

# Report Template

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**Type of document:** *(check one)*

<input type="checkbox"/>	Education Trends
<input type="checkbox"/>	Education Policy Analysis
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**Which states are highlighted in this report?** *(list all)* Utah

**What issue area(s) should this report be tagged to on the website?** *(Check all that apply)*

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Please list any words users would enter on our website or in a Google search to search for this report or the type of information in this report. These synonyms will be added to the website to help improve search results. STEM, science, technology, engineering, math, mathematics

**Highlight three key takeaways. Try to use numbers and or other specific points: 25-30 words each**

- 1.
- 2.
- 3.

# **A State Policymaker's STEM Playbook**

Jennifer Zinth, ECS and Tami Goetz, Utah STEM Action Center

Intro for front page: (120-140 words)

Science, technology, engineering and mathematics (STEM) has captured the attention of state policymakers who are concerned about equitable access to high-quality educational experiences and the need to prepare and inspire students to pursue careers in STEM occupations. Yet in many states, STEM policymaking efforts have not achieved their intended return on investment because programs are missing one or more of three essential elements:

- Statewide coordination or consolidation within a single statewide entity
- Adequate, reliable funding from year to year
- Quality assurance or program evaluation

This report briefly unpacks the importance of each of these elements, and highlights Utah as a case study of a state that has successfully enacted and implemented legislation assuring the presence of all three of these components. The report also identifies other elements that contributed to the passage and implementation of Utah's efforts that other states should be aware of.

## **Three essential elements**

Hundreds of pieces of legislation related to STEM education have been passed in the decade-plus since the "STEM" acronym began to gain currency in education policymaking circles in the early to mid-2000s. While the focus of these policymaking efforts has been diverse – STEM teacher recruitment, preparation and

professional development; ensuring access to high-quality standards and curricula ensuring real-world applications and hands-on learning experiences; increasing STEM interest and achievement among female and underrepresented minority students, to name just a few – policymakers by and large feel they have not “solved” the STEM issues in their state.

This is in part because all too often, state STEM policy approaches lack one or more of three essential elements:

- **Coordination:** Statewide coordination or consolidation within a single statewide entity
- **Resources:** Adequate, reliable funding from year to year
- **Evaluation:** Quality assurance or evaluation of funded programs.

## The Utah Story

Utah is one state that has taken policy action to ensure that all three of these elements are present in state-level STEM education initiatives. The section that follows identifies critical steps in developing and implementing the Utah STEM Action Center, in large part grouped under these three elements. This report also identifies other key considerations that supported or enhanced Utah’s adoption and implementation efforts, that other states should be mindful of.

### The Need Is Identified for a STEM Program:

#### [icon] Coordination

According to Tami Goetz, Executive Director, Utah STEM Action Center, talent demand was a key motivator for Utah to look at a K-16, even “K to gray” approach to STEM education. This need for talent existed across the state, and across industry sectors. To address this demand, it was clear the state had to align education efforts with industry talent needs.

#### [icon] Evaluation

Some STEM programs in Utah had been in place for 10-15 years, but while data showed a sustained level of participation, very little available data demonstrated impact. Policymakers questioned whether some of these programs were a good investment.

#### [icons] Coordination + Resources

**Commented [tg1]:** I think that they are pretty self-explanatory, particularly in the downside category

**Commented [JD2]:** Debating whether I need to include a sidebar that describes positives of “If you have it...”, negatives of “If you don’t”. Are the upsides/downsides of including/not including obvious?

**Commented [tg3]:** This definitely was a key motivator, but equally motivating was the fact that there were numerous STEM efforts being deployed across the state, but they went unnoticed. We were not leveraging our efforts and resources effectively. Greater coordination was recognized as a solution.

Conversations around talent development with industry representatives ultimately led some state leaders to determine that state-level coordination for a state STEM initiative was needed, along with a substantial leveraging of resources, across K-12, postsecondary, and business/industry.

