STEM
Action Planning Summit
Science, Technology, Engineering & Math

FINAL REPORT	➤ November 8-9, 2012 ➤ The Lodge at Santa Fe, Santa Fe, NM

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Executive Summary

A wide range of New Mexico professionals interested in science, technology, engineering, and math came together in late 2012 to develop action plans for strengthening STEM education. Their work was informed by a comprehensive backgrounder that provides a companion to this report: http://nmfirst.org/_literature_154590/STEM_Action_Planning_Summit_Background_Report.

Participants at the two-day summit addressed three main goals:

- Cultivate top-notch, inspiring K-12 math and science teachers.
- Make STEM more relevant, exciting, and rigorous in the K-12 classroom.
- Recruit and retain more STEM college students.

These issues overlap a great deal, and the detailed actions plans presented in this report reflect that reality. A few cross-cutting ideas came up repeatedly in the discussions:

1. Cultivate student interest in STEM subjects at K-12 and college levels, by using proven **active-learning strategies** and **hands-on research.** Help future teachers, current teachers, and professors develop the ability to use these techniques instead of relying on lecturing.
2. Implement the **Common Core State Standards** in math effectively, with significant involvement from educators, adequate professional support, and effective classroom tools.
3. Adopt the **Next Generation Science Standards**, and similarly support their implementation.
4. **Involve industry** in STEM education at every opportunity, including K-12 classrooms, colleges of education that are preparing future math and science teachers, recruitment of university STEM majors, and development of industry-relevant curricula.
5. Get teachers the **quality materials** they need to teach science and math effectively.
6. Provide **ongoing professional development** to K-12 and college teachers, so they remain current in the rapidly evolving STEM fields.
7. **Break out of silos** and create collaborations between government agencies, school districts, colleges and universities, departments, industry, unions, and other groups who may tend to work in isolation.
8. **Fund STEM efforts** in a sustainable way, drawing on public and private sources.

These are just a few of the high-level priorities that emerged. The following report contains additional actions and details.

The *STEM Action Planning Summit* took place November 2012. Convened by the New Mexico Partnership for Math and Science Education, the process was facilitated by New Mexico First. The two organizations will collaborate in the coming year to advance many of the actions proposed in this report.

Introduction

Purpose of the Summit

As a state that is home to two national laboratories and many companies engaged in high-tech industries such as energy, agriculture, aerospace, bioscience, and digital media, we have long understood that our workforce must develop strong science, technology, engineering, and math abilities. We know employers need workers with STEM skills because today's economy is knowledge-based and globally competitive. We also know that high-quality education is key to both economic prosperity and personal achievement in New Mexico. Ensuring that students are prepared for careers in a modern economy, and that teachers are ready to help these students succeed in their academic training, is essential.

The *STEM Action Planning Summit,* held in Santa Fe on November 8-9, 2012, was an opportunity for participants to create action plans that ensure important STEM education goals are achieved for New Mexico students and teachers. With approximately 90 registrants, the event included people from all regions of the state. Participants came from urban and rural communities and represented business, government, higher education, PreK-12 education and STEM-related nonprofit organizations.

The summit built on the solid foundation developed through a previously developed strategic plan, *Project 2012: Math and Science Education for the Future.* That plan contains over 50 specific STEM strategies. Last summer, New Mexico First issued a statewide online survey to help prioritize *Project 2012's* strategies. Over 150 people answered the survey, and the resulting top priorities formed the basis of the summit discussions. The summit

resulted in action plans for three important STEM education goals:

- **K-12 teacher preparation and professional development:** focused on how colleges train new STEM teachers and how schools support existing teachers.
- **K-12 STEM classroom experience**: focused on how to ensure students excel in rigorous math and science, and provide teachers the tools they need to be effective.
- **STEM students in college:** focused on how to recruit and retain STEM majors, including an effective transition from high school – and recognizing that women and minority populations are often under-represented in STEM fields.

