

# STEAM ECHO Project v.3

## Final Report

May 2022

### Executive Summary

The STEAM ECHO Project completed its third iteration during the 2021-2022 school year. We adopted the Project ECHO model to facilitate professional development for a cohort of 11 elementary teachers in New Mexico. The project built on the successes of our projects the prior two years, and used the ECHO model's interactive video conference format featuring a case-study approach, with the goal to improve teachers' abilities to develop and deliver high quality interdisciplinary lessons grounded in the Next Generation Science Standards (NGSS) and informed by the NM Core Arts Standards. Over the 7 month span of the project, the teachers, specialists and facilitators formed a learning community in which they practiced developing and delivering STEAM lessons and shared them with the group, who collectively analyzed the lessons in the context of the NGSS Science Practices and Cross Cutting Concepts and the NM Core Arts Standards. After a kickoff training session and 12 video conference sessions, the participants showed dramatic increases in their proficiency with the NGSS framework, and the Core Arts Standards, and they showed a strong preference for the online ECHO format as opposed to traditional in-person professional development. We compare the findings between this year's cohort and the first two series.



## **Objectives**

The program set out to accomplish the following objectives for the teacher participants:

- Model and explore successful elements for collaboratively developed STEAM lessons that align with Next Generation Science Standards / NM STEM Ready! science standards
- Develop familiarity and practice with NGSS, particularly science and engineering practices and crosscutting concepts
- Create a supportive professional learning community in which teachers can safely practice and refine their STEAM lessons and contribute constructive feedback
- Co-develop and share a valuable resource library of high quality Standards-based STEAM lessons and tools for teachers to use

In addition, the program had a higher level objective to adapt the ECHO model for school teachers, to test its efficacy compared to traditional in-person traditional development, and to compare the results with the outcomes from the first STEAM ECHO project.

## **Program Overview**

Forty-two teachers registered to participate in the program, ranging from 3<sup>d</sup> grade to 7<sup>th</sup> grade. Seventeen participants attended the kickoff, and eleven of the teachers completed the program and qualified for the stipend by participating in at least 10 of the 12 video conference sessions.

The program began with a 2 hour online introductory kickoff session. The rest of the program occurred online every other Wednesday from 4:15-5:30pm via Zoom. During each of these sessions, each participant had the opportunity to present a lesson they shared in a standardized lesson template format. The program ended with a final retrospective session where the participants reflected on the impact the program had had on them.

## Session Outline

Each session followed a standardized format, and the program facilitator worked to keep to the agenda such that everything could be covered within the allotted 1:15 time.

- Welcome and Introductions
- Lesson Introduction
- Lesson Plan Presentation
- Discussion - If you were to teach this lesson, what part of this lesson feels the most challenging to you?
- Discussion - What part of this lesson do you feel will be the most challenging to your students?
- Discussion - What part of this lesson do you feel could be connected with students' lives outside of school?
- Discussion - How does this Cross Cutting concept work with this Practice? (Polleverywhere)
- Discussion - Which Science Practices are best served by this? (Polleverywhere)
- Discussion - Which Art Practices are best served by this? (Polleverywhere)
- Discussion - Where does it best fit into the curriculum?
- ECHO updates
- Post Session Reflections (via Google Form)

## Technology Tools

**Zoom** was the video conferencing tool used for the online sessions, and the Zoom license for the program was provided by Project ECHO.

**Padlet** served as a simple web destination that contained all the information the participants needed, including the schedule of sessions, the link to join Zoom, the lessons in the resource library, the lesson template and resources for creating lessons, as well as the link to the post-session reflection form.

We used a dedicated URL to make it easy for participants to access the resources in Padlet: [steamecho.world](https://steamecho.world)

**Google Docs** was used to host the lesson template and the lessons in the resource library that were then linked to from within Padlet.

**Google Forms** was used for the post-session reflections, as well as the final survey, and the data analysis in the Results section below.