## **The idea incubates...**

### **[icon] Coordination**

Goetz, in her role as the Governor's State Science Advisor, along with the STEM Coordinator for Utah State Office of Education, Diana Suddreth, brought together a small group of individuals to spend a year exploring "best practices" in state STEM initiatives. This "nucleus" included representatives from the Utah State Office of Education, the Utah System of Higher Education, the Governor's office, legislators, and industry.

### **[icon] Resources**

The group realized that the proposed STEM effort justified greater support and this support needed to come from industry. Legislative funding would be needed to support this effort.

### **[icon – maybe exclamation point?] Other key considerations**

**Framing the initiative, and finding the right supporter.** Lessons learned from successful university-level engineering initiatives pointed to three needs for the burgeoning STEM effort:

- Industry-led
- Every successful campaign needs a passionate evangelist. This STEM evangelist needs to come from within industry, and needs to know how to navigate the legislative process and garner legislative support. The industry champion must be one that understands, and is motivated, by a need for talent. And understands that a solid STEM education foundation leads to more talent. A true STEM believer.
- Speak the language of accountability and outcomes

Industry partners, working through a strong and supportive technology trade organization, the Utah Technology Council, united on a campaign to work with legislators to support the creation of a state STEM initiative. Industry support, along

with a substantial leveraging of resources, across K-12, postsecondary, and business/industry, was the tipping point for real action. Action for STEM.

**Differentiating from existing initiatives.** The group saw the need to clearly differentiate the work of the Utah STEM Action Center from that of the Utah State Office of Education. The Utah STEM Action Center is meant to drive research and development (R+D). Conducting intensive 3<sup>rd</sup> party evaluation of programs and ongoing program oversight and monitoring, including professional development and supplemental education programs, is outside the mission of the State Office of Education. The Utah STEM Action Center would work in synergy with but separate from the State Office of Education.

[sidebar: **R+D?** For example, Utah districts were already purchasing supplemental math learning tools. Districts, however, do not have the time or capacity to research whether the products they are considering will achieve their desired outcomes. As a result, districts may make choices on supplemental math products based on cost, or other factors beyond the quality of the product or its alignment with the specific challenges within the district.

[Enter the Utah STEM Action Center. The Center can test a wide variety of products, targeting a wide variety of students, including English learners who may struggle with reading. Based on this research, the Utah STEM Action Center can provide a menu of options districts can choose from, based on local challenges (for example, a district serving a large immigrant population can choose products tailored to their needs). And if a district decides a product is not meeting their needs, they can trade it in to the STEM Action Center for a more suitable product, and not be “stuck” with a single product they may have been limited by cost or other factors into purchasing.]

## Embarking on the legislative process

Once a state decides to move forward with creation and funding of a statewide STEM coordinating entity, policymakers should consider the challenges Utah leaders faced.

### Location, location, location

Commented [tg4]: STAN:

Commented [JD5]: Appropriate to use “Utah STEM Action Center” here? At what point in the process was that name adopted?

Commented [tg6]: It was adopted from the beginning. And given that Idaho is now using the name it has become important to put “utah” in front of it©

Commented [tg7]: I always like to say that it is a truly equitable partnership.

Commented [tg8]: STAN: is this a fair comment?

Where will the Utah STEM Action Center be housed? The notion of housing it within a single postsecondary institution was set aside, as the vision of the STEM Action Center as an agnostic agency working with all governmental entities and agencies in the state would be compromised if the Center were perceived as being “owned” by a single institution.

The same argument was used against housing the Utah STEM Action Center within a single school district. Housing the STEM Action Center also went beyond the mission of a local education agency.

Further concerns dissuaded decision-makers from housing the initiative within the State Office of Education. Beyond conducting R+D on existing efforts, the Utah STEM Action Center was intended to serve as an innovative space. If innovation was not the focus of the new entity’s efforts, the innovation component would go away as the entity was subsumed into the agency within which it was housed. However, the STEM Action Center would conduct all efforts with the blessing of the State Office of Education.

Sentence on how governor’s office of economic development was arrived at as home for Utah STEM Action Center?