Key Outcomes for Collective Impact

This report summarizes the results of three groups that worked during the two-day summit to create detailed action plans. **There is considerable overlap among the three plans, and they will be further refined by a Collective Impact Team.** This team will prioritize actions and work for the next year to implement key STEM strategies. Given the volume of proposed actions, it will not be possible to address all the actions in this plan. The team will focus first on those that are most achievable or will be most impactful. The team will also use separate resource lists that were drafted during the summit by each group.

Implementation of the action plans developed during the summit will use the "Collective Impact" model, including:

- A common agenda
- Shared measurement system for accountability
- Diverse expertise that capitalizes on each person's strengths
- Regular meetings to advance the plans and make adjustments as new information is learned
- Communication with the summit participants, wider STEM community, media, and public officials
- A goal to create a supporting infrastructure to provide a backbone for the ongoing initiative

About New Mexico Partnership for Math & Science Education

The summit was convened by the **New Mexico Partnership for Math and Science Education.** The partnership is a statewide membership organization representing institutions and projects involved in STEM education. The vision of the organization is to promote coherence and quality of STEM education initiatives through dissemination of information, networking, coordination, and collaboration so that New Mexico will become a leader in STEM education. Its mission is to serve as a clearinghouse and network for STEM education initiatives in New Mexico.

About New Mexico First

The summit was facilitated by **New Mexico First.** The nonprofit, nonpartisan organization engages people in important issues facing their state or community. Co-founded in 1986 by Senators Jeff Bingaman and Pete Domenici (retired), the public policy organization offers unique town halls and forums that bring together people from all walks of life to develop their best ideas for policymakers and the public. New Mexico First also produces nonpartisan public policy reports on critical issues facing the state. These reports – on topics like education, healthcare, the economy, and energy – are available at www.nmfirst.org.

ACTION PLAN #1

K-12 Teacher Preparation and Professional Development

During the summit, participants were organized into teams, and each team was assigned one STEM education goal and a number of strategies. The teams were asked to define action steps for their assigned strategies and outline the expertise and resources needed to implement the action steps.

STRATEGY ONE: Include engaging, problem-solving, inquiry-based math and science content and pedagogy in pre-service teacher preparation curricula.

SUGGESTED ACTIONS

1. Use the Common Core State Standards and Next Generation Science Standards to improve STEM Education PreK-20 education levels: support their implementation K-12, change regulations to align with standards, and integrate standards into pre-service teacher preparation.

2. Endorse the teacher technology competencies as outlined by the International Society for Technology in Education.

3. Coordinate PreK-12 pre-service teacher preparation curriculum across institutions of higher education and develop consistency on the topics that should be taught and how they should be modeled.

   Examples:
   - Agreement could be modeled on articulation and transfer agreements, but should be more specific.
   - Align teacher education with actual practices in the schools.

4. Develop a funding strategy to support pre-service teacher preparation and classroom technology investments.

   Suggestions/Options:
   - Focus on pre-existing, as well as new, funding streams (e.g., university research grants, industry, technology producers).
   - Amend the higher education funding formula to include incentives for STEM teacher preparation in addition to current incentives for STEM majors, and use the funds collected to invest funds for inquiry-based math and science classes for pre-service teachers.
   - Use the permanent fund to sustain inquiry-based classes.

5. Provide high-quality, problem-based learning materials for use in pre-service teacher preparation, and train instructors in how to use and adapt the materials.

   Suggestions:
   - Offer a series of workshops, discussion-based groups, observations, and hands-on experience that address a specific topic over time.
   - Partner with professional development providers, e.g., MC2, Los Alamos Math & Science Academy, EPSCoR, Supercomputing Challenge.
   - Use existing resources, e.g., YouTube, Massive Open Online Courses.
   - Create central repository for sharing instructional plans and tools.
   - Utilize mentors and convene a statewide STEM industry day.
   - Provide classroom book sets.

6. Allow more class time for STEM subjects and extend learning time outside the classroom for pre-service teachers by using blended learning (e.g., face-to-face practice, observation opportunities, and online courses).

   Example:

SUGGESTED ACTIONS

Develop a "Technology and Social Networks in the Classroom" course for teachers.

7. Prioritize internships and field experiences for first and second-year college students (and high school students) who want to be teachers.

