Colorado STEM Network
State-wide Progress Report
Fiscal Year 2008

Students exploring while attending STEMapalooza 2008.
Photos by CASMIC

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TABLE OF CONTENTS

INTRODUCTION

In 2006, the National Governors Association (NGA) launched Innovation America, a nationwide strategy to prepare America for a future driven by innovation and global competition. In order to deploy this new effort, the NGA partnered with the Bill & Melinda Gates Foundation and the Intel Foundation to fund the STEM Center Grant Program. Colorado was one of six states selected out of twenty-four to receive a $500,000 two-year award from this program to create the Colorado STEM Network. The grant period is from September 2007 through August 2009.

The goals of the Colorado STEM Network are to build a state-wide coalition of regional STEM stakeholders in order to inform and integrate and enhance state and local STEM education policies. Through a regional grassroots approach, the Colorado STEM Network coordinates closely with Governor Bill Ritter's P-20 Education Coordinating Council, Colorado Achievement Plan for Kids (CAP4Kids) legislation and the Governor's Jobs Cabinet. The activities of this grant align directly with the Governor's education agenda to decrease the dropout rate, double the rate of certificate degrees earned, and close the achievement gap.

The Colorado STEM Network strategic partners include: Governor Ritter's Office, the Center for Education Policy Analysis (CEPA) at the School of Public Affairs, University of Colorado Denver; Colorado Children's Campaign; College in Colorado, Colorado Math, Science, Technology, and Engineering Coalition (COMSTEC); Denver Metro WIRED (Workforce Innovation in Regional Economic Development); and the Colorado Department of Education (CDE).

The Colorado STEM Network has two components: a state-level coordinating center and a network of regional STEM compacts.

1. The state-level STEM Coordinating Center works to: provide state-level guidance and coordination at both state- and local- levels by integrating STEM education alignment and best practices into the state education reform policy package developed through the Governor's P-20 Council; to improve local STEM policies and practices through the coordination and support of the network of regional STEM compacts throughout the state; communicates and builds public will for policy changes promoting STEM education redesign to support Colorado's innovation capacity; and builds capacity at the state and local level through applied research and analysis for improving STEM outcomes for Colorado students.

2. The Regional Compact Network, distributed across five regions in the state, is led by four institutions of higher education and a nonprofit science center. The Network brings local and regional STEM stakeholders together to identify the local challenges and assets around the alignment of K-12 outputs and expectations and to support development and implementation of policy at the local level.

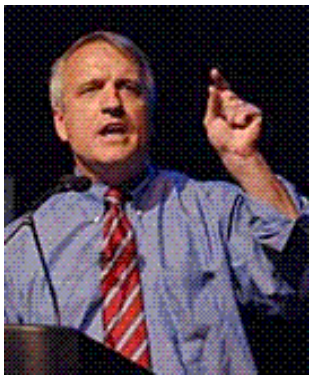
COLORADO STEM NETWORK PARTNERS

The Network's partners are a multidimensional group of strategically selected organizations who provide leadership and management of the Colorado STEM Network grant and its implementation.

Governor Ritter's Leadership

Office of Policy Initiative

The Governor's Office of Policy and Initiatives (OPI) is the chief administrative agent for the Colorado STEM grant. Senior Policy Analyst, Dr. Matt Gianneschi, leads the Colorado STEM Network in a multiple ways: providing consistent guidance regarding the intent of the grant, ensuring that deadlines are met; and communicating the grant's connections to other areas of state policy and the Governor's agenda.



In order to assist the Colorado STEM Network in financial administration and leadership, three professional staff were assigned to the project, two from the office of the Chief Operations Officer and one from OPI.

Please click the link below to view Governor Bill Ritter's speech at the 2008 STEMapalooza:
http://stsmediaproductions.com/page14.html

The P-20 Education Coordinating Council and CAP4K legislation

Governor Ritter established the P-20 Council in 2007 by executive order, to create a seamless education system from pre-school to postsecondary education that provides Colorado students with the skills and knowledge to succeed in a 21st century economy. Co-chaired by Lt. Gov. Barbara O'Brien, the P-20 Council discussions resulted in Senate Bill 212, the Preschool to Postsecondary Alignment Act, also known as CAP4K, approved by the legislature in 2007.

Regarded as a landmark in Colorado education reform, the bill takes a long-term approach to adapting Colorado's public education system to the 21st century. CAP4K directs the State Board of Education and the Colorado Commission on Higher Education – and their respective departments, the Colorado Department of Education (CDE) and the Department of Higher Education (DHE) – to collaborate in creating a new seamless system of public education standards, expectations and assessments – from preschool through postsecondary education – designed and aligned to prepare high school students to enter postsecondary education, or technical or trade schools, or the workforce without the need for further remediation. Specifically, it requires the state board and CCHE to "negotiate a consensus and adopt a description of postsecondary and workforce readiness" on or before December 15, 2009. On or before December 15, 2010, the state board and CCHE shall adopt postsecondary and workforce planning, preparation and

readiness assessments that align with the updated definitions, to be administered by local education providers (public schools, school districts, Colorado Boards of Cooperative Educational Services (BOCES), charter schools, etc.). Though the bill does not mandate statewide graduation requirements, schools are required to align their content standards with the newly adopted state standards and revise their curricula accordingly, by December 15, 2011, and begin administering assessments by December 15, 2012.