### Money, money, money

An endeavor that coordinates various STEM activities including R+D and evaluation activities, between K-12, higher education and workforce/industry, will only be able to fulfill its mission with substantial support for grants and staff. In fact, one-time funding to the Utah STEM Action Center over three appropriations between 2013 and 2016 has been \$23.9 toward projects, as well as \$9.5 million in operating funds.

## What is the Utah STEM Action Center?

[Statutes](#) pertaining to the Utah STEM Action Center are in the section of Utah Code governing the Governor’s Office of Economic Development

Per [U.C.A. § 63N-12-203](#), the Center is governed by the [STEM Action Center Board](#), which includes various representatives of K-12, higher education, government, and business [include bulleted list below in sidebar:

- Six private sector members who represent business, appointed by the governor

**Commented [tg9]:** In other words, aligning with the successful model of “disruptive innovation.”

**Commented [tg10]:** I would say that it is more accurate that the Center worked in close partnership with the State Office of Education in the planning, implementation and evaluation of all K-12 programs.

**Commented [tg11]:** The final decision was to make the Governor’s Office of Economic Development (GOED) as the home for the Center. This co-location represented a neutral location that would allow the Center to serve comfortably all education partners. The alignment of the Center’s education and talent development efforts with economic development was seen as beneficial.

**Commented [tg12]:** It is probably more accurate to say a combination of one-time and on-going funding via three appropriations that span four fiscal years. The total amounts are \$23.5M in one time and a total of \$23.6M in ongoing. The ongoing supports both operational (\$1.5M annually and now with the 2016 session \$3M to support the math program) and programs.

Combined... approximately \$47.1M (there have been COLA increases).

Also, it might be worth mentioning that this has all been from the General Fund, not Education.

Not sure how much detail is necessary!

- The state superintendent of instruction\*
- Member of the state board of education, chosen by the board chair
- The commissioner of higher education\*
- The executive director of the governor's office of economic development\*
- The executive director of the department of workforce services\*
- The Utah College of Applied Technology commissioner of technical education\*
- One member appointed by the governor
- One member with a degree in engineering and experience working in a government military installation, appointed by the governor.

\* indicates where designee may take the place of an official]

Broadly speaking, statute directs the STEM Action Center board and STEM Action Center, under the leadership of a director appointed by the board, to fulfill a variety of functions. Many of the functions of the STEM Action Center, its board and executive director relate to these critical elements of coordination, evaluation and resources.

The section that follows identifies statutory duties and powers assigned the STEM Action Center board, executive director, and the STEM Action Center, as well as other key considerations a state should be mindful of in developing the duties and powers of a similar statewide entity.

### **[icon] Coordination**

The STEM Action Center board is directed by [statute](#) to:

- Establish a STEM Action Center to:
  - Coordinate STEM activities among various K-12 and higher education stakeholders at the state and local level
  - Align K-12 and higher education STEM activities
  - **Create and coordinate best practices among K-12 and higher education.** [bolded intentionally]
- Strategically engage industry and business entities to cooperate with the board to support high-quality professional development and provide other assistance to educators and students.

As funding allows, the STEM Action Center board is additionally directed to:

- Work cooperatively with the state board of education to further STEM education, and
- Work cooperatively with stakeholders to support and promote activities that align STEM education and training activities with the employment needs of Utah business and industry.<sup>1</sup>

### **[icon] Evaluation**

As funding allows, the director of the STEM Action Center must:

- Ensure that the STEM Action Center acts as a research and development center for STEM education through a request for proposals process described in [63N-12-206](#)
- Review and acquire STEM education related materials and products for
  - High quality professional development
  - Assessment, data collection, analysis, and reporting, and
  - Public school instruction.
- Identify at least 10 best practice innovations used in Utah that have resulted in a measurable improvement in STEM student performance or outcomes
- Identify best practices being used outside Utah and, as appropriate, develop and implement selected practices through a pilot program
- Identify K-6 and 7-12 learning tools identified as best practices
- Collect data on Utah best practices, including from K-12, higher education, the Utah Education and Telehealth Network, and other STEM-related entities
- Keep track of how the best practices data are being used, and how many individuals are using the data, including the demographics of the users, if available.
- Support best methods of high quality K-12 STEM professional development, including methods that reduce cost and increase effectiveness, to help educators learn how to most effectively implement best practice learning tools in the classroom.<sup>2</sup>

