CASE STUDY

Lied STEM Academy

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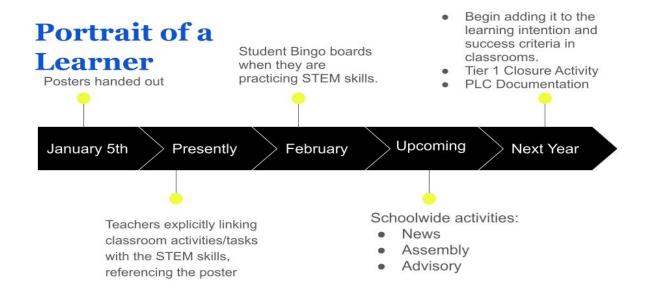

What is your Design Challenge?

Our school faced the issue of all teachers at our STEM Academy not considering themselves STEM teachers. To address this, we decided to reframe STEM. During a school tour in Baton Rouge, Louisiana, we came across a school with the slogan "The 3 C's in every classroom, every lesson, every day." This inspired us to think about the skills that teachers in non-STEM classes can develop in relation to STEM subjects. We then created a list of words that answer the question, "What do students learn through STEM?" The list included "collaboration, failing forward, problem-solving, reading for understanding, critical thinking, exploration, communicating ideas…" Based on this list, we created a new definition of STEM: Solving Problems, Trial and Error, Effective Communication, and Mental Perseverance. We believe that this is the first step in helping all teachers on our campus understand that no matter what subject they teach, it is related to STEM.

What did you do?

- Met as a team of 5 to fully understand what our vision was

- Rolled out to a team of 13 teachers who
    - developed the framework for STEM, a chart that identified what they were already doing in their classrooms that related to STEM
    - began using the language of Solving Problems, Trial and Error, Effective Communication, and Mental Perseverance in their classrooms
    - Reflected on the implementation of the language by rating students' understanding of STEM and attitude toward STEM, as well as the activities they

were doing when using that language

- Formed a Student Advisory Board that:
  - Were selected from the classrooms of the 13 teachers
  - Our students played a pivotal role in this journey. We met once to explain what their teachers had been asked to do, instructed them to listen to the language, and observed their classmates' reactions to hearing these new terms. They met two additional times to give feedback on their observations. This active involvement of students was a key factor in the success of our implementation.
  - Met two additional times to give feedback on their observations

- Presented to all staff members during Professional Development (PD)
  - Overview of Portrait of a Learner (POL) Process
  - How Lied STEM Academy is involved
  - Further, the development of the framework
  - Synthesize the framework and create student-friendly statements about what STEM looks like in each content area.

- Re-looked at the draft posters on September 11th Staff Development Day
  - Each content area made edits to the draft posters
- STEM Tank Kickoff Assembly January 5th
  - Connected the STEM Tank of "Future Schools or Workplaces" to the Portrait of a Nevada Learner and our STEM Framework
  - All teachers received their posters that day to hang in their classrooms

- Staff Development January 22nd
  - The Why behind the Portrait of a Learner work at our school was presented
  - Teachers have been encouraged to start explicitly using the language on the posters when giving directions for tasks/activities in their classrooms.

- February 7th Staff PD and February 9th Assembly
  - We introduced Bingo Boards that students and staff can stamp when they catch themselves engaging in one of the STEM skills.

- Staff Development April 1st
  - Recapped for new teachers
  - Expectations for next year
  - 6th grade ELA and ⅜ Robotics Teacher shared how they are incorporating the portrait into their classrooms

- Staff Development September 11th
  - Finalized wording of the posters

- January 5th: Kick-off Assembly for STEM Tank "Future Schools and Workplaces"
  - Rebooted our work-handing out posters

- Staff Development January 2024
  - Explained the "why" behind the Portrait work

Portrait of a Learner
Posters handed out

Student Bingo boards when they are practicing STEM skills.

- Begin adding it to the learning intention and success criteria in classrooms.
- Tier 1 Closure Activity
- PLC Documentation

January 5th	Presently	February	Upcoming	Next Year

Teachers explicitly linking classroom activities/tasks with the STEM skills, referencing the poster

Schoolwide activities:
- News
- Assembly
- Advisory

- ○

What was the biggest surprise/barrier in implementation? What was the impact?

Before the draft competencies were available, we connected our STEM Framework to the draft portrait language, click here to view that description.

6th-8th Grade Band Competencies and 9-12/Graduate:

The "Connecting" Domain has two attributes: **communication** and **collaboration.** Both of these attributes and competencies are related to the E in STEM, which is "Effectively Communicating."

Communication 6-8	Collaboration 6-8
Demonstrate empathy to sustain relationships within a community by communicating effectively in different situations.	Collaborate with peers and see the shared benefit of different viewpoints and adapt their opinions based on new evidence.

Communication 9-12/Graduate	Collaboration 9-12/Graduate
Demonstrate empathy to sustain relationships with various communities by communicating effectively in different situations.	Collaborate respectfully with individuals of diverse viewpoints, share and exchange information, and utilize tools and technologies to contribute to mutual goals.

The "Impacting" Domain has three attributes: **Critical Thinking, Solution Oriented,** and **Application of Knowledge;** these attributes relate to the S in STEM, "Solving Problems."

Critical Thinking 6-8	Solution Oriented 6-8	Application of Knowledge 6-8
Utilize critical and creative thinking skills to develop potential solutions across contexts.	Examine evidence and apply problem-solving strategies to solve non-routine problems.	Apply knowledge & skills to investigate ways to impact various conditions in the community.

