

## **Characteristics and Effects of a Statewide STEM Program**

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### **ABSTRACT**

A comprehensive statewide STEM (science, technology, engineering, mathematics) reform initiative enters its fifth year in the U.S. state of Iowa. A significant proportion of the state's pre K-12 students and teachers participate in one or more of the twenty programs offered, ranging from classroom curricular innovations to teacher professional development, and from community STEM festivals to career exploration events. An external, inter-university evaluation consortium measures annual progress of the initiative through the Iowa STEM Monitoring Project. Results show citizens to be increasingly aware of and supporting of STEM education; students to be increasingly interested in STEM as well as outperforming nonparticipating peers on state math and science tests; and teachers more confident and knowledgeable in teaching STEM. Iowa's STEM initiative has garnered national acclaim though challenges remain with regard to expanding the participation of learners of diversity, as well as ensuring the long-term sustainability of the programs and structures that define Iowa's statewide STEM initiative.

### **STEM Beginnings in Iowa**

At a roadside motel conference room at the geographic center of Iowa on a sunny spring weekday in 2010, a model for implementing statewide STEM programs was conceived. Over the course of the next eleven months, a core group of thought leaders representing K-12 education, industry, government, higher education, nonprofits and more composed a clarion call to rally citizens and policymakers to act. They produced a strategic plan – The Iowa STEM Education Roadmap (<http://www.csqmidwest.org/MLC/documents/STEMEducationRoadmap2011.pdf>). The Roadmap advised that “STEM fluency is no longer just a worthy ‘initiative.’ It is an imperative to stave off the risk of becoming an irrelevant state of a slipping nation.” Seven recommendations were proposed ranging from new partnerships to strengthened collaborations toward realizing the group's vision: “All Iowa learners, from Pre-K through adult, will acquire knowledge and skills in STEM-related subjects which will provide benefits to all community members for effective citizenry and

employability.” The document was bolstered by letters of support from agencies and organizations across the state, and then presented to the Governor in early 2011. By summer, the Governor’s STEM Advisory Council was established by executive order to be led by the Lieutenant Governor, with an overarching goal “...to dramatically raise student achievement in STEM, better prepare math and science teachers, and map STEM education to economic development...” (Governor’s press release, July, 2011). Over the course of the last four years, the programs, processes, and products of Iowa’s statewide STEM initiative have evolved to be detailed here.

## The STEM Imperative

The national call for STEM began in earnest in 2010, when The President’s Council of Advisors on Science and Technology advised that, “As the world becomes increasingly technological... STEM education will determine whether the United States will remain a leader among nations and whether we will be able to solve immense challenges in such areas as energy, health, environmental protection, and national security” (PCAST, 2010). Since that time, a number of US states have launched STEM efforts around similar goals. The Education Commission of States keeps a database of such programs at <http://ecs.force.com/mbdata/mbstemmap>. In addition, STEMconnector® tracks state initiatives at <http://www.stemconnector.org/state>. The logic shared across state STEM undertakings is captured by the National Conference of State Legislatures—“Education in science, technology, engineering and math (STEM) has received increased attention in recent years due to fears that a failure to produce enough students with high-quality STEM skills will hamper America’s ability to compete in an increasingly global economy.” In Iowa, specific challenges around preK-12 enrollment and performance in STEM courses, post-secondary STEM enrollment, diversity of the STEM talent pipeline, STEM teacher recruitment and retention, and school-business partnerships are targeted.

## Iowa STEM Organization

A forty-seven member Governor-appointed Council sets the agenda for STEM in Iowa. Membership consists of leaders in academia, industry, nonprofits, and government. The Council is co-chaired by Iowa’s Lt. Governor and the president of a global manufacturing company based in the state. The current roster is listed at <http://www.iowastem.gov/council>.

Two early decisions on the part of the Council profoundly shaped all STEM activities to follow. At their first convening in 2011, the Council determined that in order to achieve a goal of STEM for all Iowans, a network has to be built to penetrate all corners of the state. Six institutions now partner as Hubs for the statewide STEM network of the Governor’s STEM Advisory Council, depicted as Figure 1. Each houses a regional STEM manager guided by a Governor-appointed Regional Advisory Board.

