



## **Educated Locally, Competitive Globally**

*Closing the Opportunity Gap through Excellence and Equity in STEM Education*

Coloradans are entrepreneurial, independent and innovative. We drive our economy, shape our future and dictate our destiny. We *will* thrive in a highly-skilled, global economy. Our community will have bright and vibrant opportunities in school, career and life. Our workers will be highly competitive in a global marketplace.

### **Colorado STEM Education Roadmap**

The Colorado Legacy Foundation is focused on preparing all Coloradans for success in Colorado's 21<sup>st</sup> Century economy and community by improving science, technology, engineering and math (STEM) education for every Coloradan, regardless of career path.

Increasingly, science, technology, engineering and math (STEM) education and experiences are a prerequisite to success in college, career and life. While preparing more STEM professionals to fill Colorado’s high-demand, high-wage occupations is a key priority of the Colorado STEM Education Roadmap, an equally important objective is to ensure that every Coloradan develops the STEM skills needed to succeed in a 21<sup>st</sup> Century economy and community – regardless of background or career choice.

## 21<sup>st</sup> Century Skills in Colorado

**Critical Thinking and Reasoning:** cause and effect, analysis, logic

### **Information**

**Literacy:** knowledge acquisition, source discernment, system management

**Collaboration:** synergy, team resourcing, leadership for new knowledge

**Self-direction:** persistence, adaptability, work ethic, initiative

**Invention:** creativity, innovation

The Colorado STEM Education Roadmap is a call to action to improve STEM education in Colorado through identifying a common vision, mission and goals to align, connect and evaluate the individual and collective impact of the numerous STEM efforts, policies and programs across the state. The roadmap builds on the momentum in Colorado to improve our talent pipeline, boost our economic competitiveness and to ensure Coloradans continue to enjoy the high quality of life for which Colorado is known.

## STEM Education—An Economic and Social Imperative

The statistics are clear. Colorado ranks second highest in the country for the percentage of adults with college degrees, but ranks 47th in high school graduates continuing to college.<sup>i</sup> This leads Colorado businesses to rely on imports to fill the jobs we could be preparing Colorado students and adult workers to compete for. Forty-six percent of Colorado's first-time community college students who just graduated from high school need remediation in math, which costs the state more than \$16.7 million each year.<sup>ii</sup>

There is also an opportunity gap in Colorado. On average, low-income students perform two grade levels below - and have lower proficiency rates than - the general student population in math and science. Among minority students, there is a 13.4 percentage point gap compared to the general student population scoring at or above proficient in mathematics.<sup>iii</sup> Further, even though females represent 49.8% of the state’s population, they are underrepresented in high-demand, high-pay STEM occupations making up only 29% of the STEM workforce<sup>iv</sup>.

## New Partners

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The opportunity gap created by underserved poor and minority populations, as well as the underrepresented minority and female populations in high-wage, high-demand STEM occupations, is attracting the attention of new and important partners. The Gill Foundation’s Gay and Lesbian Fund for Colorado is supporting the Colorado Legacy Foundation, in partnership with Governor John Hickenlooper, to advance a three year project to develop and implement a *Colorado STEM Education Roadmap and Action Plan*. JP Morgan Chase is joining forces with the Gill Foundation’s Gay and Lesbian Fund to support this work in recognition that STEM skills have become a prerequisite to success in college, career and life -- regardless of background or career choice.

## A New Era for Colorado

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The convergence of the economic imperative to ensure Coloradan’s are highly-skilled, combined with the collective will to elevate the expectations for Colorado’s education system P-20, make this the time to develop a unified vision and strategy for improving STEM education in Colorado.

Governor John Hickenlooper has committed to making Colorado the best state in the nation to do business by supporting entrepreneurs, encouraging innovation and promoting the state’s high-skilled workforce. The Colorado Blueprint, a grassroots economic development plan for Colorado, identifies fourteen key industries, all of which include high-skill STEM occupations. Seven of the fourteen key industries are Advanced Industries. The Advanced Industries are comprised of engineering and R&D-intensive companies that deliver groundbreaking, innovative products. They share common workforce skills in STEM, as well as manufacturing. The economic impact of these industries is significant, accounting for 30 percent of the state’s economy, 520,300 high-paying jobs, and hundreds of thousands of ancillary jobs.<sup>v</sup> Coloradans must be ready.