In 2008, the P-20 Council reconvened and focused on the following areas: improving the use of data, improving the preparation of classroom teachers; reducing high school dropout rates; and strengthening post-high-school and workforce-ready educational opportunities for students. Subcommittees formulated and presented policy recommendations at the final 2008 meeting of the Governor's P-20 Education Coordinating Council on December 5th. In his State of the State speech delivered on January 8th, 2009, Governor Ritter used these recommendations, saying his education agenda will strive to deliver a statewide concurrent-enrollment plan that will give high school students an opportunity to earn college credits while finishing high school. Though the P-20 Council recommendations did not focus solely on STEM subjects, the P-20 Council's goals and the Governor's education agenda will continue to inform, and be informed by, the Colorado STEM Network in 2009.
For more information visit:
http://www.colorado.gov/cs/Satellite?c=Page&cid=1187772339688&pagename=GovRitter%2FGOVRLayout

The Center for Education Policy Analysis

The Center for Education Policy Analysis (CEPA) conducts cutting edge analysis of applied education policy issues that bring national perspectives and solutions to Colorado's education problems. CEPA's role in the Colorado STEM network grant is to build capacity at the state and local level by providing administrative, technical and scholarly expertise and support to the Network participants. For instance, in 2007, CEPA published a major research report related to the state of STEM in Colorado entitled, *Learning About Science, Technology, Engineering, and Mathematics: Assessing the State of STEM Education in Colorado.*

Throughout 2008, CEPA worked to build public awareness and support of the Colorado STEM Network in a number of capacities. CEPA continues to represent the perspective of the Network to the Denver Metro WIRED effort to build the regional economy through partnerships among industry, economic development, workforce development, and education and disseminates WIRED information back to the Network. CEPA also represented Colorado at the NGA STEM Academy in Huntsville, Alabama.

CEPA has built the capacity of the Colorado STEM Network by providing resources, development, and staff support. It developed toolkits for the Regional compact coordinators in order to assist, improve and inform the state-wide efforts. The toolkits included: asset mapping templates, data collection strategies, and policy communication materials and programs for education local leaders/policymakers and community

members. CEPA continues to update the toolkit, providing additional materials focused on current issues and feedback, including the CAP4K legislation and advocacy techniques.
With the support of the Metro Denver WIRED Initiative, communications and facilitation experts from the School of Public Affairs will convene a strategic communications planning conference of top stakeholder communications officers from all WIRED and Science, Technology, Engineering, Arts & Math (STE/AM) sectors take place to:
develop shared messages across sectors that will provide understanding of how all of the moving parts in Colorado greater WIRED network interact and complement each other; and,
develop an action plan for strategic communications, both formal or informal, and within and across organizations as to how these messages are disseminated.
Stakeholders will include post secondary education, CDE and regional school districts, the adult learner education community, informal education providers, formal workforce board, government agencies, target industry, trade associations and professional associations. This work will be completed by June 2009.
For more information visit: http://cepa.cudenver.edu

Colorado Children's Campaign

The Colorado Children's Campaign (CCC) works to create hope and opportunity for more than one million children at a time. The CCC is a nonpartisan, nonprofit organization focused on expanding access to quality health care, P-20 education and early childhood experiences. The CCC provides data support to the regional STEM compacts, assists with the communications and outreach efforts of the Colorado STEM Network, and supports state-level policy development. The CCC also provides staff support for the subcommittee of the Governor's P-20 Council addressing data and accountability issues.

In April 2008, the Colorado Children's Campaign hosted a meeting to discuss "Rigor in High Schools," a conversation to inform the Governor's priority legislation (CAP4K). This conversation included the chairs of the House and Senate education committees, as well as the deputy commissioner of education.

The Children's Campaign is working to launch a P-20 Data Center and provide needed analytical support to inform the Governor's policy decisions.
For more information visit: www.coloradokids.org

College in Colorado

The campaign to improve college access and expectations in Colorado led to an initiative of the state which created College in Colorado, based in the Department of Higher Education. College in Colorado (CiC) is a one-stop resource to help students, parents and counselors plan, apply, and pay for college. As part of the leadership team of the Colorado STEM Center grant, College in Colorado is helping to build public will for STEM education redesign and increased student achievement.

The CiC team has provided a variety of resources and leverage for the Colorado STEM Network. College in Colorado assisted in the regional STEM asset mapping, attended several Regional Compact convening sessions, and brokered relationships for the Compacts. CiC also provided administrative support and expertise for the Student Transition subcommittee of the P-20 Council in 2008.

The newly launched College In Colorado Partner Network Website is an interactive site created to connect and invigorate educators, service providers and other community partners dedicated to academic and career success. Partners include many Colorado pre-collegiate programs, counselors, career technical educators, admissions and financial aid officers, administrators and teachers, CollegeInvest, workforce development and corrections officers, special education professionals, trades associations, STEM advocates and many others with an interest in helping Colorado students achieve success. The website offers online discussion boards, resources, facts, tips, articles and opportunities to network and collaborate with others that share a common goal of reversing the Colorado Paradox. The Partner Network aims to supplement and complement many of the resources provided for students and parents on the College in Colorado website. CiC established the Network to meet the expressed needs of our many partners who wish to interact, communicate, collaborate and share best practices. With the support and participation of our partners statewide, this site will become an efficient online forum, saving you time and resources.
For more information visit: http://www.collegeincolorado.org and http://www.cicpartnernetwork.org

COMSTEC

The mission of the Colorado Mathematics, Science, Technology, and Engineering Education Coalition (COMSTEC) is to build a state-wide coalition of businesses, government, education, and community groups to improve STEM education for all students. The role of COMSTEC in the Colorado STEM Network is to support and coordinate the activities of the five regional compacts.