   Obstacle:
   Students at UNM and other higher education institutions may need to be admitted to education programs earlier than junior year.

8. Design incentive programs for:
   - Higher education faculty to collaborate across institutions and departments on pre-service teacher preparation
   - Higher education first-year students to stay in STEM disciplines and become teachers (e.g., tuition reimbursement)
   - Clinical practice partnerships between Colleges of Education and school districts for pre-service teachers
   - Pre-service and practicing teachers to use inquiry-based instructional methods (tuition reimbursement)
   - Pre-service and practicing teachers to obtain STEM specialist licenses (e.g., tuition reimbursement)

9. Implement a centralized mechanism to share information that facilitates communication and collaboration at all levels of the state education system, including:
   - Resources and opportunities for pre-service teachers
   - Clearinghouse for posted job opportunities
   - Publicize existing STEM organizations and databases
   - Database of practicing teachers

10. Resurrect the NM PED Math & Science Advisory Council to observe best practices for pre-service teacher preparation and make policy recommendations at the state level.

11. Elicit student and teacher voices regarding education policy, academic concerns, and the types of lessons/projects they find most valuable.

    Example:
    Santa Fe Superintendent's Community Forum and technology-based communications

12. Analyze why attempts to implement this strategy have not succeeded in the past and change course.

STRATEGY TWO: Redesign entry-level math and science content competencies for student teachers at elementary, middle, and high school levels.

SUGGESTED ACTIONS

1. Use Common Core State Standards and Next Generation Science Standards as a framework for content competencies guided by research on teacher education, induction, and student learning.

   Suggestions:
   - Address common student and teacher misconceptions in math and science using existing research.
   - Use a "Funds of Knowledge" model rather than deficit model.
   - Incorporate best practices such as student communication skills, lectures supported by visuals, problem-based learning, and spatial learning skills.
   - Ensure that entry-level content competencies flow into expectations for pre-service teacher preparation.

2. Include National Educational Technology Standards as appropriate and integrate with professional development for Common Core State Standards.

3. Align content competencies for entry-level teachers to those for alternative licenses.

4. Make math and science standards higher for teachers.

5. Require STEM education courses be taught by relevant department and content experts.

   Example:
   Support team teaching by content experts and education experts (e.g., require engineering education to be taught in partnership with engineering experts).

6. Identify knowledge and practices for endorsement of K-5 math and science specialists.

7. Designate some K-5 teachers as math/science specialists and support them in schools.

8. Require cultural competency training that is sensitive to the learning styles of diverse student populations for new teachers (as well as seasoned teachers).

   Suggestion:
   Utilize prior assessments to identify gaps and address them.

9. Follow the process for changing education leader competencies:
   - Secure agreement from PED.
   - Formalize the process for rewriting the math and science competencies with PED.
   - Create a diverse, expert group to bridge needs at all institutions (i.e., school districts, PED, and HED).
   - Set deadlines for delivery of competencies.

STRATEGY THREE: Create and support school environments that enable new STEM teachers to thrive, feel supported, and remain in the profession for the long-term.

SUGGESTED ACTIONS

1. Investigate best practices and models globally and nationally that support new teachers (e.g., Professional Learning Communities).

2. Explore various support structures for new teachers, e.g., medical model induction support like rotation and residencies and spending time in other learning environments.

   Caution:
   Avoid unfunded mandates for universities to provide in-service experiences for students.

3. Revive appropriation for STEM Mentorship Program for new teachers to at least the FY 09 level of $2 million. Use funding to research best practices, support programs that use best practices, and utilize successful STEM teachers and instructional leaders as mentors.

   Suggestions:
   - Establish criteria for application.
   - Include standards for reporting.
   - Ensure consequences for failure to report progress.

4. Create a "STEM buddy system" (less formal than mentoring system), partnering new teachers with seasoned teachers within their own school system or members of the science community.

   Suggestion:
   Create an online repository and social network.

5. Establish a statewide support network specifically for new STEM teachers utilizing existing STEM organizations and an online forum.

