Impact Report

NEVADA DESIGNATED STEM SCHOOL NETWORK STEM TEACHER CERTIFICATE PILOT

Presented by
the Nevada Governor's Office of Science, Innovation and Technology, in partnership with the National Institute for STEM Education.

IMPACT SNAPSHOT

6
Designated STEM Schools

35
K-12 Educators

4,776
Students

OSIT

NATIONAL INSTITUTE for STEM EDUCATION

PILOT PROGRAM

Spring of 2022, the Nevada Governor's Office of Science, Innovation and Technology (OSIT) invited teams of teachers and administrators from Nevada Governor Designated STEM Schools to apply for the pilot program, which sought to identify the impact of the National Institute for STEM Education's (NISE) National Certificate for STEM Teaching (NCST) program on the school's STEM instruction as well as the school's overall rating on the Classroom Category of the Nevada STEM Framework.

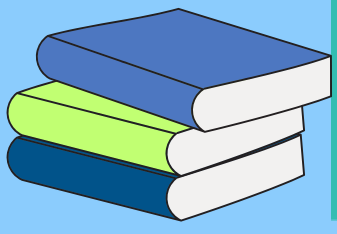
Designated STEM Schools have regularly communicated to OSIT the desire to
1) engage more teachers at their schools in STEM,
2) continue staff STEM professional learning, and
3) advance their school to a higher tier of the Governor STEM School Designation.

OSIT has observed that many Developing STEM Schools require a significant shift to student-led learning in order to move to Established or Model.

PILOT PROGRAM

"The National Certificate for STEM Teaching (NCST) certifies STEM professionals in STEM education. Once enrolled, participants are guided through the development of a portfolio that demonstrates proficiency across 15 teacher actions essential to STEM learning. Because the certificate is competency-based, skilled teachers do not need to "sit through content" they already comprehend. Rather they are invited to demonstrate proficiency through their portfolio, self-evaluation, documentation, and examinations of student work." (https://nise.institute/teacher-certification.php) The units consist of an online learning component, an action research activity, and a portfolio development piece. Four guiding principles, woven through 15 teacher actions and three domains of the certificate program are: student autonomy, constructivism, explicit/reflective methodology, and 21st century skill building.

	TEACHER ACTIONS
DOMAIN 1 **CREATING AN ENVIRONMENT FOR LEARNING**	1. Creating a Positive Classroom Culture 2. Establishing Cooperative Learning 3. Integrating Technology 4. Connecting Learning Outside the Classroom
DOMAIN 2 **BUILDING SCIENTIFIC UNDERSTANDING**	5. Implementing Inquiry 6. Addressing Student Misconceptions 7. Facilitating Questioning & Discourse 8. Utilizing Assessment 9. Building Scientific Literacy
DOMAIN 3 **ENGAGING STUDENTS IN SCIENTIFIC AND ENGINEERING PRACTICES**	10. Cultivating Scientific Investigations 11. Developing Engineering Solutions 12. Fostering Data Utilization 13. Implementing Project Based Learning (PBL) 14. Developing Scientific Explanations 15. Facilitating Scientific Explanations



PILOT PROGRAM

OSIT and NISE collaborated to develop and facilitate this year-long pilot program with the intention of discovering the NCST program's impact on the Designation program. Together, OSIT and NISE developed a cross-walk of the NCST indicators and the attributes described in the Nevada STEM Framework. The cross-walk evidenced a near perfect alignment of the two programs.

One hundred forty-eight educators from twenty schools applied for the pilot program. OSIT accepted 35 educators from six schools, representing a variety of grade levels, years designated, and geographic location. All accepted schools were rated at the Developing designation level at the time of acceptance.

Walter Bracken Elementary School
Berkeley L Bunker Elementary
David E. Norman Elementary School
Pinecrest Academy of Nevada, Cadence
Smithridge STEM Academy
Empire Elementary

Participants completed an extensive pre- and post-survey about their instruction, confidence, and experience with STEM. School cohorts met regularly throughout the year to progress through the program together. NCST coaches regularly supported individual participants through meaningful feedback on their course work as well as with technical assistance. School cohorts attended quarterly workshops led by OSIT and NISE coaches which helped participants make connections between the NCST indicators and the Nevada STEM Framework attributes.

OSIT funded the participants' enrollment in National Certificate for STEM Teaching (NCST) program, as well as a $5,000 stipend per educator for the roughly 80 hours of work committed to the program.

EDUCATOR CONFIDENCE INCREASED

"I KNOW INSTRUCTIONAL STRATEGIES NECESSARY TO TEACH STEM EFFECTIVELY."

Before:

4%

Agree or Strongly Agree

After:

94.3%

Agree or Strongly Agree

"I UNDERSTAND STEM CONCEPTS WELL ENOUGH TO BE EFFECTIVE IN INTEGRATING STEM INTO MY TEACHING."

Before:

8%

Agree or Strongly Agree

After:

91.4%

Agree or Strongly Agree

"STRONG INSTRUCTIONAL STRATEGIES ARE MORE IMPORTANT THAN STRONG CONTENT BACKGROUND FOR EFFECTIVE STEM INSTRUCTION."