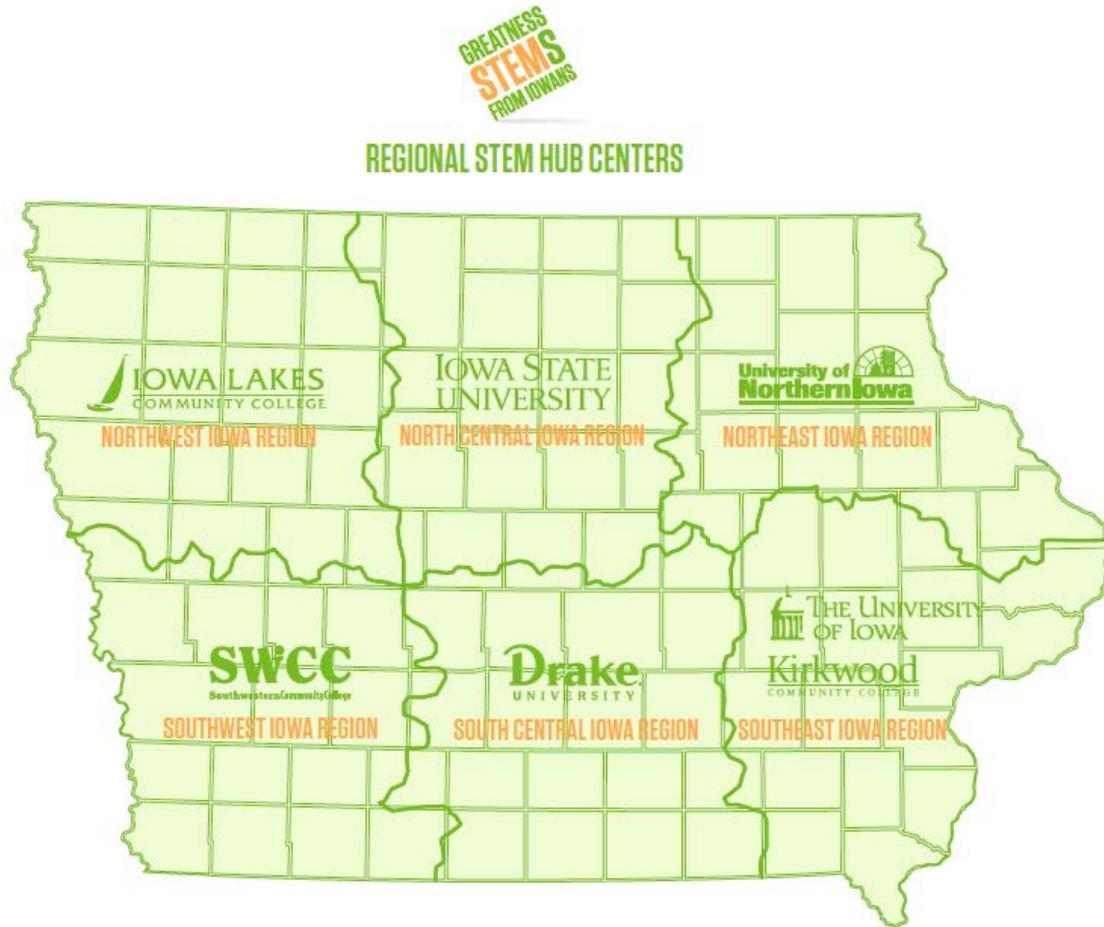


Figure 1. Iowa's statewide STEM network.

At the same meeting, Council members reached consensus on scaling of proven STEM programs across the state, an undertaking to become known as Scale-Up, that in 2015 delivered fourteen vetted programs to over 100,000 youth and 3,000 educators (see video: [https://www.youtube.com/watch?v=zflRjnnq\\_g](https://www.youtube.com/watch?v=zflRjnnq_g)). Finally, a third decision made at the first STEM Council meeting in 2011 was the unanimous answer "Yes!" to the question, "Should we focus on preK-12 curriculum, or teacher preparation, or specialty schools, or under-represented groups, or business partnerships, or public messaging, or community engagement, or one or another aspect of STEM such as technology or engineering?" This all-inclusive answer has distinguished Iowa STEM moving forward ever since. The Council saw STEM reform as a systemic, not piecemeal challenge. Addressing teacher preparation, for example, in a vacuum of the broader school/community milieu would disjoin and ill-serve practitioners. Thus, a comprehensive array of simultaneous solutions has been instituted and evaluated over four years, possible only through strong collaborations depicted as Figure 2.