   Suggestion:
   Find a balance between organization collaboration and merging organizations.

6. Provide ongoing, job-embedded professional development to ensure strong leadership at grade, department, and

school levels, and include evaluation of progress.

7. Provide professional development for administrators to broaden their awareness and understanding of project-based learning, and include in administrator education at the university level.

8. Invest in technology and lab environments, including teacher professional development, teacher tools (e.g., smart boards, digital resources, broadband), and student materials for inquiry and problem-based learning.

   Suggestions:
   - Use action research in deployment of materials.
   - Study how materials work and share with others.
   - Consider mini-grant model with required proposals, simple applications, reporting, and publicity.
   - Offer supports for districts that are less experienced/successful in grant-writing.
   - Create forum where teachers can make presentations on grant results.
   - Consider preferred funding as an incentive for years served as a STEM teacher.

9. Provide incentives for teachers who:
   - Meet professional development goals for K-8 STEM license endorsement after Level III (similar to how national board certification works).
   - Tutor students outside the classroom (similar to Capital High School, Saturday Morning Tutoring Program).

10. Provide teachers with opportunities to meet on a regular basis within their discipline and across disciplines to collaborate and share ideas/best practices.

    Suggestion:
    Could be done during scheduled professional development time, however more frequent meetings would be ideal (i.e., once a week or daily).

11. Build partnerships between industry and education.

    Suggestions:
    - Utilize content experts and scientists in classroom activities and collaborate to develop lesson plans that match standards.
    - Create opportunities for teachers to engage in industry research.

12. Replace standardized tests with more relevant evaluation methods that are helpful to schools, teachers, and students.

    Suggestions:
    - Use interactive learning assessments.
    - Advocate for formative assessments.
    - Develop performance assessments to evaluate teachers rather than evaluations based on student standardized tests.
    - Provide incentives and information on why tests are important to encourage test completion by students.

13. Develop less restrictive, more welcoming school environments that create cultures where learning is more important than compliance.

14. Re-professionalize teaching to foster respect, autonomy, and continual growth.

    Suggestions:
    - Develop a uniform definition of STEM.
    - Encourage teachers to view themselves as STEM professionals.
    - Support attendance of teachers at professional meetings.
    - Develop a STEM public relations campaign that promotes STEM teaching in collaboration with industry.

STRATEGY FOUR: Provide research-based STEM professional development that is useful for teachers and school administrators.

SUGGESTED ACTIONS

1. Adhere to best practices as guidelines for professional development.

   Suggestions:
   - Align STEM professional development with Common Core and Next Generation Science Standards.
   - Explore research on STEM professional development.
   - Define criteria for high-quality professional development.
   - Provide at least 49 hours of professional development on a topic to ensure significant behavioral change.
   - Ensure that professional development is job-related, data-driven, culturally competent, and ongoing.
   - Explore options other than during the school day for professional development to minimize the need for substitute teachers and impact on students (e.g., common preparation time, classroom coaching, multi-disciplinary team teaching, project-based learning, subsidized expenses for weekend courses).

2. Update statewide professional development standards to align with Learning Forward standards.

3. Coordinate regular opportunities for professional development providers to align programs to new standards and collaborate through existing teacher associations.

4. Require alignment with professional development standards on requests for proposals issued by all funders (i.e., PED, foundations, industry, etc.).

5. Create a statewide measurement system to evaluate all professional development programs and staff to ensure competitiveness for federal grants.

   Suggestions:
   - Use authentic assessments.
   - Create a sustainable infrastructure to store and update evaluation data.

6. Form and fund comprehensive partnerships to build capacity among all stakeholders—including universities, school districts, informal professional development providers, industry, community, parents, and students.

7. Revive appropriation for Math & Science Teacher Institutes to at least FY09 level of $2.5 million.

8. Ensure that continuous statewide professional development opportunities are available to all teachers, principals, and administrators.

   Suggestions:
   - Disseminate best practices information.
   - Fund participation in state and national conferences.

