. The grants also support a STEM elementary school summer program in which over 5,000 students have participated.

The next step in the IBM partnership is for SVVSD to adopt PTECH (Pathways to Technology Opportunities program), a career pathway providing an early college, associate in arts degree that is STEM-skills focused. After completing this two-year college curriculum while in high school, these workforce-ready students will receive mentoring from industry partners and an internship in a STEM-related field.



**SeedPaths, DaVita, Ball Corporation, and SpireMedia: Employing Low-Income Youth**

SeedPaths teaches young, low-income adults how to develop software during an intensive, eight-week boot camp and then helps them find employment in the IT industry. Of the graduates who sought employment in SeedPaths' first two programs, 89 percent found an opportunity within 90 days of graduating and enjoyed a 460 percent pay increase. SeedPaths also has an IT recruiting and staffing division that helps top-tier companies find top-tier talent and invests all of its profits into its academic division, creating a sustainable business model. The recruiting division also creates direct avenues to employment for its students, which increases the likelihood that graduates will find employment.

In 2014, 30 graduates completed the boot camp and are now employed at DaVita, Ball Corporation, SpireMedia, and a variety of consulting firms.

SeedPaths has a repeatable process for finding, training, certifying, and employing entry-level talent, many of whom have little to no job experience or no formal higher education. (Some even lack a high school diploma or equivalent.)

All low-income youth should have access to this type of opportunity, regardless of their educational track record.

**Colorado Workforce Development Council: Aligning Education and Training to Industry Skill Demand**

The Colorado Workforce Development Council is instrumental in engaging cross-sector companies, educators, postsecondary, workforce development, economic development, and various other partners to develop sector partnerships and career pathways. These efforts support local stakeholders in developing the talent pipeline to meet local employer needs and to support economic growth across the state. For more information about this effort, see Appendix E.

**Lockheed Martin: Engaging Girls in STEM**

In spring 2014, Girls Inc. of Metro Denver launched the Rocket Girls program in partnership with Girls Inc. National and Lockheed Martin. This effort strengthens girls' interest and confidence in pursuing STEM education and careers. Fifty elementary-age girls completed the six-week program, and Lockheed Martin volunteers served as partners and mentors. Program components included a rocket science curriculum, hands-on activities, field trips, and guest speakers. At the end of the program, girls built and launched rockets hundreds of feet in the air at Sloan's Lake in Denver. In addition, two fifth-grade Rocket Girls attended the USA Science & Engineering Festival in Washington, D.C. The result of these efforts? Girls' enthusiasm for and skills in STEM were enhanced through activities that allowed them to explore, ask questions, persist, and solve problems — and view STEM careers as exciting and realistic options for their futures.

**CH2M HILL: Supporting STEM Pathways**

The Denver School of Science and Technology (DSST) Public Schools transform urban public education by eliminating educational inequity and preparing all students for success in college and the 21st century. Seventy-five percent of students at DSST's nine schools are minority while 65 percent come from low-income households. DSST has operated the highest-performing middle schools and the highest-performing high schools in Denver Public Schools (DPS) for the past three years:

- 100 percent of seniors have been accepted to college seven consecutive years.
- 45 percent of students are choosing STEM majors in college.

Recently, the CH2M HILL Foundation awarded a \$100,000 grant to DSST to establish the Higher Education Partnerships for STEM Workforce Development. DSST will use the grant to build a comprehensive pathway for Denver secondary students pursuing STEM careers through open enrollment public charter schools in Denver. At full enrollment, DSST will serve over 6,500 students in 14 schools on seven campuses and will nearly double the number of four-year college-ready DPS graduates by 2023. This new program will bolster support for the 60 percent of DSST seniors who intend to major in STEM. The ultimate goal of this program is to infuse a diverse group of 250 new STEM professionals into the workforce by 2020, many of whom will remain in Colorado as a pipeline of talent for CH2M HILL and other employers reliant on STEM-capable employees.

An impressive goal, and impactful for the DPS students engaged in this program. But more needs to be done to ensure all of Colorado's students, particularly those in rural communities, can engage in these types of opportunities.

Learn more at [www.coloradoedinitiative.org/stem](http://www.coloradoedinitiative.org/stem).



**Become a STEM Champion!**  
 STEM Champions are companies, foundations, and private donors contributing financial resources, time, and talent to the implementation of the Roadmap.  
 Learn more: [www.coloradoedinitiative.org/stem](http://www.coloradoedinitiative.org/stem).