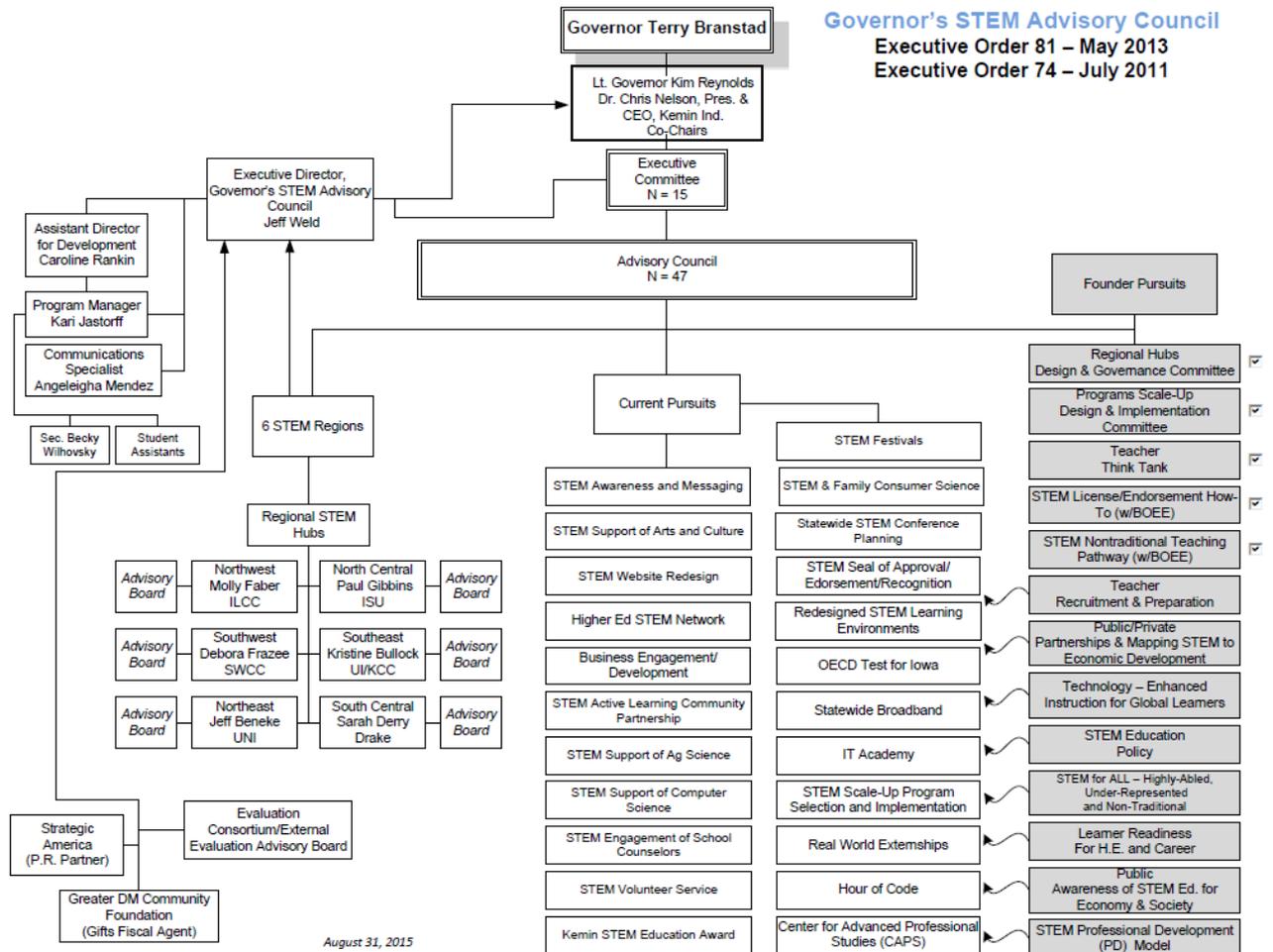


Figure 2. Organizational Structure of the Governor's STEM Advisory Council.

## Iowa STEM Programs

The STEM Council's mission is to increase student interest and achievement in STEM toward fostering STEM economic development. Every taskforce, committee and working group is guided by that mission, manifesting in programs of promise to realize the goal. Here are those programs.

- STEM Scale-Up Program.** Approximately 60 percent of the annual state appropriation (\$3.1M) is devoted to identifying exemplary preK-12 STEM programs via a competitive proposal process and delivering those programs to educator-applicants and their learners throughout the state. All but ten of Iowa's 338 school districts have at least one Scale-Up STEM program. A list of current programs may be found at <http://www.iowastem.gov/Scale-Up/2015-2016-scale-up-programs>. They range from building robots and wind turbines to virtual reality and STEM career awareness, demonstrating an appeal to diverse youth, success in improving academic performance, evidence of integrating STEM concepts, development of school-business-community partnerships and sustainability beyond the STEM Council financial support.
- STEM Festivals.** Each of the six STEM regions conducts several community STEM festivals per year, typically as a conference or event. The regional STEM manager

engages (or assigns to a planner or planning committee) a broad range of partners throughout the region in organizing, presenting, and participating in the event. STEM festivals are free, hands-on educational experiences for Pre-K-12 youth and their families. Activities may include stage events, exhibits, as well as sessions to boost students' interest in STEM. A window into a community STEM festival may be viewed here: <https://www.youtube.com/watch?v=yA0wIPxCtYo>