During the past year, COMSTEC has played a large role in enhancing communication among the Colorado STEM Network and among key STEM stakeholders. This has been accomplished through the distribution of newsletters, brochures, developing a STEM education website, and with regular conference calls and team meetings

COMSTEC served as an advocate and resource in order to highlight the efforts of the Colorado STEM Network, by coordinating and attending regional compact meetings, and through its participation in various events hosted by other STEM-related organizations. In addition, COMSTEC presented the regional compact findings to the Governor's P-20 Council and Governor's Jobs Cabinet in June 2008.
The Colorado STEM Network is organizing meetings over the next few months to facilitate communication and collaboration between Colorado's STEM academies. STEM academies are a formal education organization focused on teaching the skills of

science, technology, engineering and math. In Colorado, there are several existing STEM academies but there are many more that are in the beginning stages of formation. Plans are also in place to assist business and industry to be more active participants in the transformation of STEM education in Colorado. COMSTEC will begin a series of Business Roundtables in February 2009 focused on the needs of the business community to understand the issues in education in their terms, why they need to be involved and definite roles they can take on to make a difference.
With assistance from CEPA, COMSTEC conducted a communications audit and has developed a strategic communications plan with the identified goal of an "informed and active Board of Directors with implementation to begin in January of 2009. Key STEM messages were developed and approved. (See Appendix 1). The communication will be expanded during 2009 for external audiences and the key messages will be offered as a starting point for CEPA's communication planning conference of top stakeholder communications officers.

COMSTEC is also examining its future role and that of the regional compacts, in terms of the structure and organization of the Colorado STEM network. COMSTEC is also working to identify and secure additional funding sources.
For more information visit: http://www.ColoradoSTEMeducation.com/ and contact Nicole McGee, Executive Director, at nicole@ColoradoSTEMeducation.com

Denver Metro WIRED Initiative

The Metro Denver Workforce Innovation in Regional Economic Development (WIRED) Initiative is a partnership between industry, workforce, education, and economic development in the seven-county Metro Denver region and two-county Northern Colorado area. It addresses the "Colorado Paradox" of having the country's second most educated workforce, yet ranking 24th in sending high school graduates on to college. WIRED partners are implementing transformational and sustainable changes in Colorado's education and workforce systems to enhance the region's global competitiveness. WIRED seeks to further develop a labor force skilled in STEM subjects that supports the region's fastest growing industries – aerospace, bioscience, energy, and information technology.

The WIRED Initiative has funded several research studies of industry and workforce needs, resources currently available in the Metro Denver region to plan strategies and recruit and develop talent, and public opinion polls of students, parents, educators, guidance counselors and industry around STEM skills and 21st Century jobs. The analyses will help create an action plan to address the region's short-term and long-term workforce needs. WIRED builds upon existing partnerships and leverages public and private funding sources to sustain WIRED successes well beyond the life of the grant.
For more information visit: http://www.metrodenver.org/workforce-profiles/WIRED

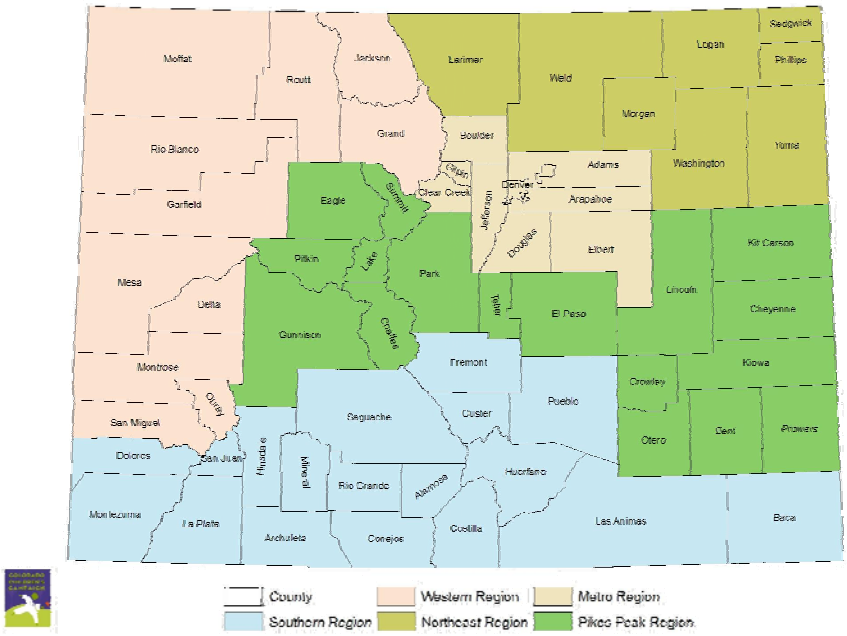
Colorado Department of Education

While not a named partner in the Colorado STEM Network, the Colorado Department of Education (CDE) is an important ally and resource for the Network. The CDE supports