9. Ensure K-5 math & science specialists provide professional development at each school.

10. Provide opportunities for teachers to become researchers during the summer.

11. Develop a mechanism to allow constructive feedback on teacher effectiveness from students.

    Suggestions:
    - Provide narrative feedback.
    - Incorporate feedback into School Report Card.
    - Avoid university model of using a form.
    - Consider unintended consequences of student feedback on teachers.

K-12 STEM Classroom Experience

STRATEGY ONE: Encourage school polices that increase curriculum rigor.

SUGGESTED ACTIONS

1. Define statewide STEM policy.

   Comments:
   - Include science in K-5 curriculum.
   - Incorporate a seamless integration approach to STEM curricula in grades 6-12.

2. Adopt Next Generation Science Standards.

3. Establish a statewide K-12 STEM Best Practices Consortium.

   Suggestions:
   - Utilize existing state and local resources.
   - Compile best practice examples.
   - Update and distribute information on project-based competitions, tool kits, program data, etc.
   - Create a cadre of STEM facilitators.

4. Fund STEM learning communities and implement STEM best practices training and initiatives in each school.

STRATEGY TWO: Require Education Plans for School Success to include STEM as a goal area.

SUGGESTED ACTIONS

1. Provide statewide guidelines for STEM success and require Education Plans for School Success to include STEM as a goal area.

   Suggestions:
   - Identify a statewide STEM coordinator.
   - Form a group to define STEM success and create guidelines for district implementation.
   - Define STEM success in terms of K-12 curriculum, practices, instruction, and assessment.

2. Introduce preliminary Education Plans for School Success that integrates STEM as a goal area at the local level.

   Suggestions:
   - Identify local STEM coordinators.
   - Establish a core school/community team to create an engagement strategy for partners, and develop a program that incentivizes teacher involvement.
   - Implement community affiliated programs.

STRATEGY THREE: Leverage the Common Core State Standards (and potentially the Next Generation Science Standards) to provide common, high-quality curriculum materials to more students, including hands-on experiments and team research projects.

SUGGESTED ACTIONS

1. Secure the appropriate funding to implement the Common Core State Standards and problem-based learning.

2. Build teacher buy-in for implementation of the Common Core State Standards and problem-based learning.

   Suggestions:
   - Share data on impacts of Common Core State Standards and problem-based learning on student performance.
   - Incorporate teacher input in the implementation of Common Core State Standards and problem-based learning.
   - Create a staged process of teacher growth in the Common Core State Standards and problem-based learning.

3. Create a support system for school districts and educators to implement the Common Core State Standards and problem-based learning.

   Suggestion:
   Create and train a STEM coordinator position at each school or district to support this action. This person would coordinate between Common Core State Standards and problem-based learning organizations, provide ongoing training and support, implement best practices and evaluations, lead curriculum writing.

4. Provide administrative support at schools to implement Common Core State Standards and problem-based learning.

   Suggestions:
   - Provide evaluation training to school administrators on Common Core and problem-based learning.
   - Require school administrators to support Common Core State Standards and problem-based learning.

5. Provide training and information on problem-based learning methods.
   Suggestions:

   - Develop a short list and introduce schools to quality, problem-based learning training organizations (e.g., MC2, Intel Math, If Inc., higher education trainings, summer teacher trainings and internships).
   - Provide teacher training stipends.
   - Require students to enter state and local STEM competitions to reinforce problem-based learning.
   - Duplicate the same athletic completion climate for academic competitions.

6. Create and support a funding plan to provide common, high-quality, curriculum materials to more students, including hands-on experiments and team research projects.

STRATEGY FOUR: Provide solid professional development and materials for inquiry-based teaching techniques in order to develop students with the content knowledge, skills and dispositions for critical thinking, questioning, research and innovation.

SUGGESTED ACTIONS

1. Develop policy recommendations to support implementation of Common Core State Standards in math and Next Generation Science Standards in all school districts.