- **STEM Educator Award.** The Governor's STEM Advisory Council and Kemin Industries teamed up to honor K-12 teachers in Iowa who teach a science, technology, engineering, and/or mathematics subject and who are inspiring Iowa's students to develop a passion for STEM subjects. The STEM Educator Award is dedicated to honoring one teacher from each of the six Iowa STEM Regions for their contribution and dedication to STEM in Iowa. Each recipient receives a \$1,500 award and \$1,500 to be used in their classroom. Details about the award program may be accessed at <http://www.iowastem.gov/teacheraward>.
- **Microsoft IT Academy.** The Microsoft IT Academy program is a competitively awarded software and systems certification program that bridges the world of education with the world of work. The program is designed to help drive employability, digital literacy, technical and STEM-focused training and certification, and 21st-century workforce development for students. Iowa's STEM Council and Microsoft IT Academy have partnered to provide 150 Iowa high schools and community colleges with the programming. More information about the program may be accessed at <http://www.iowastem.gov/mita>.
- **Code Iowa.** Another support for information technology education, the STEM Council partnered with Code.org in its second international celebration of computer science week "Hour of Code." This partnership, referred to as "Code Iowa," localized Code.org's effort to introduce 100 million students around the world to at least one hour of computer coding. In Iowa, nearly 400 schools registered to be Certified Code Iowa Partners and more than 10,000 students take part in the "Hour of Code." Through a grant from Google, Iowa's STEM Council awarded prizes to high participation schools and supported professional development workshops for teachers across the state to incorporate coding and app. design into their elementary school classes. More information is available at <http://www.iowastem.gov/codeiowa>.
- **STEM Teaching Endorsement.** A committee of the STEM Council worked with Iowa's Board of Educational Examiners to debut a new STEM endorsement for K-12 teachers. Leaders are now working with Iowa's colleges and universities to build the course pathway toward this endorsement. Presently five institutions offer the endorsement with 30 teacher preparatory programs in the state.
- **STEM-Focused Classrooms.** The STEM Council's priorities include establishing STEM-focused schools and classrooms. The STEM Council designated a matched portion of the state funding to competitively award Redesigned STEM Learning Environment grants. The hallmarks of the winners included (a) the design of a 21<sup>st</sup> century learning space, (b) the preparation of educators capable of conducting student-centered, active, problem-solving instruction, and (c) purposeful connections to local business partners. A video vignette of one of the STEM classrooms may be viewed here: <https://www.youtube.com/watch?v=Flv7vi5Ge3g>
- **STEM BEST (Businesses Engaging Students and Teachers).** To drive business-school partnerships, the STEM Council competitively awarded five BEST grants that immerse students in professional career environments without the need for new buildings or classrooms. Funding supports professional development that equips

teams of educators and business partners to provide learning experiences driven by business and industry needs, a rigorous, relevant and dynamic STEM curriculum, and authentic partnerships. Information about BEST:

<http://www.iowastem.gov/STEMBEST>

- **Real World Externships for Teachers of Mathematics, Science, and Technology.** For secondary teachers of mathematics, science, engineering and technology, a summer work experience helps answer the age-old question from students: “When will I ever use this?” During the summer, educators work side-by-side with knowledgeable and skilled industry employees who help bring the classroom curriculum to life. Externships provide experiences in agencies and industries by which teachers can better prepare students for careers they may have in the future, and improve the overall educational experiences. A video window into the world of an extern is viewable here:  
<https://www.youtube.com/watch?v=KFuZU7oQMHA>
- **STEM Messaging Campaign.** Through competitive bidding, a cost-sharing public relations partner was identified to help with branding and messaging through web platforms, social media, cable and network television, billboards, events, fairs, news stories and more. Surveys of a random sample of adult Iowans revealed that the percentage aware of STEM and its importance grew from 26% in fall of 2013 to 41% by 2015, equating to an estimated 963,078 Iowans who had read, seen, or heard about STEM (Heiden et al, 2015) . A public service “info-mercial” for Iowa STEM may be viewed at <https://www.youtube.com/user/iastem>.
- **Business Engagement Toolkit.** Guidelines list programs that engage business and education through the STEM Council. Iowa businesses are invited to invest in a variety of ways, whether in the form of time, talents, or in some instances, treasures. Positive change in the quality of our workforce comes from STEM education. Partnerships with businesses, nonprofit organizations, and industries are very important to a dynamic STEM education. The toolkit may be viewed at [http://www.iowastem.gov/sites/default/files/Business%20Engagement%20Toolkit\\_FINAL\\_0.pdf](http://www.iowastem.gov/sites/default/files/Business%20Engagement%20Toolkit_FINAL_0.pdf)
- **Major STEM Events.** The STEM Council hosts several major events throughout the year. These include the Midwest STEM Forum, STEM Day at the Iowa State Fair (August), STEM Day at the Capitol (February) and the annual Iowa STEM Summit (March). A video of the 2014 State Fair STEM exhibit may be viewed at <https://www.youtube.com/watch?v=f1UwkcaB2X8>.

The Iowa Governor’s STEM Advisory Council incubates programming ideas and policy innovations through an array of active working groups. As of Fall, 2015, those groups and their charges were:

- a. **Computer Science.** Generate recommendations for the STEM Council to engage more Iowa youth in computer science, including programming, coding, and app development.
- b. **STEM Volunteer Service.** Identify opportunities to support and expand STEM in Iowa through volunteering and service.
- c. **STEM Support of Arts and Culture.** Identify ways and means for STEM Council to support and interface with arts and culture across Iowa and provide a set of recommendations for the STEM Council to partner, support and integrate with art and culture assets and professionals.

- d. STEM Engagement of School Counselors.** Identify ways and means for STEM Council to support school counselors across Iowa toward post-secondary and career coaching in the STEM spectrum of majors and jobs and improve STEM education.
- e. STEM Support of Agriculture Science.** Identify ways and means for STEM Council to support agricultural science, including how it might satisfy graduation requirement as core science credit.
- f. STEM Seal of Approval.** Develop guidelines and complete the establishment of a protocol for the Seal of Approval for non-STEM Council programs, assets, initiatives to be identified as aligned with and supporting of STEM Council objectives on a quarterly basis.
- g. STEM Active Learning Community.** Identify and make recommendations for ways in which the STEM Council can support out-of-school STEM education.
- h. Community College STEM Network and Four-year College/University STEM Network.** Presidents of every Iowa higher education institution were asked by the Council to identify a "STEM Champion." Monthly, the STEM Council's executive director convenes those champions for sharing best practices and for collaborative partnerships, notably development of the STEM teaching endorsement.

