

Nevada STEM Advisory Council



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Pursuant to NRS 223.650, the STEM Advisory Council is required to “prepare a written report which includes, without limitation, recommendations based on the survey conducted pursuant to paragraph (d) and any other recommendations concerning the instruction and curriculum in courses of study in science, technology, engineering and mathematics in public schools in this State and, on or before January 31 of each odd-numbered year, submit a copy of the report to the State Board of Education, the Board of Regents of the University of Nevada, the Governor and the Director of the Legislative Counsel Bureau for transmittal to the Legislature.¹”

Please accept this report as the STEM Advisory Council’s recommendations for the 2019 Legislative Session. The recommendations in the report align with the key strategies and priorities identified in the State Strategic Plan for STEM². The recommendations in the report seek to achieve the following outcomes:

- Increase student awareness, interest, and desire to participate in STEM-focused formal and informal education programs.
- Increase student proficiency, enrollment, and attainment rates in STEM-focused coursework and programs.
- Expand the availability of STEM-focused career pathways and training.
- Increase elementary educator self-efficacy and confidence in teaching STEM subjects.

The following recommendations are laid out in greater detail in the report:

¹ <https://www.leg.state.nv.us/NRS/NRS-223.html#NRS223Sec650>

² http://osit.nv.gov/STEM/STEM_Strategic_Plan/



Nevada STEM Advisory Council



1. Computer Science Professional Development
2. Regional STEM Networks
3. STEM Motor Vehicle License Plates
4. K-5 STEM Grants
5. Recognition Events Statutory Cleanup

Finally, the STEM Advisory Council is a body whose members are appointed by the Governor and Legislature. Additional ex-officio members come from other state agencies. Four of the eight legislative appointments have been vacant for some time, which has made having the required quorum for public meetings difficult. We are happy to recommend qualified and diverse candidates for appointments upon request.

Sincerely,

Mark Newburn
Co-Chair

Kelly Barber
Co-Chair



STEM Advisory Council Recommendations to the Legislature

Computer Science Teacher Professional Development

Anticipated Results:

1. Increase student proficiency, enrollment, and attainment rates in STEM-focused coursework and programs.
2. Expand the availability of STEM-focused career pathways and training.
3. Increase elementary educator self-efficacy and confidence in teaching STEM subjects.

Overview: In order to build on Senate Bill 200 (79th Legislative Session) that expands access to K-12 computer science, the STEM Advisory Council recommends further legislation that provides for training and certification of computer science teachers.

Background: One of the primary goals of Nevada's education system is to prepare students with the knowledge and skills needed for the jobs of the future. Increasingly, high-wage jobs of the future will require students to have knowledge and skills in computational thinking, even for jobs that don't directly involve computer programming as a primary job duty. According to Code.org, computing is the number one source of all new wages in the economy and there are over 500,000 open jobs across the country. In 2017 the Legislature enacted SB 200. The legislation has been very successful thus far, but more work is needed to ensure Nevada's students are prepared for the jobs of the future.

SB 200 sets various requirements for K-12 computer science education, including requirements for the State to adopt K-12 academic standards in computer science and for all high schools to offer at least one course in computer science by 2022. In 2018, the State Board of Education adopted Nevada's K-12 computer science standards. In 2018, the Computer Science Subcommittee of the STEM Advisory Council, in partnership with the Department of Education and the Office of Science, Innovation and Technology held Nevada's first Computer Science Summit to educate school districts on the requirements of SB 200 to offer computer science classes in high school and implement the new standards.

One of the largest challenges to broaden opportunities in computer science is the shortage of teachers with the training and certification required to teach it. The training needed involves both the continuing of in-service teacher professional development as well as educating pre-service teachers in fundamental computer science concepts before entering the profession. For future sustainability of computer science education, it is critical that we encourage more teachers to earn the new computer science endorsements developed by the Computer Science Subcommittee. The Subcommittee proposes an incentive program through either a scholarship program or tuition reimbursement for courses leading to the computer science endorsement.



Recommendations:

- To expand the number of current in-service teachers capable of teaching K-12 computer science:
 - Funding for continued in-service professional development in K-12 computer science (similar to the funding method in SB 200 except also making the state's Regional Professional Development Programs eligible for funding).
- To guarantee that future K-12 pre-service teachers have knowledge in the K-12 computer science standards:
 - An incentive program through grants for college and university schools of education to develop new pre-service K-12 curriculum and require all pre-service teachers to receive appropriate training on the computer science standards.
- To guarantee a sufficient amount of teachers with computer science endorsements:
 - The creation of a computer science teaching endorsement reimbursement program. Both pre-service and in-service teachers are eligible. Reimbursement for coursework required to receive the computer science endorsements will come after they receive their endorsement from the state. (This could be done through a scholarship program.)

Regional STEM Networks

Anticipated Results:

1. Increase student awareness, interest, and desire to participate in STEM-focused formal and informal education programs.
2. Increase student proficiency, enrollment, and attainment rates in STEM-focused coursework and programs.
3. Expand the availability of STEM-focused career pathways and training.