and serves 178 school districts and their work to provide quality learning for more than 800,000 students statewide. Under Senate Bill 212 (CAP4K), the CDE is mandated to define 21st Century school and workforce readiness by 2009 and to revise the state's curriculum standards to align with the definitions by 2010.
In September 2008, the CDE named four individuals who will strengthen the department's team of curricular experts and lead efforts to close the achievement gap. Two of the four positions focused on STEM subjects, with two full-time employees for a Mathematics Content Specialist and a Science Content Specialist.
For more information visit: http://www.cde.state.co.us/index_home.htm

REGIONAL COMPACT STRATEGY

The Colorado STEM Network's five Regional Compacts are central to the Colorado STEM Center initiative. Divided along county lines, the five regional compacts are established in the Western part of the state, Northeast, Metro Denver, Pikes Peak, and Southern regions. The regions include a diverse range of communities (e.g. rural, resort, urban, and agricultural plains) and varying levels of socioeconomic conditions.



REGIONAL COMPACT ACTIVITIES

The five regional compacts are charged with bringing local and regional STEM stakeholders together through community convening events to identify local challenges and assets around the alignment of K-12 outputs and expectations and support development and implementation of policy at the local level. The regional approach has served the Colorado STEM Network well by building a strong coalition of STEM education champions, from the business, education and government sectors across the state. The following section provides an overview and highlights of the regional compacts activities in 2007 and 2008, based on the compact coordinator's monthly reports submitted throughout the past year.

Approach and Tactics

The regional coordinators engaged STEM stakeholders and gathered information by conducting interviews, holding individual meetings and facilitating large convening sessions throughout the regions at diverse locations from higher education institutions to

community centers. Other tactics that have been effective for the compacts include: leveraging endorsement from Governor Ritter's Office in marketing materials, hiring consultants to provide research assistance and meeting facilitation expertise and support, and coupling the convening sessions with other community or educators meetings. Regional collaboration and information sharing has also enhanced the effectiveness of the regions, particularly to share the successes and challenges of the regional convening meetings.

SOUTHERN REGION

Background

The Southern region consists of 18 counties spanning from the eastern plains to rural mountain communities. The compact is housed at Colorado State University - Pueblo and lead by Hector Carrasco and LaRita Souza-Corcoran.

Strengths

A new STEM business partner, Vestas Wind Systems, began construction on wind turbine plant in the region. Not only will the plant provide many job opportunities the company is partnering with Pueblo Community College to begin an employee training program for Vestas' employees through a specially designed curriculum. The business and educational partnership will also bring state-of-the-art equipment and technology to the campus to provide students with the technical skills needed to step right into the workforce upon graduation. The training program is expected to begin in early 2009, with the goal of having at least 100 production workers trained by the time Vestas opens its plant in May. Those who successfully complete the training can expect well-paying jobs as fabricators, welders, machinists and in other production skills.

CHIEFTAIN PHOTO/MIKE SWEENEY -- Instructor Bill Hartwick (center) shows students Matthew Mascarenas (left) and Salvatore Giannetto how to navigate the user interface of the Haas VF-3 computer numerical controlled milling machine at the Gorsich Technology Center's machine shop at Pueblo Community College.

Tactics

The coordinators felt that a valuable tactic was to hire a consultant who handled the logistics and administration for their convening meetings. The coordinators have also collected data on the region's technology capacities, state rankings, and other valuable information for the Colorado STEM Network and policy leaders.

Accomplishments

The Southern Compact held two convening sessions with 48-50 people in attendance in Pueblo and Trinidad, Colorado. They have scheduled an additional two meetings in the more rural part of their region in Durango (February 2009) and Alamosa (March 2009.

Challenges
A major issue for this region is that it is comprised of lower income communities who don't understand the need for STEM education or how it will increase their income potential. There is a need of funding for STEM-related classes and programs. There are districts in the Southern region that have gotten rid of science in school because there is neither time nor funds for it. A second issue is motivating and encouraging students to participate in STEM-related classes and work as well as instilling work ethics.

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NORTHEAST REGION

Background
Colorado's Northeast Regional compact includes nine counties, with primarily agricultural communities. The compact is hosted by the Department of Education at Colorado State University, led by Ellyn M. Dickmann, Ph.D., Associate Professor of Educational Leadership, Department of Education.

Strengths
Through its convening sessions, the compact has identified a number of strengths in the region including: an understanding of STEM issues, existing partnerships, an understanding of shared resources, and a high level of belief and support for the Colorado STEM Network activities.

Tactics
The coordinator is working to enhance media coverage of the compact's activities by preparing and distributing an article for publication. The Compact is are also working to improve the relationships among area school district's and community colleges.
The regional coordinator is documenting and creating templates for use by other regional compacts, identifying potential funding opportunities, and writing a paper on the networking process employed in the region through this initiative. They have gathered information and feedback from Colorado STEM Network participants and stakeholders through web surveys and community-based forums.
The Northeast region plans to collaborate on the redesign of the *ColoradoSTEMeducation* website, as well as contribute material to the regional webpage by providing: updated information, relevant links, calendar updates, shared documents and reports.