Importantly, statute also directs the STEM Action Center director, as funding permits, to work with an independent evaluator to track and compare

**Commented [JD13]:** Communications, is there a way to draw attention to this passage? I would put it at beginning of this section but wouldn't make sense to list it before the best practice activities listed above

performance of students participating in a STEM Action Center program to all other similarly situated Utah students in terms of:

- High school graduation rates
- The number of students taking a remedial math course at a state institution of higher education
- The number of Utah public high school graduates who begin a postsecondary education program
- The number of students, compared to all similarly situated students, who are performing at grade level in STEM classes.<sup>3</sup>

The STEM Action Center board is directed by statute to work to meet the following expectations:

- That at least 50 educators are implementing best practice learning tools in classrooms
- Performance change in student achievement in each classroom participating in a STEM Action Center project.

As funding allows, the board must work also cooperatively with the state board of education to ensure best practices are implemented as relates to the STEM education-related instructional technology program described in [63N-12-206](#) and distribution of STEM education instructional technology to schools as described in [63N-12-207](#).<sup>4</sup>

### **[icon] Resources**

The Utah STEM Action Center Board is directed to strategically engage industry and business entities to cooperate with the board in providing private funding and support to the STEM Action Center.<sup>5</sup>

The board is authorized to establish a foundation to assist in:

- The development and implementation of the programs authorized by statute to promote STEM education
- Implementation of other STEM education objectives described in statute.

As funding allows, the board must also engage private entities to provide financial support or employee time for STEM activities in schools in addition to what is currently provided by private entities.<sup>6</sup>

### **[icon] Other key considerations**

**Commented [JD14]:** Not sure what this sentence means

**Commented [tg15]:** We interpret it as assessing student achievement via metrics, where appropriate, with each project. For instance with the math tools project, we look at proficiency gains with end of year test scores. For the STEM certification program we look completion and acquisition of an identified credential as student achievement.

It is not so easy with the STEM endorsement or professional learning projects.

For the applied science project, we looked at student pre- and post-surveys, teacher observations...

The Utah STEM Action Center is also directed to perform various functions related to engaging students, educators, private sector representatives, and others in a number of activities.

## Additional components critical to the Center's positive impact

While it's difficult to meaningfully legislate the components in the section that follows, Goetz of the Utah STEM Action Center identifies these interrelated elements as also critical to the Center's positive impact.

### Communications, marketing and positioning

#### STEM Action Center as "megaphone" and center of convergence

In the words of Tami Goetz, the STEM Action Center functions as a "megaphone," a statewide mode of communication for stakeholders and communities to learn what Utahans are doing in STEM. And inversely, the STEM Action Center is also outward-looking, so that if individuals have an issue or idea, the STEM Action Center is the place to take it, because something will come of it.

In other words, "Action" is key to the name of the STEM Action Center. The Center is not just a repository or clearinghouse of information, but "active" in the sense of communicating what others in Utah are doing around STEM, and connecting individuals with resources.

#### What is it you do...do?

Quoting Madeline Kahn's line from the film *Young Frankenstein*, a state developing its own STEM Action Center needs to be intentional at the outset on what kind of programs it will be operating. Programs supported in the STEM Action Center must be meaningful; they must make a difference for students, educators, industry and parents. Students learn to do STEM, think with STEM and solve with STEM. Programs ensure that educators have the ability to make STEM come to life in the classroom.

**Commented [JD16]:** Wondering if it would help to create an appendix listing out at least a sampling of activities from 63N-12-205(2), and -209 through -213.

**Commented [tg17]:** It might. We have our micro-grant programs for students and teachers, as well organization grants and sponsorships for events. We have our assembly program for elementary schools, which is a STEM magic show. It is very cool. Our mobile STEM classroom that we will launch in Q1 of 2017. Our mobile app project for mentoring that is being led by industry partners.