## **Effects of Iowa STEM**

One of the keys to success of Iowa's statewide STEM initiative has been an annual evaluation. Formally known as the Iowa STEM Monitoring Project (ISMP), the evaluation is a multi-faceted and a collaborative effort among three independent evaluation and research centers, one each from the state's three Regent institutions. The purpose of the ISMP is to systematically observe a series of defined metrics and sources to examine changes regarding STEM education and economic development in Iowa centered on the activities of the Iowa Governor's STEM Advisory Council. The ISMP is comprised of four components: 1) eighteen Iowa STEM Indicators; 2) the Statewide Survey of Public Attitudes Toward STEM; 3) a Statewide Student Interest Inventory; and 4) STEM Scale-Up program monitoring. Taken together, the evaluation utilizes data from multiple sources, including publicly available data on indicators of education and economic development and direct surveys of residents, educators, and students in Iowa.

### *Iowa STEM Indicators*

The Iowa STEM Indicators track publicly available data at the national and state level. The purpose of the indicators is to provide annual benchmarks on a variety of STEM topics in education and economic development by systematically assessing the progress and condition of the state's STEM landscape. Iowa's STEM indicators include eighteen metrics across four primary areas of focus: 1) STEM achievement and interest among K-12 students, 2) STEM preparation of K-12 students, 3) STEM college completions, and 4) STEM employment (See Heiden et al, 2015). Data used to track Iowa's STEM indicators are publicly available and come from sources such as state departments of education and workforce development, state and national databases of student achievement, and national databases of postsecondary education data.

### *Statewide Survey of Public Attitudes Toward STEM*

The second component of the evaluation is an annual statewide public survey of adults on their awareness of and attitudes toward STEM. Survey topics include STEM awareness, attitudes toward STEM and the role of STEM in the state, perceptions and attitudes about STEM education and strategies to improve it. The survey utilizes a dual-frame random digit dial sample design that includes both landline and cell phones. In addition, a targeted (landline list-assisted) oversample of three groups is included of parents of school-aged children, African-American adults and Hispanic adults. Respondents are Iowans who are at least 18 years of age or older at the time of the interview. The survey has been conducted in 2012, 2013, and 2014 during the summer months from approximately June through August, and average 25-30 minutes in length. Interviews are conducted in both English and Spanish.

In 2014, a total of 1,916 interviews were completed. The data are weighted in order to obtain point estimates that are representative of all adult Iowans (gender, age, race/ethnicity, education, place of residence, and telephone status). The post-stratification weights were computed with SAS (see [www.sas.com](http://www.sas.com)) statistical software. Descriptive statistics, including frequencies and distributions were calculated for the total sample and for population subgroups including gender, education, parent status, and place of residence for select questions in the survey. Margin of sampling error taking into account the design effect is +3.2% for the overall sample and as high as +12.2% for the analyses using the smallest subgroups (Race subgroup: All other, including oversampling). IBM SPSS Statistics (V22.0) was used for initial data management and descriptive analysis, and SUDAAN software (see [www.rti.org/sudaan](http://www.rti.org/sudaan)) was used to estimate population estimates of attitudes toward STEM. Analyses conducted in SUDAAN have been adjusted for the design effect due to differential probabilities of selection, clustering and weighting.

### *Statewide Student Interest Inventory*

The third component of the evaluation is analysis of an 8-item interest inventory that is administered in conjunction with the Iowa Assessments, standardized tests taken annually by nearly every student in grades third through eleventh in the state of Iowa. Developed and implemented in the first year of the Governor's STEM Advisory Council, the interest inventory serves as a data source for both the Iowa STEM Indicators (See Component 1), and a way to compare students who participate in Scale-Up Programs with all students statewide. Two versions of the inventory were created with variations in question wording and response options to accommodate different grade levels. The eight items ask how interested the student is in seven individual subject areas and in having a job that uses STEM skills. Response options include "I like it a lot," "It's okay," or "I don't like it very much" for students in grades third through fifth. For students in grades sixth through twelfth, response options are "Very interested," "Somewhat interested," or "Not very interested."

### *STEM Scale-Up Program Monitoring*

The fourth component of the evaluation assesses the effects of Scale-Up programs awarded annually by the Governor's STEM Advisory Council for implementation in both school and out-of-school settings. As part of the Iowa STEM Monitoring Project, three submissions are expected from all schools or organization implementing a Scale-Up Program: 1) an educator survey, 2) a student participant list, and 3) student surveys.