Accomplishments
The Region hosted seven well-attended convening sessions which brought together local stakeholders including: school districts, higher education institutions, city/town governments, chambers of commerce, economic development entities, workforce development centers, and STEM related business and industry. These sessions were planned with community members in strategic locations across the region. The

coordinator leveraged the enthusiasm and competitive nature between districts to expedite the progress of their first year goals.

Challenges
The Northeast Region has identified the need for feedback and increased input from its stakeholders. The region is also addressing concerns with the Colorado STEM networks long-term sustainability plans and compulsory fundraising goals. Activities include: collaborating with the Larimer County BioScience Group on grant funding ideas, meeting with the Larimer County Workforce Center to provide information/dialogue on their SECTORS grant work, and working with Northern Colorado Economic Development Corporation.
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METRO DENVER

Background
There are nine counties located within the Metro Denver region, which is the smallest geographically, but a significant percentage of the Colorado population and includes the two largest school districts in the state. The Metro region is primarily an urban setting but also includes surrounding suburban and rural communities. The metro Denver compact is based out of the University of Colorado Denver's Center for Applied Science and Mathematics for Innovation and Competitiveness (CASMIC) and led by Carole Basile and Sharon Unkhart.

Tactics
Because of vast amount of work that has previously been accomplished networking and convening stakeholders in the Metro Denver region, the regional compact formed a Steering Committee comprised of industry, higher education, non-profit, government agency, and K-12 stakeholders to inform and guide the production of "STEMapalooza" a large state-wide convening event that took place on October 24 and 25 at Denver's Colorado Convention Center in Denver. The two-day event hosted activities for all ages with educational booths, workshops, and a large scale exhibit hall all focused on exploring and promoting STEM subjects and careers. .

Accomplishments
STEMapalooza was a living asset map, with participation from business, education, nonprofit and government leaders. More than 6,000 participants, including 2,500 students from elementary school to

college level, attended the convention which featured over 100 exhibitors with hands on experiments, live animals and insects, interactive virtual simulations, a tornado generator, a wind tunnel, and many other activities for the all ages of students and adults.

Colorado Governor Bill Ritter attended the Friday luncheon and introduced the keynote speaker. The Governor also used STEMapalooza as the backdrop for to create a Public Service Announcement on-site about the need for Colorado students to have a 21st Century STEM education. All of the Compacts will have the use of this PSA.

The project outcomes include:
5442 attendees passed through the turnstiles;
70 people signed up to volunteer their time in support of the event;
112 exhibitors representing business/industry, higher education, workforce and economic development, K-12 education, and informal education were able reach out to the public and to each other;

Over 150 people attended the luncheon, featuring Governor Ritter and Dr. Tom Cech, to discuss policy implications of STEM in Colorado and the need to continue the work that has begun;

Two well-attended discussion groups facilitated conversations about policy implications including the intersection of the arts and STEM, changes in teacher education and professional learning, increasing scholarships for students for informal STEM activities, and the formation of career academies.

STEMAPALOOZA MAKES A WINNING MATCH!

On Saturday, February 14, 2009 Frederick High School's Mathematics, Engineering and Science Achievement (MESA) after-school program accomplished an amazing feat, winning the Western Regional *FIRST* Tech Challenge! As a result, seven Frederick High MESA students and their advisor, Julie Constantine, will be on their way to compete in the *FIRST* Tech Challenge at the US *FIRST* World Championship! The Frederick High MESA team will compete against teams from 8 countries fielding 100 different robots at the Georgia Dome in Atlanta, April 16-18, 2009. "We were lucky to be introduced to this challenge while our MESA team was presenting at Stemapalooza last October," explained Constantine. Kathy and Matthew Collier, Regional US *FIRST* representatives, grabbed the MESA students' attention by demonstrating a model FTC robot. No one suspected that that "lucky" meeting would end with Frederick High MESA being the first and only Colorado MESA team to enter and win a *FIRST* Tech Challenge.

An effective marketing campaign created the ability to brand and communicate the STEM message. The event itself provided parents and teachers the opportunity to see the larger STEM picture and begin to understand the economic and workforce opportunities for children and youth. www.Stemapalooza.org

Challenges
The greatest challenge to the Metro Denver Compact is being able to facilitate the communication and collaboration among stakeholders in such a vast population while planning for STEMapalooza 2009, especially as this successful event continues to grow.

The Metro Denver Compact identified the top issues related to STEM education which included: implementing youth programs in STEM, middle school science, building bridges between industry and education, making STEM "cool," K-12 connection to real-life, labor and workforce in STEM, relevance of STEM education, the capacity and alignment of the pipeline from P-20 to industry (workforce development) and the need to create a diverse workforce.

The Metro Compact has begun work on the production of STEMapalooza 2009, and announced it will take place on October 16th and 17th, 2009 from 9am to 4pm, at the Colorado Convention Center.
Contact Information: Sharon Unkart Sharon.unkart@ucdenver.edu

COLORADO SPRINGS

Background
The Colorado Springs region encompasses 17 counties, including rural, mountain resort, front-range urbanized areas, and agriculturally based areas stretching into the eastern plains. The University of Colorado Colorado Springs' College of Education, working with University's, Colorado Springs Center for Science, Technology, Engineering & Mathematics Education (CSTEME) project are supporting the Colorado Springs Regional Compact, led by David Khaliqi and Lynn Frederick.