Overview: In order to increase business, family, and community engagement at the local level, The Office of Science, Innovation and Technology (OSIT) proposes to start and fund three regional STEM Networks: Southern Nevada, Northwest Nevada, and Rural Nevada. The Networks would be overseen by OSIT and the STEM Advisory Council.

Background: Twelve other states that could be considered leaders in STEM have regional STEM networks or hubs. Similar to the Regional Development Authorities that work with GOED, these regional STEM networks would have five important roles:

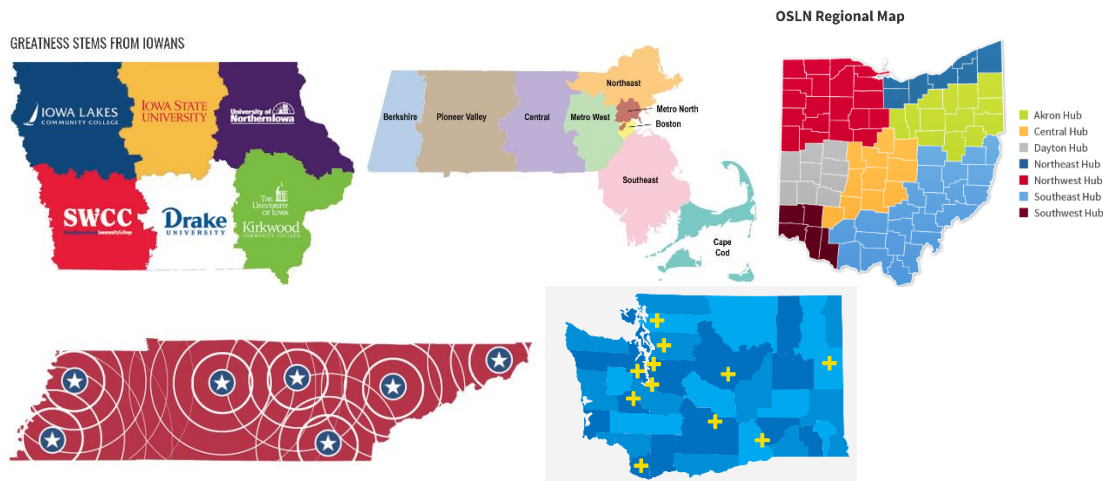
1. Identify on-the-ground programmatic gaps or implementation challenges in need of a state-level solution.

Nevada STEM Advisory Council



2. Grow interest and awareness of STEM in the region.
3. Carry out the on-the-ground implementation of state-level programs/goals.
4. Identify and build local programs worthy of scaling statewide.
5. Facilitate connections and sharing of resources among K-12, higher education, and business/industry.

In other states, these networks are housed at an institution of higher education, non-profit, or other similar organization that shares in the cost of running the network. In Nevada, each region would have an advisory board to identify, grow, and create STEM programs that strengthen the region. Each network would be managed by a director that would work with OSIT, the STEM Advisory Council, and regional stakeholders. Each network would provide and present quarterly reports of its activities to OSIT and the STEM Advisory Council at the Council’s meetings. OSIT would hold an RFP process to designate a ‘home’ for the network in each region.



Use of Funding: Each regional network would receive about \$100,000 per year. Funding would be allocated from OSIT’s budget. This funding would be used to pay part of the Director’s salary and travel as well as funding for local STEM camps, festivals, and programs that meet the definition of high-quality as determined by OSIT’s STEMworks program.

STEM Motor Vehicle License Plates

Anticipated Results:

1. Increase student awareness, interest, and desire to participate in STEM-focused formal and informal education programs.
2. Increase student proficiency, enrollment, and attainment rates in STEM-focused coursework and programs.



3. Expand the availability of STEM-focused career pathways and training.

Overview: In order to increase awareness of STEM and provide resources for STEM-related programs, the Legislature should create a STEM license plate for motor vehicles. A portion of the proceeds from the license plates would be used to fund informal STEM education programs and other outreach initiatives that meet the STEM Advisory Council’s definition of high-quality.

Background: According to the State Strategic Plan for STEM, “too few Nevadans consider STEM careers in large part because they are not exposed to STEM education as students or are not made aware of the many exciting career opportunities in STEM available to those with some postsecondary education.”³ More must be done to make students, especially at an early age, and families aware of the opportunities available for STEM education and STEM jobs.

The STEM Advisory Council’s Informal STEM Learning Environments Subcommittee (ISLE) has developed standards and a guide to assist informal STEM education programs around the State improve in quality. Many high-quality programs already exist in Nevada but struggle to scale due to lack of resources. The first goal of the State Strategic STEM plan is to “promote equitable opportunity for STEM education across Nevada.” Increase the number of high-quality informal/after school STEM programs. Identify and scale existing programs with positive results.