### *14 Colorado Key Industry Sectors Including 7 Advanced Industries*

<i>Advanced Manufacturing</i>	<i>Aerospace</i>
<i>Bioscience</i>	<i>Creative Industries</i>
<i>Defense &amp; Homeland Security</i>	<i>Electronics</i>
<i>Energy &amp; Natural Resources</i>	<i>Financial Services</i>
<i>Food &amp; Agriculture</i>	<i>Health &amp; Wellness</i>
<i>Infrastructure Engineering</i>	<i>Technology &amp; Information</i>
<i>Tourism &amp; Outdoor Recreation</i>	<i>Transportation &amp; Logistics</i>

At the same time that the Governor is focused on improving Colorado’s economy and promoting a highly-skilled workforce, policy makers and state agencies are ramping up efforts to ensure Coloradans

are developing globally competitive skills. The following timeline includes STEM-relevant policies and agency activities, how CLF is partnering with the state and a number of key stakeholders to develop the Colorado STEM Education Roadmap and Action Plan, and the plan for moving the STEM work forward – and sustaining the STEM work – in Colorado.



Pre-2011	2011	2012	2013	2014	2015	2016 →
<b>NGA STEM Grant</b> - Colorado develops STEM Centers and Colorado STEM Network  <b>WIRED Grant</b> - Colorado creates stakeholder partnerships for key industries.  <b>HB07-1243 - Sci/Math AfterSchool Grant Program</b>	<b>Colorado STEM Network</b> - CDHE and CDLE maintains network and monthly calls  <b>Colorado Blueprint</b> - Identifies demand for STEM skills across 14 key industry sectors	<b>CDE Race to the Top Award</b> - CDE focuses on STEM  <b>Advanced Industries Legislation Passes</b> - 7 key industries demand more STEM professionals  <b>ELC STEM - STEM Action Plan work begins</b>  <b>Vital Signs</b> - STEM stats for Colorado  <b>Colorado Joins 100k In 10</b>  <b>Endorsed Diploma Guidelines</b> developed  <b>XSCI - Joins STEMx Network</b>	<b>SB 08-212</b> - New content standards statewide  <b>SB 10-191</b> - new educator evaluation system state wide  <b>State Board adopt Graduation Guidelines</b> - science competency, ICAPs and 21 <sup>st</sup> Century skills required for graduation by 2020-21  <b>Advanced Manufacturing Legislation</b>  <b>CDHE Revises Policies</b> - higher education admissions   remediation policies  <b>STEMOSPHERE</b> revived	Stakeholders develop definitions of effectiveness and quality metrics for STEM efforts, programs and policies  CLF Coordinates Implementation of the Colorado STEM Education Roadmap and Action Plan  New Statewide Science Assessments Grades 5, 8, 12  <b>National XperienceSTEM Conference</b> - Xsci hosts in Denver at the convention center in partnership with Merck and REI (July 29 to Aug 1st 2014)	Identify, scale and connect effective STEM education programs, policies and efforts  CLF and Governor's office develop sustainability strategy for STEM roadmap and action plan	STEM work continues across state agencies and partners

## The Missing Pieces

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Improving STEM education in Colorado is not a new concept. There are numerous partners in Colorado from early childhood to postsecondary and into the workforce including community-based organizations, industry partners and policy makers leading varying STEM education reform efforts. The problem we are trying to solve is not one of inactivity or apathy. The challenge in Colorado is one of coordination, alignment and evaluation of individual and collective impact.

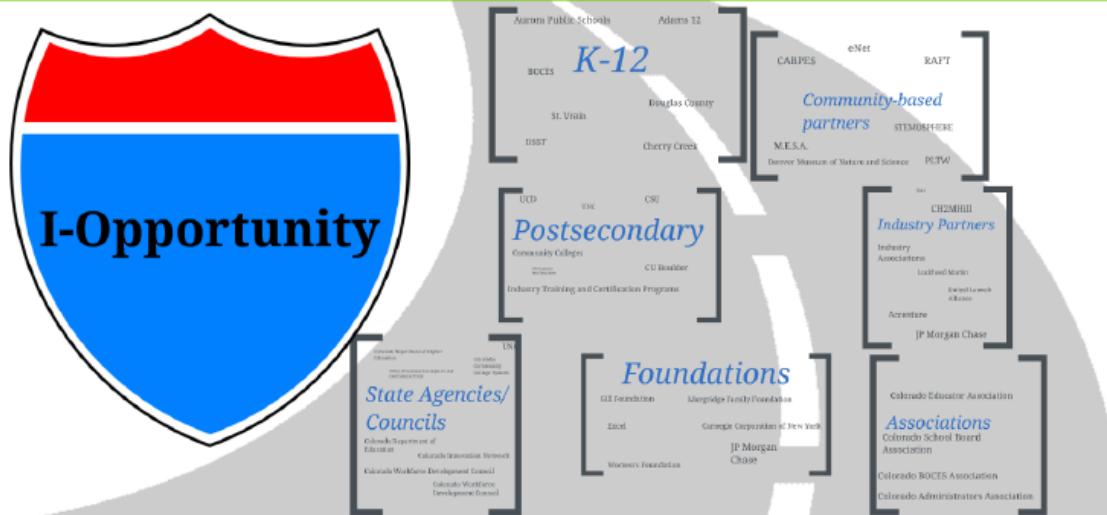
The real need in Colorado is to define a shared vision, mission, goals and actions for improving STEM education; organize and mobilize all of the amazing work already underway to support the state’s vision, mission, goals and actions; define effectiveness across the continuum of STEM education efforts; make connections across related efforts to ensure we have a strong STEM education pipeline; and evaluate whether or not we are making progress. The Colorado STEM Education Roadmap is the call-to-action to meet this need.