Before:

54.8%

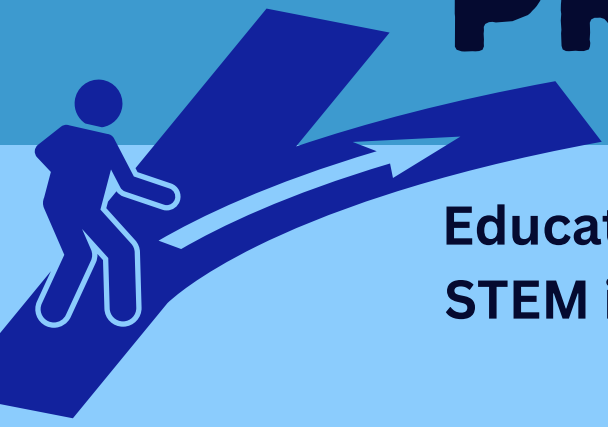
Agree or Strongly Agree

After:

77.2%

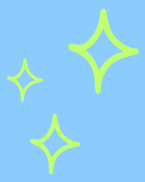
Agree or Strongly Agree

CHANGES TO INSTRUCTIONAL PRACTICES



Educators demonstrated more high-quality STEM instructional practices after the pilot program.

Before the pilot, educators told students how their learning applied to real-world situations.
After the pilot, educators put students in the driver's seat, allowing them to define real-world problems and find meaningful solutions.



Before the pilot, engineering was absent from most classrooms.
After the pilot, educators helped students engage in the engineering design process as a fluid, authentic problem-solving strategy.

Before the pilot, science instruction was aligned to grade level disciplinary core ideas, but instruction was not three-dimensional.
After the pilot, science instruction was aligned to grade level performance expectations and integrated science and engineering practices, disciplinary core ideas, and cross-cutting concepts.

CHANGES IN PERCEPTION

Pre- and post-surveys highlight change in educator perception of STEM instruction.

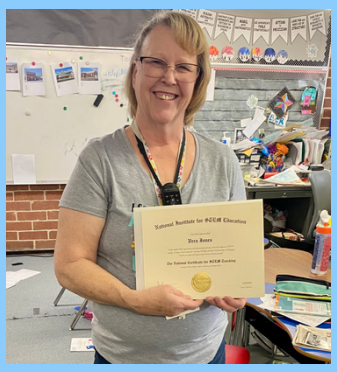
What does STEM mean to you?
and **Why is STEM Important for each learner?**

Responses ***before*** the pilot were peppered with buzz words and phrases, particularly "critical thinking," "student-centered," "problem solving" and "preparation for the future."

Responses ***after*** the pilot still included common phrases, but were more nuanced and touched more on student autonomy, empowerment, collaboration and practical application to real-world contexts.

What are the qualities of an effective STEM teacher?
...of a STEM classroom?

While responses in both pre- and post-surveys described similar characteristics, responses ***after*** the pilot were more specific and included more detailed examples.



> I used to think that STEM was just adding an engineering component to your lesson, but now I see that it is much more of a classroom climate and culture change. Students need that autonomy to be able to make choices and create meaningful connections in their learning.
> -Carina T.

Is it more important for a STEM teacher to have strong content knowledge or strong STEM instructional strategies?

While responses in both pre- and post-surveys favored effective STEM instructional strategies, responses ***after*** the pilot highlighted the value of a growth mindset and utilizing effective instructional strategies so that students and teachers can learn alongside each other.

When provided an example STEM lesson and asked how to improve it,
responses ***before*** the pilot were more general strategies appropriate for any subject area (hands-on, collaborative, student-centered).

Responses ***after*** the pilot were more specific overall and more specific to STEM, including technology integration, authentic contexts, asking questions and making observations, and taking diverse perspectives.

LIMITATIONS AND RECOMMENDATIONS

Evaluation included individual surveys in which participants responded to free-response reflection questions, Likert Scale questions, and uploaded lesson plans. School sites were also evaluated during site visits using the Nevada STEM Framework in the same way all Designated STEM Schools are evaluated.

LIMITATIONS

While the evaluation analysis highlighted many celebrations from the year of work, there were areas of stagnation. Evaluators from OSIT and NISE identified the timeline as a limitation of the pilot. Specifically, participants completed the NCST program mid- to late-Spring 2023. Evaluations occurred late-Spring 2023. Educators had very limited time to implement and refine the instructional strategies they learned through the pilot.

Additionally, some participants in the pilot were new to their school and not part of the school's designation evaluation. This mix of teachers observed during the pre- and post-site visits made it difficult to identify the pilot's impact on the school's overall designation rating.

RECOMMENDATIONS

Evaluators recommend completing the site visit evaluations again after a year of implementation of new learning. OSIT anticipates participating schools will see their overall Designation rating improve.

While the pilot included small school teams, OSIT recommends participating schools fund enrollment in the NCST program for all teaching staff at their schools, while also supporting them through the program with reflection and feedback sessions.

> The NCST pilot program was challenging, but I loved the process. I feel that through evaluating observations and true self reflection of my own practices, I've learned and grown a lot in regard to my STEAM practices, especially in regard to student autonomy.
> -Jennifer W.

Congratulations

to Nevada's First Cohort of National Certificate for STEM Teaching (NCST) Graduates!

To learn more about the NISE NCST Program, visit https://nise.institute/teacher-certification.php

To learn more about funding enrollment in the NCST program, visit https://osit.nv.gov/Grants/Grants/

For more information about the Nevada Governor's STEM School Designation Program, visit https://osit.nv.gov/STEM/Gov_Designated_STEM_Schools/