It is your call, but I am happy to draft a list.

Programs are a part of the function of the Center. But is that all? Will it be convening? Facilitating dialogue? Writing and receiving grants? Seeking legislative funding to establish programs that require reporting, monitoring, or contracting? How will the targets of its programs be identified? Goetz notes that the first few projects of the Utah STEM Action Center resulted from a combined interest of legislators and education partners. However, recent projects are a result of considerable industry input.

### **The key role of industry, the importance of workforce alignment,**

It is critical that the Utah STEM Action Center develops and clearly articulates its workforce alignment component. Industry partners are not only essential to securing financial support, but also to guide workforce alignment strategy. The Utah STEM Action Center should ideally serve as a nerve center, helping to support economic development efforts, helping Utah companies grow other Utah companies.

As Tami Goetz phrases it, "There is life after credentials." That is, the Utah STEM Action Center must be intentional about extending its focus beyond STEM education, serving a role after credential attainment, specifically workforce development, or talent alignment, talent development. Industry must play a pivotal role in aligning STEM education efforts with the broader goals of workforce/talent development.

Commented [JD18]: Pullout quote – Tami, is that ok?

Commented [tg19]: Sounds good!

### **Marketing and branding**

While coordination with business and industry is important, marketing and branding also are essential in creating a "brand" for STEM in Utah. Initially, the Utah STEM Action Center used the governor's marketing and communications staff for this work. However, the STEM Action Center staff soon realized it needed its own marketing staff member, with the experience to savvily target different messages to a diverse set of STEM stakeholders with very different agendas – K-12 educators, legislators, CEOs, to name just a few.

### **Legislative communication strategy**

Early on in the process of implementing a center modeled after the Utah STEM Action Center, it is important for states to develop a legislative communication strategy. This is not a one-and-done proposition, but rather an iterative process, that considers which legislators a STEM Center is coordinating with on specific committees, which legislators may be skeptical on a certain issue the STEM Center is in favor of, etc.

## Partnerships and liaisons

Partnerships are essential to the Utah STEM Action Center's coordination with other state agencies. To ensure the Utah STEM Action Center's strategic plan is developing or building upon work of other agencies – and, alternatively, is not creating gaps or duplicating efforts – the Utah Action Center makes use of liaisons, which work part-time for the Utah STEM Action Center and part-time for another state agency. The Center currently employs three liaisons, one each with the Department of Workforce Services, Governor's Office of Economic Development, and State Office of Education. These positions, funded by the STEM Action Center as well as the state agency they liaise with, also share responsibility for the portion of the STEM Action Center strategic plan they are responsible for that year. In the end, liaisons bring more depth to the Utah STEM Action Center's work, but for half the cost, and allow the Center to ensure it is aligning its work with workforce needs.

## Funding

### Diverse funding portfolio

Goetz notes there is value in portfolio diversification. An initiative such as the Utah STEM Action Center cannot exist without substantive and reliable legislative funding, and private donations also provide critical funds. Yet the establishment of a public 501(c)(3) in May 2016 has also been a game-changer for the STEM Action Center, particularly in how the entity is viewed by corporate donors.

### Author information

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Tami Goetz is Executive Director, Utah STEM Action Center. She enjoys skiing, trail running and hanging out with her husband, two stepdaughters, two dogs, four cats and four chickens. Contact Tami at 801-674-2405; [tgoetz@utah.gov](mailto:tgoetz@utah.gov)

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<sup>1</sup> U.C.A. § 63N-12-205(1)(c)(i), (1)(e)

<sup>2</sup> U.C.A. § 63N-12-205(2)(b), (c), (g)-(k), (n)

<sup>3</sup> U.C.A. § 63N-12-205(4)(a)

<sup>4</sup> U.C.A. § 63N-12-205(1)(c)(ii)

<sup>5</sup> U.C.A. § 63N-12-204(1)(d)

<sup>6</sup> U.C.A. § 63N-12-205(1)(d)