The educator survey is an online report that is submitted by a teacher or leader from a school or organization who implemented a Scale-Up program. The purpose of the educator survey is to gather information about Scale-Up Program implementation and outcomes. All educators implementing a Scale-Up program are asked to complete an online questionnaire via a web link. Second, the student participant list collects information about students who participate in a Scale-Up that can be matched to their records within the statewide dataset of students who have taken the Iowa Assessments. To protect the confidentiality of Scale-Up student participation, the list is submitted using a password-protected, secure web-based interface directly from the school or organization to Iowa Testing Programs, the group who administers the Iowa Assessments and already receives student information when students take the standardized test. Finally, a post-program, seven-item student questionnaire was created for completion by all students who participate in a Scale-Up program. Students are asked to report their age, gender, and any change in interest in individual STEM subjects and in pursuing a STEM career after participating in the program. Interest is measured on a 3-point scale using response options reflecting "more interested," "just as interested," or "less interested"

## **Results**

Select findings from statewide survey, interest inventory, and program evaluation are reported here.

*Statewide survey of attitudes toward STEM.* In 2014, 41% of Iowans had heard of the acronym STEM. In contrast, only 26% of Iowans had heard of the acronym in 2012. This represents a 58% increase in awareness of the acronym STEM from the beginning of Year 1 to Year 3, but no measureable change from Year 2 to Year 3.

The 2014 survey found that over half of Iowans rate the quality of science, technology, and math education in their community as 'Excellent' or 'Good.' Most Iowans agree (61%) or strongly agree (34%) that math and science courses teach important critical thinking skills. Among Iowans, the two most commonly cited barriers to STEM education were not enough access to or availability of resources for STEM, and personally held perceptions that suggest "STEM is not for me."

Among parents, most indicate their child is doing 'very well' (approximately 50%) or 'ok' (almost another 30%) in science, technology, or math; but fewer parents say this about "designing, creating, and building machines and devices, also called engineering." When asked how well their child is doing across individual STEM subjects, more parents of an elementary-aged child respond "does not apply" compared to parents of a middle- or high school aged child. It is unclear whether parents perceive their child is not receiving education in STEM topic areas, or are unaware of STEM-related learning that may be happening.

*Student Interest Inventory.* For 2014-2015, among the 346,914 students in Iowa who took the Iowa Assessments, 215,134 also completed the interest inventory (62% match rate). Among all students statewide who completed an interest inventory, interest in individual STEM topics or in pursuing STEM careers started high in 2012-2013 (Year 1), and has remained high in 2013-2014 and 2014-2015 (Year 2 and Year 3 of Scale-Up programming, respectively) (Figure 3). Approximately 75% of all students indicated they were very interested or somewhat interested in an individual STEM topic or in pursuing a STEM career in Year 1, Year 2, and Year 3. By grade group, interest in the four STEM subjects and STEM careers was highest among elementary students followed by middle school and high school students. While interest in all subjects decreases as students' progress through school, the proportion of students who are "very interested" in pursuing a STEM career remains close

across grade groups, from 44% among grades 3rd through 5th, 43% among grades 6th through eighth, and 38% among grades 9th through 12<sup>th</sup>.