   Suggestions:
   - Fund a group to determine criteria for high quality professional development and materials (based in inquiry learning, high cognitive demand, Common Core math practices, etc.).
   - Create list of professional development providers that meet the criteria and are accessible to districts statewide.
   - Provide guidelines for school districts to design, align, and implement long-term professional development plans for teachers, principals, and administrators that support high quality STEM curriculum and instruction.
   - Provide guidelines (that consider budgets and community needs and resources) for school districts to align policy, professional development plans, and assessments.
   - Create a mechanism (e.g., virtual, face-to-face, regional representative, conferences) for school districts to access these guidelines and resources.

ACTION PLAN 3

STEM Students in College

STRATEGY ONE: Pursue multiple approaches to recruit high school students as well as college freshmen and sophomores to STEM majors. Include efforts that reach out to women and minorities.

SUGGESTED ACTIONS

1. Create an explicit STEM recruitment plan that is connected to workforce needs, job certainty, and instruction.

   Suggestions:
   - Reference diversity, technology, mentoring, teaching strategies, and interdisciplinary partnerships.
   - Utilize competitions, field trips, and fairs to develop interdisciplinary learning, applied technology, STEM career awareness, and student excitement.
   - Increase exposure to STEM career paths in rural communities.
   - Identify key community stakeholders to champion economic development involving STEM professions.
   - Attract technology organizations for application development and programming.

2. Bring in experts who reflect diversity as well as cultural and local relevance to inspire and inform prospective students about STEM careers.

   Suggestions:
   - Establish a mentorship and tutoring program that uses successful role models.
   - Engage under-represented minority college students as STEM Ambassadors to K-12 schools.
   - Create a statewide website listing internships for high school students in STEM areas.
   - Develop curriculum and credentials by involving both industry and academia.

3. Identify, publicize, and implement model partnerships that integrate STEM programs and other academic areas (i.e., interdisciplinary within STEM and/or Liberal Arts or History).

4. Increase use of technology (e.g., robotics, computers) in classrooms.

   Suggestions:
   - Use retired technical equipment from national laboratories in the classroom.
   - Establish smart classrooms.
   - Create internet lesson plans.
   - Use gaming applications.
   - Utilize virtual, blended, and distance learning opportunities.

5. Encourage the use of best practice learning methods that foster problem-solving and critical thinking.

   Suggestions:
   - Use project-based learning methods that allow students to work on real-world problems and see the results.
   - Teach to current events.
   - Infuse and publicize entrepreneurship into STEM curriculum.
   - Incorporate online, self-paced options, e.g., redesign introductory math courses to reduce lecture and increase online lessons and tutoring.
   - Inventory existing programs that are under-utilized (i.e. LANL tutoring programs), and increase access to STEM professionals.
   - Provide paid internship positions at local STEM employers as part of curriculum.
   - Increase ability for students to return to own communities to collaborate with STEM businesses.
   - Offer alternatives to 2-4 year programs, e.g., 1 year for entry level technician or apprentice.
   - Elicit more student input.

STRATEGY TWO: Address opportunities and challenges within the university system in order to increase the quality of undergraduate STEM teaching.

SUGGESTED ACTIONS

1. Endorse the University of Michigan research on how to "teach for retention" in science, engineering, and math. [1]

   Suggestions:
   - Create a welcoming and supportive learning environment with challenging (not trivial) but manageable (not overwhelming) work.
   - Clearly communicate grading policies and provide frequent feedback on student learning.
   - Encourage students to engage in the scientific method, creating opportunities for them to generate hypotheses and test them, interpret data, draw conclusions, and make predictions.
   - Bring real-world relevance into the classroom and highlight careers in STEM.

2. Value and provide incentives for excellence in teaching at the same level that publication and research are valued in tenure, promotion, and salary decisions.

   Suggestions:
   - Review national models, including two-year schools, for ideas.
   - Institute a variety of relevant feedback sources.
   - Consider undergraduate research involvement in faculty evaluation.

3. Decrease class sizes of introductory courses which may involve changes to funding formula.
4. Provide faculty training focused on making introductory STEM courses more participatory.
5. Connect student support systems like tutoring to instruction so that faculty and tutors communicate.
6. Publicize faculty already using best practices and disseminate their approach as a model (e.g., how two-year schools work with industry to include workplace relevance by using part-time, adjunct faculty practitioners).