Strengths
The compact coordinators were able to identify three critical elements of successful STEM efforts in the region including: time, communication and relationship building. When stakeholders committed time to addressing the STEM related issues facing the school districts, positive outcomes ensued. The Compact also noted that collaboration among elementary and middle schools helped engage parents and communities in problem-solving and leveraged community resources effectively.

Tactics
The Colorado Springs compact spent most of their first year building relationships in many communities across their region. Now they have been able to leverage those relationship to gather information about the needs. They are reaching in to the more rural parts of their region in partnership with the local decision makers and organizing smaller

sized meetings in those parts of their region. They are continuing to collect information about the STEM resources in their region including the Vestas Wind Farm and the Pierre Auger Cosmic Ray Observatory in Lamar and how they are working with the community and the educational institutions.

Accomplishments
Although all the communities reached in this region are very different, there was striking similarity among their interest in engaging students in STEM subjects. The region developed an asset map that identified a number of strengths in the region surrounding STEM activities and awareness.

Challenges
The feedback focused on the following assets: dual credit options, distance learning, scholarship incentives, technology and the academic climate. A common recommendation and interest in the region is dual credit, distance learning options, and vocational education. However, the region found a need to build trust in the accreditation process or find other ways to improve the reputation of quality of these existing programs. A suggestion to improve this situation is to encourage discussion and collaboration between the school districts and community colleges in the area.

The region also highlighted the lack of resources for STEM subjects and the lack of trained teachers to provide opportunities for it's diverse group of learners. The region identified two recommended solutions: increase opportunities for professional development and address funding shortfalls that lead to the schools' non-competitive salaries.

Finally, the region has identified a major challenge for STEM advocates in rural areas will be to combat the "rural paradox." This barrier to improving STEM education in the area is based on a commonly held belief that education is not always a high priority because it can cause movement out of the community.
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WESTERN REGION

Background
There are 11 counties located in the Western region, comprised of rural and resort towns and driven by agricultural and energy industries. The compact is housed at the Western Colorado Math and Science Center, which is a volunteer-supported educational center that has provided hands-on experiences for over 63,000 students since it was established in 2000. The Center also provides science kits and summer training sessions for elementary level teachers, helping them gain confidence in teaching science and providing hands-on activities for the classroom.

Recently, the University of Colorado, School of Engineering has partnered with the Center to provide internship opportunities for college undergraduates during the summer. Led by john McConnell, the Center is well known and respected in the area and able to garner media attention, which continues to spread awareness of the importance of STEM-related activities and initiatives in the region.

John McConnell and student make electricity, while attending the metro Denver Compact's STEMapalooza. CASMIC photo.

Strengths

There are many isolated examples of STEM activities that are working toward improving STEM educational opportunities. Several outstanding teachers and districts have been recognized for their innovative work to make science and math more accessible and enjoyable for students. The presence of higher education programs and partnerships also is also evident across the region. For example, Mesa State and Western Community College are partnering with schools to provide career exploration and dual credit programs.

Another asset identified in the region is the number of anchor institutions and companies for STEM related workforce development.

Tactics

The Western regional compact activities centered on site visits and the development of county asset maps. The regional coordinators used the media to raise awareness about STEM issues. The *Grand Junction Free Press* featured an editorial written by the coordinator and another local newspaper, the *Daily Sentinel*, asked the compact coordinator to contribute a weekly column to the paper, which has created a community focal point for STEM conversations to take place.

Accomplishments

Two well-attended convening sessions took place and generated excitement and a wealth of solutions to address the STEM needs in the area. The regional center also hosted students from a neighboring community who were interested starting an organization similar to the host center. The Center has travelled to other districts in the state to have similar conversations including Trinidad in the Southern region.

Challenges

The needs of the region are based on systemic and resource limitations. The educational system lacks standards so the quality of STEM subjects varied among school districts. Teacher training and incentives are needed to allow STEM education improvements to

occur. The resources are very limited in the region - most small districts in the region can only afford to have school in session 4 days a week. The regional coordinators highlight the region's lack of career counseling and exploration opportunities for students as another limitation. Several issues were raised due to the region's recent gas industry development, namely the issues facing its growing English Language Learners population. The regional coordinators have also identified a need to enhance current communications with business leaders in order to demonstrate the need for their support of STEM activities.