Use of Funding: Funding from the revenue generated by the STEM license plates would be allocated via a competitive grant process to school districts and informal education providers to increase interest and achievement in STEM. The STEM Advisory Council will request the awarded programs provide outcomes data in order to evaluate the success of the program.

K-5 STEM Grants

Anticipated Results:

1. Increase student awareness, interest, and desire to participate in STEM-focused formal and informal education programs.
2. Increase student proficiency, enrollment, and attainment rates in STEM-focused coursework and programs.
3. Increase elementary educator self-efficacy and confidence in teaching STEM subjects.

Overview: In order to cultivate and nurture greater interest and achievement in science, technology, engineering, and mathematics in students at an early age, OSIT proposes to continue its successful K-5 STEM Grant program that provides curriculum and equipment to elementary schools. Additionally, based on an evaluation of the results of the initial program, OSIT will place

³ http://osit.nv.gov/STEM/STEM_Strategic_Plan/



greater emphasis on providing funding for professional learning for educators in order to increase self-efficacy and confidence in teaching STEM.

Background: According to the research, one-third of boys and girls lose interest in science by the fourth grade and a child's interest in STEM is largely formed by the time he or she reaches upper elementary and middle school.⁴ The same research also finds that early exposure to STEM, especially for girls, makes children more likely to succeed in science and pursue STEM fields in college. Yet, just 38% of Nevada's elementary schools report offering STEM during the school day.⁵ Therefore, if the State's goal is to increase the number of students participating in STEM programs in middle and high schools that prepare them for success in post-secondary STEM degrees and careers, research suggests STEM concepts should first be introduced at the elementary level.⁶

In 2017, OSIT applied for and received a grant in the amount of \$150,000 from the Pennington Foundation to begin funding grants to elementary schools serving children at the age where interest in STEM subjects is cultivated. OSIT awarded 21 applications impacting 5,136 students and over 100 teachers. K-5 STEM Grants seek to promote equitable access to and the increased quality of STEM programs in elementary schools in order to better prepare students for a career pathway to success in the New Nevada. This grant program aligns with four key strategies identified in the State STEM Strategic Plan:

1. To increase the prevalence of evidence-based, high-quality formal and informal STEM practices and programs in Nevada's elementary schools.
2. To increase the use of hands-on, evidence-based, experiential STEM learning in grades K-5.
3. To increase the percentage of elementary schools that teach science for three-plus hours per week.
4. To increase interest in, awareness of, and achievement in the subjects of science, technology, engineering, and mathematics in grades K-5, particularly amongst demographic groups that are traditionally underrepresented in STEM.

Results: With only \$150,000 available, OSIT received 42 applications requesting a total of \$350,111 from Northern Nevada alone. 5,136 students in 24 elementary schools will benefit from these grants. An independent evaluation by the Raggio Research Center at UNR found statistically significant increases in student interest in STEM subjects, student awareness of engineering as a useful skill, and student content knowledge in STEM as a result of the program. All schools reported spending more time teaching hands-on, high-quality STEM lessons; greater student engagement, collaboration, and excitement about learning; and increased student demonstration of

⁴ Daugherty, Michael K.; Carter, Vinson; and Swagerty, Lindsey (2016) "Elementary STEM Education: The Future for Technology and Engineering Education?," *Journal of STEM Teacher Education*: Vol. 49 : Iss. 1 , Article 7.

⁵ According to a statewide survey of STEM practices conducted in May, 2016 by the NV STEM Advisory Council.

⁶ DeJarnette, N. K. (2012). America's children: Providing early exposure to STEM (science, technology, engineering and math) initiatives. *Education*, 133(1), 77-84.



problem-solving skills. The results also found that more work must be done to increase teacher self-efficacy through the provision of professional development.

Use of Funding: OSIT proposes to expand this program statewide and allocate funding from OSIT’s budget to elementary school applicants on a competitive basis. Applicants would be eligible to apply for funding for programs on the STEM Advisory Council’s List of Recommended STEM Programs (formal and informal programs that have been deemed high-quality by the Nevada STEMworks program)⁷.

Recognition Events Statutory Cleanup

Anticipated Results:

1. Increase student awareness, interest, and desire to participate in STEM-focused formal and informal education programs.
2. Increase student proficiency, enrollment, and attainment rates in STEM-focused coursework and programs.

Overview: NRS 223.650 requires the Council to hold student recognition events each year at institutions of higher education. While the requirement to hold the events at colleges and universities certainly has merit, the specificity of the location requirement unnecessarily restricts the Council and forecloses the possibility of holding the events in other worthy venues, such as businesses, where the Council could more easily accomplish other objectives, such as business engagement and STEM career awareness.

Likewise, the Council is required to hold an annual recognition event for schools in Carson City. While the Council sees no immediate need to change the location of this event, future Councils may have good reason to hold the school recognition event elsewhere in Nevada.

Recommendation: The Legislature modify NRS 223.650 to remove the location requirements for student and school recognition events.

⁷ <http://osit.nv.gov/STEM/STEMworks/>