Critical Thinking 9-12/Graduate	Solution Oriented 9-12/Graduate	Application of Knowledge 9-12/Graduate
Apply critical and creative thinking skills to design practical solutions across contexts.	Evaluate the impact of their solution to defend or redesign that solution.	Analyze and justify the impact of their knowledge and skills in the community.

The "Empowering" Domain has three attributes: **Balance, Curiosity, and Self-Advocacy;** these attributes relate to the S in STEM, which is "Solving Problems," the M in STEM, which is "Mental Perseverance," and the E, which is "Effective Communication."

Balance 6-8	Curiosity 6-8	Self-Advocacy 6-8
Manage their time by evaluating options with available resources with goals in mind.	Apply their learning to questions and their impact on community and global matters.	Seek peers who complement their strengths and challenges for all parties to succeed.

Balance 9-12/Graduate	Curiosity 9-12/Graduate	Self-Advocacy 9-12/Graduate
Analyze goals and prioritize tasks to manage time effectively.	Engage their curiosity and perspectives about diverse matters to guide their learning and defend their decisions.	Embrace their strengths and challenges with a well-grounded sense of confidence, empowering them to advocate for themselves.

The "Thriving" Domain has one attribute: **Resilience;** this attribute relates to the T and M in STEM, which is learning through "Trial and Error" and having "Mental Perseverance."

Resilience 6-8
Use previous knowledge to learn, unlearn, relearn and show persistence as they engage with new concepts that impact their school and community.

Investigate and adapt to evolving opportunities as they continuously learn, unlearn, and relearn to become successful, productive, contributing members of their communities.

What was the greatest success? How did this success impact young people or how might it impact young people on your campus? What are their perceptions?

- Student Perspective of the Portrait (Video)
- Teacher Perspective of the Portrait (Video)
- Bingo Boards: Many students were excited about the Bingo Boards, asking teachers to stamp their boards and being able to "argue" why they deserved their stamp.
- Classroom Posters: Successfully hung up in all classrooms
- 6th Grade ELA-Portrait in Action: One ELA teacher successfully linked the STEM Attributes to the novel they were reading, and students could identify how the characters used the attributes.
- Art students' reflections: Students reflected on their work and what they could do differently next time, which is an example of Trial and Error. They also Solved Problems, by figuring out how to make their design come to life, does their art Effectively Communicate the theme?
- Portrait of a Learner Day: Practiced the STEM attribute skills through isolated activities on the last full day of the semester
- Student POL Survey: Students indicated that they had improved their STEM skills and could identify real-world examples of when they have used one of these traits in their lives.

What's next? How does your team plan to evolve this work? What are the most significant pieces of learning you see impacting adult work and young people's experiences? What school level, district level, state level policy may need to be addressed?

Student POL Survey: Drivng "Next Steps":

Based on this survey, the next steps stand out as we need to be more explicit in teaching our STEM attributes to students and linking these attributes and skill-building to the activities/concepts in the classroom.

Teachers were surveyed at the end of the year on a scale of 1 to 4 and asked to indicate their understanding and investment in the portrait of a learner rollout and the current implementation status. While the results were reasonably positive, some opportunities were highlighted in the data and feedback offered. Teachers were asked to rate themselves using the following indicators, with results listed in numerical form.

Rate yourself on your understanding and implementation of POL: **Mean score 3**

Rate yourself on your ability to integrate POL within core instruction: **Mean score 2.9**

Rate student investment in POL: **Mean score 2.4**

This data implies that staff has a relatively high, albeit fundamental, understanding of POL indicators. Staff can successfully define each component of the redesigned STEM acronym, provide examples, and apply each component in general terms to their content areas. Looking ahead, some opportunities exist surrounding staff successfully incorporating the STEM framework into their content areas, tying each indicator to specific standards. Additionally, there are opportunities to increase student investment in the overall framework. The following short- and long-term steps are outlined below to target each opportunity.

Integrate POL & Core Instruction

Short Term:

- Attach content standards to each component of the design process rubric used schoolwide for PBL.
- POL/STEM competencies are included in department long-range planning and PLC documents.
- Embed and identify POL competencies within each lesson.
    - Ex: In the book Harbor Me, each main character demonstrates mental perseverance because they all experience challenges and use a tool to share their stories and cope.

Long Term Goals: To have consistent use of the STEM language in all classes as we work with our

Students.

Research + Resources that inspired and informed our thinking

In what ways has participating in the network supported your learning and unlearning this year? What more do you look forward to?

Participating in the network gave us a reason to do this good work for students. At Lied SA, we want to be a part of creating a vision for what education in Nevada can look like. When we looked at our school through the lens that being a part of the network gives us, we identified an area in which we can improve what we do for students.

Participating in the network has allowed us to gain validity in this work through our conversations with all aspects of the network, including other schools across Nevada, the Competency Champions that Claire is a part of, and the network leadership team.

Applying the knowledge and skills gained from the network allows us to tackle complex challenges innovatively, pushing the boundaries of our current understanding and capabilities in the POL skills and competencies.

Building more connections with industry leaders, experts, and peers may open more doors to new opportunities and insights for students.

Continuing to engage actively with the network will bring even more opportunities for growth and development in the future.

Hyperlink texts, case studies, blogs, and additional media that inspired the work

https://www.ascd.org/el/articles/high-impact-leadership

STEM Tank

https://casel.org/fundamentals-of-sel/what-is-the-casel-framework/#classrooms

Ellis, E. (2022). Classroom-Ready Resources for Student-Centered Learning. Ulysses Press.

(Tucker, C. R., & Novak, K. (2022). The Shift to Student-Led: Reimagining Classroom Workflows with UDL and Blended Learning. IMPress.)