STRATEGY THREE: Improve quality and coordination of STEM student support services, e.g., social and cultural support, special-interest learning communities, and academic mentoring.

SUGGESTED ACTIONS

1. Increase outreach to college students regarding STEM support services.

   Suggestions:
   - Establish a web portal for services available.
   - Modernize outreach methods (i.e., social media, email).
   - Review other successful techniques and follow best practices.
   - Improve career counseling and hire dedicated career counselors.
   - Provide professional development to administrators regarding service information and outreach infrastructure.
   - Find ways to streamline service requests/responses.

2. Improve auxiliary student services.

   Suggestions:
   - Invest in student transportation to access services.
   - Provide more options for accessing services (i.e., not only after school).
   - Create a Parent Academy to educate parents in computer literacy and importance of STEM.

3. Evaluate needs and build a technology infrastructure (e.g., internet and phone) throughout the state, especially in rural and tribal communities.

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[1] (Center for Research on Learning and Teaching 2009)

4. Strengthen communications between:
   - Professional programs within institutions
   - High schools and universities
   - STEM organizations and rural communities

Suggestions:
- Support the virtual community forum being built.
- Support STEM summer camps/courses.
- Eliminate institutional hurdles regarding dual credit and online courses.
- Utilize the Citizen Schools model to expand and fund STEM career exploration and entrepreneurship.
- Organize regional college fairs annually and utilize local role models.

STRATEGY FOUR: Increase opportunities for undergraduate research in STEM disciplines.

SUGGESTED ACTIONS

1. Provide opportunities to apply learning, with an emphasis on research, in a way consistent with the mission of the institution (e.g., for two-year colleges, this may look like internships and work applications; for four-year institutions, this may take the form of formal research).

   Comment:
   Make sure two-year institutions are not excluded from consideration for research opportunities.
2. Provide research opportunities within the first two years of undergraduate education.
3. Create partnership opportunities between two-year programs and non-government organizations, industry, and four-year institutions that have additional research capacity.
4. Provide multiple opportunities to engage in research activity (i.e., from short-term classroom projects to formal, long-term research) over the course of undergraduate education.
5. Require higher education institutions to offer a specific number of opportunities for undergraduate students to engage in internships and/or research as a condition for receiving tax incentives.

STRATEGY FIVE: Build relationships between industry, government, small businesses and higher education in order to create partnerships that will engage STEM college students directly, including internships, job training, and other tactics.

SUGGESTED ACTIONS

1. Create channels for potential partners to communicate with one another.
2. Provide access to STEM workplaces and STEM professionals for the students to see what happens (e.g., job shadowing).
3. Create paid and unpaid internship positions at local STEM employers as part of curriculum.
4. Establish and increase training on technical equipment in classrooms (e.g., Caterpillar and Santa Fe Community College partner for testing of new equipment).
5. Integrate real world business problems into applied learning to incentivize industry to provide input and support programs (e.g., ASK Academy students become consultants for business problems).
6. Build public awareness regarding the value of STEM experiences for students, families, and community economic development.

   Suggestions:
   - Explain value of STEM in a culturally relevant way.
   - Compare number of available STEM-related jobs in New Mexico with the number of STEM graduates.
   - Give school credit for internships, mentorships, and job shadowing.

Funding and Industry Involvement

The teams also outlined ways the action plans could be funded and how industry could be involved. The following is a consolidation of their ideas for consideration by the Collective Impact Team.

Funding Options

One of the cross-cutting obstacles to making progress in all three education goals is sustainable funding. Each team recommended pursuing both private and public funding sources. In addition to new funding, summit participants also recommended that government agencies and educational institutions utilize existing funding more effectively and realign local budgets to support STEM programs. The need to evaluate program effectiveness and efficiency in order to demonstrate the benefits of focusing on STEM education to any potential funders was also stressed. One team recommended realigning funding by forming regional funding hubs in order to control duplication of costs. A range of funding options was identified for the Collective Impact Team to explore:

- Forming public/private investment partnerships
- Applying for grants from federal agencies
- Pursuing state funds including gaming and tobacco revenue and the permanent fund
- Amending the higher education funding formula
- Coordinating with higher education institutions that can provide problem-based learning materials, technology, and software to K-12 schools
- Pursuing private foundation funding from STEM industries
- Applying for grants from national, regional, and local nonprofit foundations that support STEM education
- Establishing a statewide technical grants program

Industry Involvement

Each team saw the importance of industry partnerships in making progress on STEM education goals. Summit participants offered the following suggestions as ways industry can engage with educators and students.