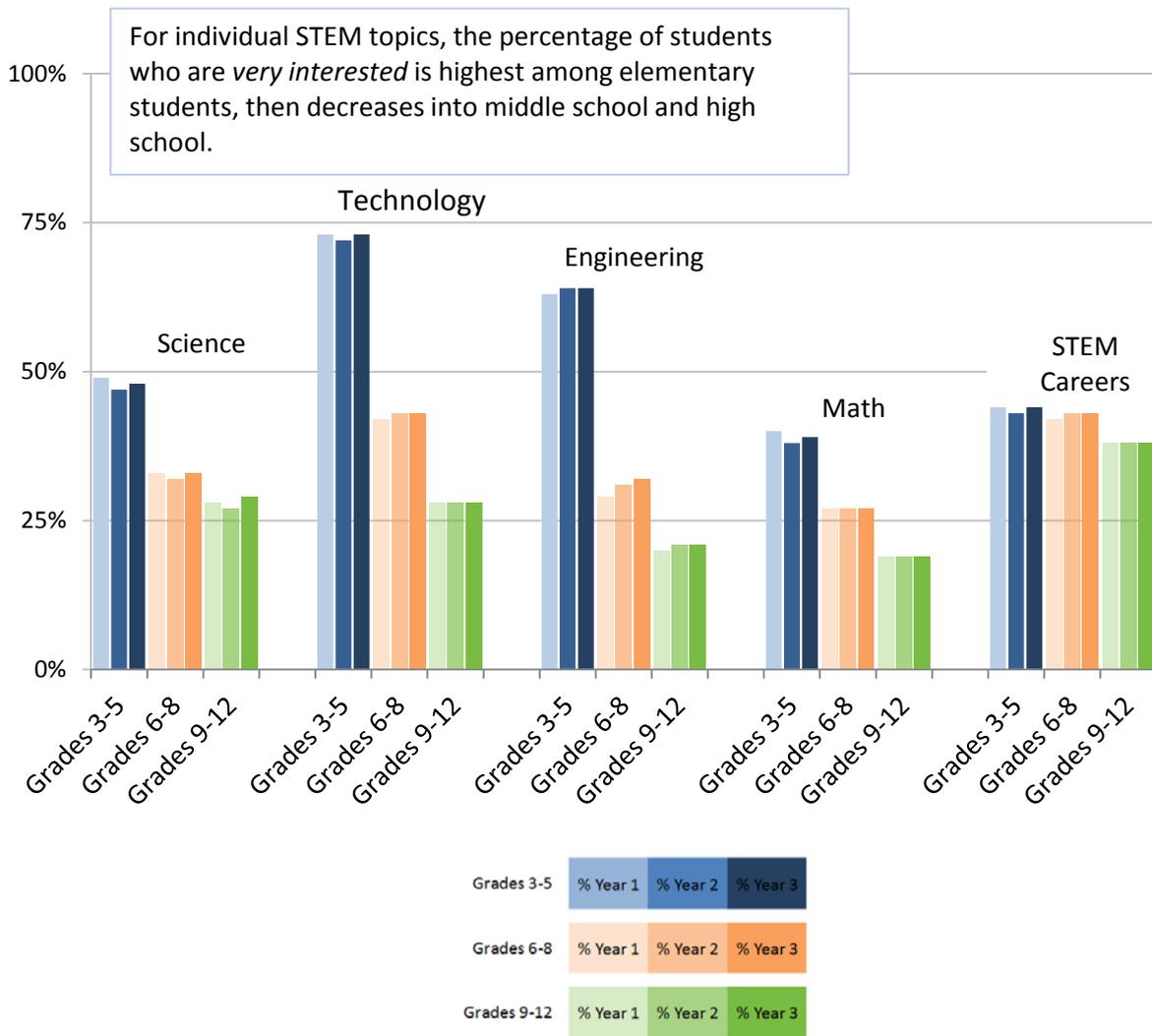


Figure 3. Proportion of students statewide who said they were *very interested* in STEM topics and STEM careers by grade group, Year 1 to Year 3.

*STEM Scale-Up program monitoring.* In 2014-2015, a total of 821 educator surveys were completed and returned, representing 228 Iowa school districts and 40 organizations such as 4-H and extension and outreach, community centers and libraries, United Way, and community colleges. Two-thirds of the respondents (68%) reported implementing their Scale-Up programs as intended. About one-fourth (26%) implemented the program with minor changes, and 5% implemented it with major changes. Educators described adjusting lessons to fit grade level (including vocabulary), adjusting or eliminating lessons due to time constraints, offering the program outside of the classroom in after-school or summer programs, and utilizing different materials than those provided in the kits. Educators were asked to report gains in their skills and confidence in teaching STEM-related content. The majority of educators agreed or strongly agreed that they now have more confidence to teach STEM content (81%), have increased their knowledge of STEM topics (86%), are better prepared to answer students' STEM-related questions (79%), and have learned

effective methods for teaching in STEM-content areas (76%). In open-ended questions, educators described utilizing existing or establishing new school-business partnerships which provided guest speakers from STEM fields, industry-based volunteers who served as mentors, or facilitated on-site field trips for students.

Of the 23,779 participants listed on student participant lists, 15,905 were matched to Iowa Assessments records (67% match rate). The proportion of Scale-Up participants expressing interest in STEM subjects and careers was compared to the proportion of students statewide that expressed interest. A higher percentage of students who participate in STEM Scale-Up programs said I like it a lot (Grades 3-5) or were very interested (Grades 6-12) in STEM subjects and in pursuing a STEM career compared to all students statewide (Figure 4). In addition, in 2014-2015, students across all grade groups who participated in STEM Scale-Up programs had higher average National Percentile Rank of math and science scores on the Iowa Assessments compared to all students statewide (Figure 5).

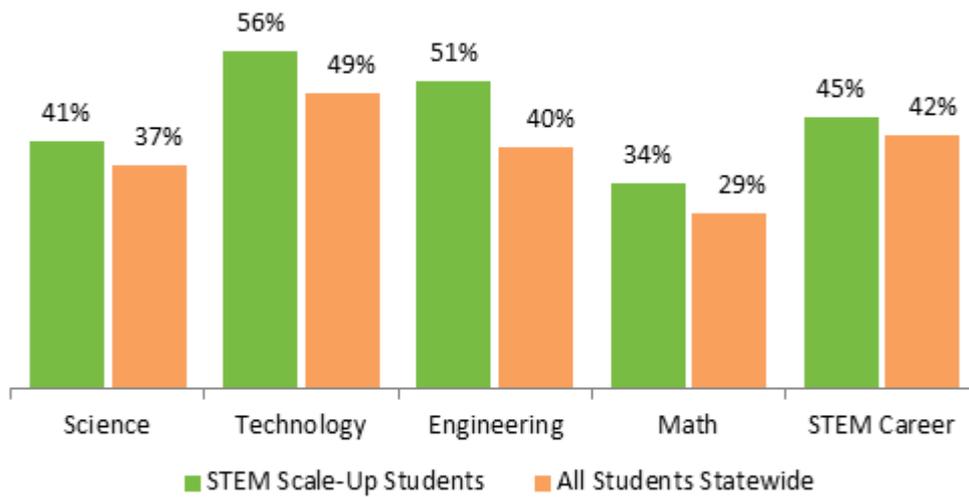


Figure 4. STEM interest among Scale-Up students versus students statewide, 2014-2015.