## Making It Happen — Partner Coordination and Alignment

Numerous companies, foundations, and individuals are investing in STEM education — the examples included in this Roadmap are certainly not an exhaustive list. And yet for all the effort and activity, the returns are uncertain and certainly uneven. The students who need STEM education the most — particularly in our rural communities — often don't have access to these resources. Further, trends show that traditionally underserved students are not achieving success in STEM and are vastly underrepresented in STEM degree attainment and STEM occupations in Colorado.

Despite the impressive efforts of the private sector and the numerous contributions of the public sector, Colorado is a long way from ensuring all students have access to the STEM instruction and experiences that will enable them to fully participate in an innovation economy. For this reason, CEI is committing to serve as the backbone organization that will facilitate the development and implementation of the Colorado STEM Education Roadmap. In this role, CEI will work with partners and stakeholders to ensure Colorado becomes the most innovative state in the country. The Roadmap will increase access to STEM opportunities for all and build a local talent pipeline for a thriving innovation economy by:

- **Defining quality** in STEM education in terms of learner, company, and economic outcomes.
- **Aligning scarce resources** to support efforts demonstrating results for Colorado's learners, companies, and economy.
- **Identifying and closing the gaps** in STEM programming and resources.
- **Expanding and amplifying the impact** of effective STEM efforts.

CEI will coordinate and interface with the state STEM Advisory Committee and STEM Champions to ensure the work is on track, meaningful, and sustained over time.

View the Roadmap appendices at [www.coloradoedinitiative.org/resources/stemroadmap](http://www.coloradoedinitiative.org/resources/stemroadmap)

## State STEM Advisory Committee — State Guidance and Industry Leadership

The state STEM Advisory Committee includes state and company leaders committed to advising and guiding CEI's efforts to implement the Roadmap. Learn more at [www.coloradoedinitiative.org/stem](http://www.coloradoedinitiative.org/stem).

### STEM Champions

An absence of a common vision to advance a strategic approach to supporting STEM education in Colorado, as well as a lack of financial resources to sustain STEM efforts, have contributed to several false starts in STEM education in Colorado over the last 15 years. STEM Champions are companies, foundations, and individuals dedicated to ensuring all Colorado students have access to quality STEM education and experiences, which will directly support the development of a local talent pipeline. In addition to supporting Roadmap implementation through financial commitments, STEM Champions dedicate their time and talent by serving on the state STEM Advisory Committee and as STEM Mentors, working directly with Colorado students.

### The Path Ahead

Colorado is poised to deliver on the promise to prepare all of our students for an innovation economy. Over the weeks, months, and years ahead, CEI will work with key partners across the state to advance implementation of the Roadmap. Join the numerous partners coming together to achieve success for all of Colorado's learners and to build a talent pipeline for Colorado's innovation economy. View [www.coloradoedinitiative.org/stem](http://www.coloradoedinitiative.org/stem) to share your STEM, contribute financial resources, view the Roadmap appendices, or mentor students - get involved and start making a difference today.

## STEM Advisory Committee



### Committee Members

- Lt. Governor Garcia, Executive Director, Colorado Department of Education
- Chris Chavez, Director, Government Affairs & Corporate Citizenship, United Launch Alliance
- Lesley Dahlkemper, Vice President of Communications and Strategy, Colorado Education Initiative
- Ellen Golombek, Executive Director, Office of Labor and Employment
- Robert Hammond, Commissioner of Education
- Michelle Hadwiger, Executive Director, Colorado Innovation Network
- Ray Johnson, Corporate Citizenship and Corporate Affairs Manager, IBM
- Tim Jones, President and Founder, ISSAC Corp.
- Leslie Larocque, Director of Business Development, Rocky Mountain Region, McKinstry
- Ken Lund, Executive Director, Office of Economic Development and International Trade
- Katie Monahan, Field Marketing Manager, Comcast Spotlight Colorado
- Wendy Nkomo, COO, VP Industry Affairs, Colorado Technology Association
- Amber Ptak, Director of Education Programs, Gill Foundation's Gay and Lesbian Fund for Colorado
- Matt Smith, Vice-President of Engineering and IT, United Launch Alliance
- Stephanie Steffens, Director, Colorado Workforce Development Council

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- Angela Baber, Director, Next Generation Learning — STEM, The Colorado Education Initiative
- Scott Wasserman, Chief of Staff, Lt. Governor Joe Garcia