Build Strong Industry/Education Partnerships

One team suggested that narrowing the universe of STEM organizations would create a more effective partnership culture. A lead organization could be a central coordination point to help regional businesses, whether large or small, connect with K-12 schools more easily. This could also facilitate connections between industry and higher education institutions. These regional collaborations could allow industries to more clearly define workforce needs and institutions to recruit students for those needs and develop more targeted programs that are industry relevant. This could also facilitate building on existing programs and making them more accessible.

Sponsor Industry-Driven Programs

The teams acknowledged that companies already offer a range of valued programs in some areas of the state. Building on the following types of programs and making them more accessible would be helpful:

- Engage company employees, such as engineers, scientists, and researchers, as mentors for teachers and students
- Submit real-life projects that students can work on, for example, find ways students and schools can be engaged in product design and testing
- Offer programs for qualified students to work a day a week to get first hand experience in STEM fields
- Open doors for summer jobs in STEM fields
- Find ways for small businesses to engage with students
- Work with STEM nonprofits to organize competitions
- Give STEM-related tours and career presentations at industry facilities

Industry Funding Opportunities

The teams also identified the types of industry funding that can be most helpful.
- Provide student scholarships and internships.
- Reimburse expenses for summer camps or competitions.
- Support teacher board certification, summer fellowships, etc.
- Fund industry staff members to up-skill and mentor educators.
- Sponsor career fairs at universities and high schools.
- Donate used, but workable, technology, equipment, and software that are aligned with school curriculum.

Other Ideas

The summit teams also had the opportunity to recommend other important strategies for consideration by the Collective Impact Team. Additional strategies include:
- Include school counselors and private schools in STEM networks.
- Establish a statewide residential STEM school for grades 10-12.
- Encourage higher education institutions to support teaching in an "information-rich environments and assign the best teachers for undergraduate programs.
- Increase the number of educators who could qualify for STEM coordinator positions.
- Offer higher salaries for STEM teachers.
- Reduce tuition fees for STEM programs.
- Train teachers to apply for funding and other resources.
- Create a "Students for STEM Education" group.
- Create a "Parent Academy" to build a mentorship culture in businesses and communities.

Summit Leadership Team

Heather Balas Plenary Chair	Ed Moreno Recorder
Sharon Berman Recorder	Kathleen Oweegon Discussion Leader
Philip Crump Discussion Leader	Charlotte Pollard Master Recorder
Jessie Lawrence Recorder	Erin Sanborn Discussion Leader
Gina Maes Event Coordinator	Melanie Sanchez Eastwood Assistant Master Recorder

Summit Speakers

Welcome Speakers
- Ben Ray Lujan, U.S. Representative, United States Congress
- Dr. José Garcia, Cabinet Secretary, New Mexico Higher Education Department
- Kurt Steinhaus, Director of Community Programs, Los Alamos National Laboratory
- Kristin Umland, Co-chair, New Mexico Partnership for Math and Science Education
- Amy Tapia, Manager of Community Involvement, Sandia National Laboratories

Roundtable Discussion Participants
- Dr. Richard Howell, Dean, University of New Mexico College of Education
- Deb Novak, Chief of Education, Natural History Museum
- Dr. Daniel López, President, New Mexico Institute of Mining and Technology
- Jami Grindatto, Director of Enterprise Talent, Intel

Collective Impact Team Preview
- Hanna Skandera, Cabinet Secretary designate, New Mexico Public Education Department and Collective Impact Team Co-chair
- Cynthia Nava, Senator, New Mexico Legislature and Collective Impact Team Co-chair

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