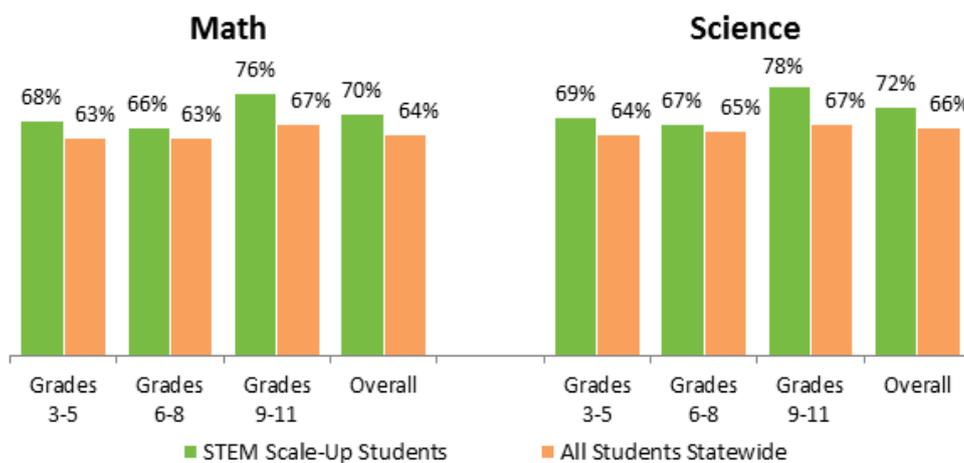


Figure 5. National percentile rank of math and science achievement on the Iowa Assessments, statewide versus Scale-Up student comparison.

Finally, data from 15,794 student questionnaires collected in 2014-2015 indicate Scale-Up programs had positive effects on student interest and awareness in STEM topics and STEM careers. Among students who participated in a Scale-Up program, 9 out of 10 participants reported higher interest in at least one STEM subject or in a STEM career following Scale-Up program participation.

### *Other Effects of Iowa STEM*

In addition to the Iowa STEM Monitoring Project, evaluation of other programs and activities are also conducted. The Real World Externship program (NSF #DRL-1031 784) produces teachers more capable of relating content to applications in the workplace as well as more adept at career advising. Business hosts attest to significant workplace contributions by the externs. And students of externs express more interest in math, science and STEM careers (Pollock & Losch, 2015). Students in one of the Redesigned Learning Environment schools had a class average 37 percent higher than peers in the same course offered in traditional learning environments according to self-reported data. Statewide STEM Festivals drew nearly 15,000 participants in the last year, with the largest, STEM at State Fair, producing 79 percent more interest among families as a result of attending, according to surveys conducted by planners.

### **Iowa's STEM Horizon**

Embarking on its fifth year, the Iowa Governor's STEM Advisory Council has achieved a number of milestones and garnered external attention for promising practices. For example,

- Iowa's evaluation consortium was awarded the first of its kind National Science Foundation Mathematics-Science Partnership Research, Evaluation and Technical Assistance (MSP-RETA) grant to study the state's STEM initiative and to disseminate findings to other states.
- The successful Scale-Up initiative has led to an invited partnership with the national organization Change The Equation (<http://changetheequation.org/press/change-equation-and-iowa-partner-scale-stem-programs-state>).
- Iowa STEM has been profiled in a number of national publications. For example, <http://www.stemedcoalition.org/2014/06/05/featured-stem-interview-iowa-It-gov-kim-reynold-2/>
- Invited speaking engagements, for example, Minnesota STEM conference keynote: <https://www.regonline.com/builder/site/Default.aspx?EventID=1085403>
- Invited publications sharing Iowa STEM, for example chapter 19 of the NSTA Press monograph, *Exemplary STEM Programs: Designs for Success* ([https://www.nsta.org/store/product\\_detail.aspx?id=10.2505/9781941316030](https://www.nsta.org/store/product_detail.aspx?id=10.2505/9781941316030))
- Numerous consults on the part of Iowa STEM leaders have guided and informed emerging STEM initiatives of over a dozen US states, for example, pp.6-7 at <http://www.governor.wv.gov/Documents/STEM%20report-FINAL%20for%20web.pdf>

National attention is a credit to the hundreds of collaborators and thousands of educators making dreams realities for Iowa youth. Yet, much work remains to be done to build on the foundation of systems, programs, and policies in place since 2011.

Looking toward the future, the Iowa STEM picture is supported by robust annual measures of progress. Increased participation in programs among learners, teachers and

citizens is expected to continue to climb despite level funding by the legislature each year thanks to yearly gains in private sector gifts as well as state and federal grants. While the participation of under-represented student groups in STEM programs encouragingly matches population proportions, targeted recruitment and retention efforts will be needed to ensure the level of diversity called for if Iowa is to fill talent positions in STEM over the coming decades. The most frequently recurrent question on the minds of Council members of late concerns sustainability. How can all of the systems and programs put in place for and by STEM over the last four years be standardized, institutionalized, and integrated into existent structures for the long term? That is the defining question around which the 2015-16 quarterly Council meetings are framed. An epilogue to this report may be in order by 2017.



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