## Colorado STEM Education Roadmap

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Through working with numerous state partners, and through multiple stakeholder engagement events, CLF seeks to ensure that the Colorado STEM Education Roadmap identifies the path forward for the numerous partners in Colorado to improve STEM education based on where we are and where we need to go.

## More Coloradans Fill STEM Occupations All Coloradans Have STEM Skills for a 21st Century Economy



### The Colorado STEM Education Vision

Coloradans are entrepreneurial, independent and innovative. We drive our economy, shape our future and dictate our destiny. We *will* thrive in a highly-skilled, global economy. Our community will have bright and vibrant opportunities in school, career and life. Our workers will be highly competitive in a global marketplace.

### The Colorado STEM Education Mission

All Coloradans will have access to high quality STEM education and experiences, regardless of background or career choice and Colorado will produce locally a workforce that is competitive globally.

### The Colorado STEM Education Goals

To achieve the STEM education vision and mission for Colorado, we must make investments in our people. This includes investing in students P-20, educators and our adult workforce. We will do this through focusing on the following three goals.

1. Increase access and equity to excellent STEM education and experiences.
2. Support and empower every learner through personalized learning experiences.
3. Ensure Coloradans develop employable, globally competitive skills for a 21<sup>st</sup> Century economy.

## Guiding Principles

Investments are required and must be made at the state, regional and local levels to ensure students, educators and adult workers have the supports needed to develop skills to succeed in Colorado's increasingly global economy.

**Every Coloradan - regardless of age, background, race, zip code or gender – deserves the opportunity to develop in-demand STEM skills to fill our high-wage, high-skill occupations.**

**Developing STEM skills is more than an economic priority. STEM education and experiences develop critical thinking and analytical skills, preparing Coloradans to be informed and civically engaged members of the community in ways that preserve our vibrant democracy and our quality of life.**

**With the appropriate supports and structures, educators will lead in ensuring all students develop the 21<sup>st</sup> Century skills needed to succeed in college, career and life in Colorado.**

**Industry is the best voice to communicate the competencies and requirements for the jobs of today and for the careers of the future.**

**Data must be at the core of driving and evaluating the Colorado STEM Education Roadmap.**

## Priority Action Items

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The following is a table of key objectives and action to achieve the STEM education vision, mission and goals for Colorado.

Discussion Draft for Stakeholder Engagement Meetings: Not for Distribution

Stakeholder Review and Feedback – Roadmap v11

Angela Baber: Director of Initiatives, Colorado Legacy Foundation [Ababer@colegacy.org](mailto:Ababer@colegacy.org)