Contact Information: John McConnell 970-254-1626, mcconnellj@bresnan.net

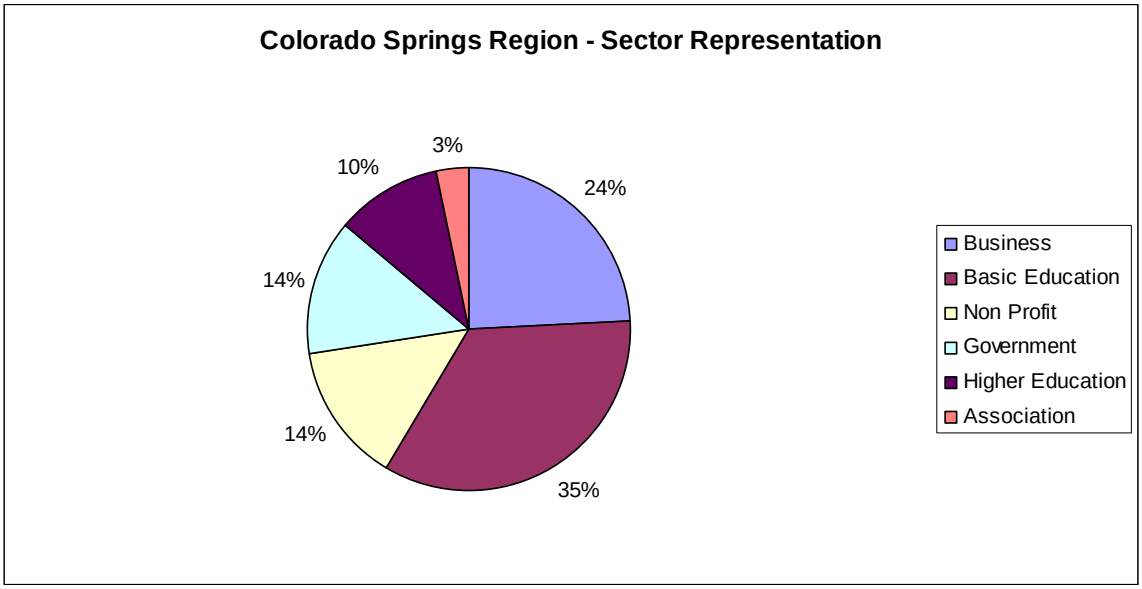
OUTCOMES AND LESSONS LEARNED

As this report has illustrated, the Colorado STEM Network has made extraordinary progress toward strengthening STEM education for all students in Colorado. Both the STEM Center and Regional Compacts have successfully established a network of participants ranging from the Colorado Boards of Cooperative Educational Services (BOCES), various district superintendants, and other education organizations; Denver Chamber of Commerce WIRED Initiative and similar economic partners and wide variety of workforce development partners. Industry leaders, such as Lockheed Martin, and representatives from the offices of key legislators and representatives have added critical value to enhance the Colorado STEM Network initiative and activities. The Network has facilitated communication and collaboration among key stakeholders and identified the needs and assets of the regions throughout the state.

Sector Representation

The Colorado STEM Network is committed to identifying and engaging the key stakeholders within each region to participate in the Colorado STEM Network. Figure 1 represents the various STEM stakeholders the Colorado Springs Region who were involved in the activities of the Network in 2008.

Figure 1



Note, this analysis is based on limited data collected by the Colorado Springs region and may not represent the precise quantity and characteristics of its stakeholder engagement. It is included here to serve as an example of one way the Colorado STEM Network can quantify its efficacy, deliverables, and identify strengths and weaknesses to enhance its overall efforts. In the future, the Colorado STEM Network will be able to provide similar data on each regional compact and will have the ability to demonstrate the total state participation rates among each of the desired sectors.

Lessons Learned

With the extent of collaboration and progress being made within the Colorado STEM Network, there is an urgent need to improve and clarify the reporting requirements which will create a more seamless way to collect, compile, and present the project's progress data. More data are needed in order to attach quantitative data to the successes and stories provided by Network partners.

As Figure 1 illustrates, the ability to display the array of stakeholders is enlightening, therefore, the regional compact coordinators need to begin collecting precise data on participation (quantity and sector representation) for all activities, particularly for each convening meetings. Using the six categories to describe the participants (business, basic education, non profit, government, higher education, and associations) this can be as simple as ensuring a sign-up sheet with the required information is completed at each event and that the information is reported to the appropriate partner agency. The compact coordinators are also looking for more direction from the leadership to guide the activities after community convening sessions have taken place.

The regional coordinators have clearly expressed the marked differences among the regions, including the populations served, stakeholders, and availability of resources for, or interest in, STEM initiatives. The Colorado STEM Network has a unique opportunity to address these differences by leveraging the relationships and benefits realized by each of the regional compacts, who have established an identity and position within their communities. For instance, may be able to indicate or isolate key features of highly effective schools, teachers, content or programs. according to the ACT Educational Planning & Assessment System (ACT EPAS), students most likely to major in STEM fields in college (and persist to earn their degrees) are those who develop interest in STEM careers through early career planning and take challenging classes that prepare them for college-level science and math coursework.

The Network needs to think about how to measure the success of its outreach efforts. The Federal STEM Goals and Metrics outline several ways to approach the evaluation of the outcomes of outreach efforts for public and professional audiences. The goals are stated clearly and there is a brief list of associated variables. An organization can measure these various outcomes in several ways, through basic data collection and analysis, pre and post testing, surveys, interviews, tracking degree of "action" steps induced in Colorado STEM Network participants, among other tactics.

Goal 1 - Public Audiences: Increase awareness, interest, engagement, and understanding of STEM concepts, processes, and careers by the general public and other targeted populations in the context of informal education and outreach.

Goal 2 - Professional Audiences: Improve practice and build professional and institutional capacity through efforts that seek to generate, develop, and apply effective ideas and models for the informal STEM education field.

- Increase representation from key sectors, growth trends.

- Educate and engage audiences about awareness, knowledge, or understanding of STEM concepts, gained skills, attitudes processes, or careers via informal STEM education
- Build engagement or interest in advancing the informal STEM education/outreach research or practice.
- Build positive attitude towards STEM-related topic or capabilities via informal STEM education and outreach deliverable.
- Build STEM communication skills in target audiences.

There is always room for improving communication efforts - especially when working with a coalition of organizations deployed throughout the state. One way to accomplish this without extensive resources is to undertake a "link campaign" which is a common form of online marketing and networking. A *link campaign* can increase the number of visitors to an organization's web site by requesting its strategic partners, professional organizations, chambers of commerce, suppliers, and customers to add links from their web sites. A *link campaign* may involve mutual links back and forth between related sites, but it does not have to require the reciprocation of links. This could benefit all of the Colorado STEM Network partners and stakeholders by improving the coordination and alignment of information and resources.

CONCLUSION

Although declining academic standings and increased demands for a technologically-qualified workforce are still major issues, our communities are now committed to working together to better prepare students for 21st century careers.

The Colorado STEM Network, led by Governor Ritter has created momentum for improving the state's approach to preparing Colorado kids for a future driven by innovation and global competitiveness. State and Federal investment in STEM Education will be vital to the continued success and sustainability of these innovative initiatives and activities.

With a continued commitment from the Colorado STEM Network's varied and talented participants, coupled with enhanced reporting requirements and communications, the Colorado STEM Network is poised to lead the effort in the West to ensure a healthy and vibrant education system, industry and workforce, and a competitive economy in the future.

Photo by CASMIC.

APPENDIX 1
KEY STEM MESSAGES DEVELOPED by COMSTEC

America's economic competitiveness in the future will be dependent upon our educational readiness today.

1. Topic Addressed: Why STEM?
Key Message: STEM stands for Science, Technology, Engineering and Mathematics – the four core disciplines critical to the development of America's technological innovations today and in the future.
Support Points:

- STEM initiatives are efforts designed to foster the development and expansion of Colorado's STEM workforce – individuals who receive sufficient academic and career exploration opportunities can become contributors to our economic innovation and competitiveness.
- STEM elements are everywhere - with technology integrated into our daily lives it is easy to forget how important these disciplines are to our children's future and livelihoods in a global, high tech future.

Message concepts targeting Education Leaders will emphasize:

Higher Ed Leaders -

- Students must have STEM skills to thrive in post-secondary education.
- You can inform others within your institution about the importance of STEM skills and knowledge for all students.
- By raising awareness within your institution and informing the Colorado STEM Network of activities and initiatives happening at the higher ed. level, you can help us align and build powerful community partnerships to support the P-20 system.

K-12 Leaders-

- School districts in Colorado depend upon high retention rates and high graduation rates.
- By integrating STEM skills into all subjects, making learning relevant, comprehensive and interesting, students are more engaged and retention and graduation rates will increase.
- STEM skills are also necessary for all students to graduate prepared and ready to succeed in the next step in their lives.

Informal Educators/Partners -

- We must work together to ensure all kids are prepared for the high-tech, globalized, future.
- COMSTEC addresses the need for a strong coalition of advocates who can share information and resources and improve access to STEM educational and career opportunities for all kids.
- Join COMSTEC today and be a part of the state-wide momentum to empower and inspire kids to reach their full potential with the necessary STEM skills and knowledge.

Government - Education Leaders -

- You can help promote COMSTEC as the resource for STEM related activities and initiatives.
- You can support these efforts with clear

Message concepts targeting Business Leaders will emphasize:

Business/Industry leaders -

- STEM skills for all students will supply the demand for a highly skilled Colorado workforce which will ensure both business growth and economic stability.

- We need businesses to drive STEM education reform by defining what skills and training are critical to future employees.

Government - Business -

- Economic development in Colorado is dependent upon a consistent and competitive workforce that can meet the 21st Century demands.
- STEM skills and knowledge are the building blocks for creating a sustainable and vibrant workforce, attract high-tech businesses and retain "home grown" talent in Colorado.
- You can ensure Colorado remains a competitive state in the future by promoting COMSTEC as the best way business leaders can support STEM initiatives and by supporting STEM focused policy initiatives.

Message concepts targeting Retired Leaders will emphasize:

Message concepts targeting Education Leaders will emphasize:

- COMSTEC can provide spokespeople, information and assistance with the various STEM subjects, initiatives, and programs.

3. Topic Addressed: Who is COMSTEC?

Key Message: COMSTEC is a state-wide coalition of businesses, government, education, and community groups who are concerned about the competitiveness of Colorado's education and workforce in light of the new demands of a global, high-tech world.

Support Points:

- The members and activities of COMSTEC are designed to advance sustainable improvement of Science, Technology, Engineering and Mathematics (STEM) education in Colorado. We offer a network-based infrastructure that informs and connects STEM initiatives through: advocacy, promotion and support, and communication.
- Everyone is welcome. As a newly emerging organization, COMSTEC is working to grow an ever-expanding base of dynamic regional partners from business, education, government and community leadership.
- COMSTEC works statewide, but is driven locally, guided by regional k-12, higher education, and business and government partners required for STEM-program success and long-term sustainability.