Key Populations	Key Objectives	Key Actions	Key Leads
<i>Students</i>	<i>Ensure a seamless and integrated STEM educational system and experiences for students P-20 to meet rapidly changing landscape of labor market and industry demand for skills.</i>	<ul style="list-style-type: none"> <li>Focus efforts to improve STEM education starting in the early grades through focusing on early numeracy.</li> <li>Backmap 14 key industry sector competencies and skills to CAS to identify gaps.</li> <li>Ensure more and better articulation between the 2 year colleges, 4 year colleges and industry / community partners.</li> <li>Create a STEM data dashboard to track student education pathways and available careers to identify misalignment.</li> <li>Develop definitions and metrics of effectiveness for STEM programs, efforts and policies P-20.</li> <li>Develop a process to identify, scale and connect effective STEM efforts.</li> </ul>	<b>CWDC, CDE, CCCS, CDHE, OEDIT, CDLE</b>
	<i>Focus on developing personalized STEM education resources, supports and experiences for all students, particularly for underserved populations.</i>	<ul style="list-style-type: none"> <li>Develop criteria for STEM experiences inside and outside of the classroom.</li> <li>Develop industry partnerships to expose more students to exciting STEM experiences and careers.</li> </ul>	<b>CLF, CDE, Community-Based Organizations, STEMX</b>
	<i>Ensure excellent STEM education and experiences for all students including those in rural communities, poor and minority students, gifted and talented students, students with special needs and female students.</i>	<ul style="list-style-type: none"> <li>Support BOCES in providing resources to rural communities to improve STEM education.</li> <li>Increase the number and diversity of students enrolling in AP, dual enrollment and other rigorous course work.</li> <li>Develop resource materials for counselors to better understand and communicate STEM careers to students.</li> <li>Support community-based programs that provide STEM experiences to girls, low income, minority and special needs students.</li> </ul>	<b>CDE, CBA, Rural Council, CWDC</b>
<i>Educators</i>	<i>Recruit, prepare, retain and support more and more effective STEM teachers and provide existing educators with the supports they need to</i>	<ul style="list-style-type: none"> <li>Identify and support Colorado teacher preparation programs effectively producing qualified STEM teachers.</li> <li>Work with administrators to define structures and working conditions that support high quality STEM instruction and experiences.</li> </ul>	<b>Governor, CDHE, CDE, CEA, CASE, CASB, universities, industry, 100 K In 10 Partners</b>



	<i>be effective educators in a 21<sup>st</sup> Century class room.</i>	<ul style="list-style-type: none"> <li>• Increase Colorado’s participation in 100 K in 10.</li> <li>• Develop STEM resources for teachers to support them in implementing new standards; evaluations; and assessments.</li> </ul>	
	<i>Provide experiences for educators that bridge formal and informal settings.</i>		
	<i>Develop high quality opportunities for educators to meaningfully engage with industry in ways that positively impact the relevance of the student STEM education experience.</i>	<ul style="list-style-type: none"> <li>• Define high quality industry externships.</li> <li>• Create a forum to connect teachers with industry.</li> </ul>	<b>CLF, industry, teachers, district HR directors and administrators</b>
<i>Adult Workforce</i>	<i>Use real-time data to communicate job openings, related STEM skills and certificate and degree attainment rates in those areas.</i>	<ul style="list-style-type: none"> <li>• Establish data sharing agreements and host a STEM data dashboard that includes employment statistics in STEM occupations.</li> </ul>	<b>CWDC</b>
	<i>Develop outreach and materials for local Workforce Investment Boards, community colleges and community-based organizations.</i>	<ul style="list-style-type: none"> <li>• Support the Advanced Industries Hub to improve STEM education and skills information across the 14 Colorado Blueprint regions of the state aligned to identified key industries.</li> </ul>	<b>CDLE, CDHE</b>
	<i>Increase the number of industry and community college partnerships focused on upskilling existing workers to fill in-demand occupations.</i>	<ul style="list-style-type: none"> <li>• Build out the career pathways work across all the regions of the state.</li> </ul>	<b>Career CAMA Pathways,</b>

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# Colorado STEM Action Plan

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The vision, mission and goals in this roadmap will allow for us to identify quality STEM instruction, programs and efforts. We will identify both strengths, promising practices, and gaps in STEM education and bring resources to bear to support effective efforts, nurture promising programs and to close critical gaps. CLF is in the process of developing an implementation plan for this work which will be released in February of 2014. Partners will move forward with implementation of this plan over a two year timeline. The end goal of this project is to ensure that the Colorado STEM Education Roadmap is institutionalized and sustained. Learn more and get involved in this effort.

{Insert information on how to access CLF STEM project}

## A Message from the Governor

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## Colorado STEM Education Roadmap Partners

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INSERT LIST OF STRATEGIC PARTNERS  
INSERT LIST OF IMPLEMENTATION PARTNERS  
INSERT FUNDING PARTNERS

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<sup>i</sup> College in Colorado

<sup>ii</sup> Delta Cost Project IPEDS Database, 1987-2009; Colorado: Colorado Commission on Higher Education, 2010 Legislative Report on Remedial Education, February 4, 2011.

[http://highered.colorado.gov/Publications/Reports/Remedial/FY2010/2010\\_Remedial\\_relfef11.pdf](http://highered.colorado.gov/Publications/Reports/Remedial/FY2010/2010_Remedial_relfef11.pdf).

<sup>iii</sup> CDE: The State of STEM Education in Colorado

<sup>iv</sup> <http://quickfacts.census.gov/qfd/states/08000.html> US Census 2012

<sup>v</sup> <http://www.colorado.gov/cs/Satellite/GovHickenlooper/CBON/1251638036525>