**PollEverywhere** is an interactive polling tool that was accessed via the participants' phones, enabling them to respond to simple questions via SMS message. During each session we used Polleverywhere to ask: "What Science Practice is best addressed by this lesson?" and "What Cross Cutting Concept is best addressed by this lesson?". The results were collected within just a few seconds and were used to guide the discussion.

## **Post Session Reflections**

After each session, we asked the participants to fill out a brief google form to answer the following questions:

- What was helpful about today's session?
- What do you still have questions about?
- What are your next steps? In what ways might you apply what you learned?
- What could we have done better?

See selected reflection responses in the Appendix.

## **Stipends**

To display respect for the teachers' time, and to help ensure consistent participation, we offered \$25 stipends per session to teachers who participated in at least 9 of the 12 online sessions, and who completed the final assessment survey. We initially accepted 42 participants, 17 of whom attended the in-person kickoff event, 11 of whom made it to the final session, and met the criteria to be paid the stipends.

## **Results:**

In addition to the post-session reflections, we also gave participants a detailed survey via a google form at the conclusion of the series to assess how the program had accomplished its goals. Completion of the survey was a condition for receiving the stipend. The pilot STEAM/ECHO project clearly achieved its stated objectives as measured in the survey results.

Results are displayed for V3, the third iteration of the project, completed in Spring 2022, followed by the results from V2 and V1, the prior projects, completed in Spring 2021 and 2020. The comparison between years one, two and three demonstrates that the extraordinary results from the earlier years were not anomalous, but could be reproduced, and even improved upon.

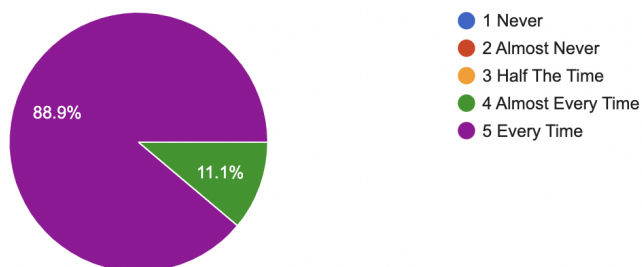
**Objective 1: Model and explore successful elements for collaboratively developed STEAM lessons that align with Next Generation Science Standards/ NM STEM Ready science standards**

Of the respondents, 88.9% (11/13) reported that the program met its first objective every time, while the remaining 15% reported it met its first objective nearly every time.

This was comparable to and slightly better than the findings for the pilot program V1, where 81.8% (18/22) reported that the program met its first objective every time and V2 where 84.6% did.

How well did the STEAM ECHO meet its first objective?

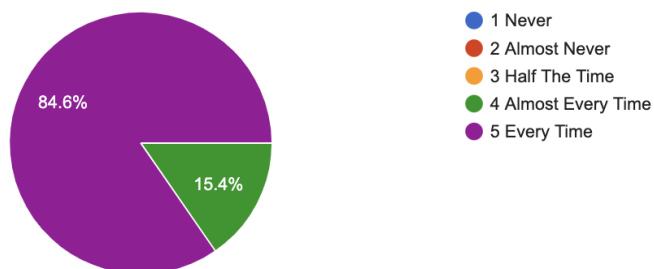
9 responses



V3 - 2022

How well did the STEAM ECHO meet its first objective?

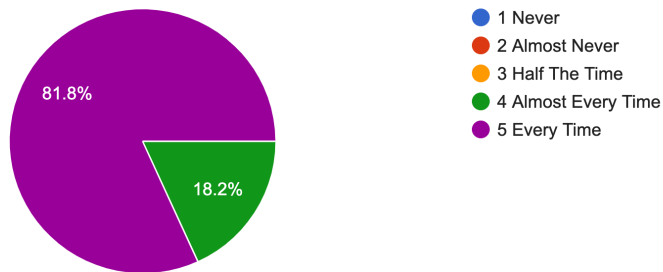
13 responses



V2 - 2021

How well did the STEAM ECHO meet its first objective?

22 responses

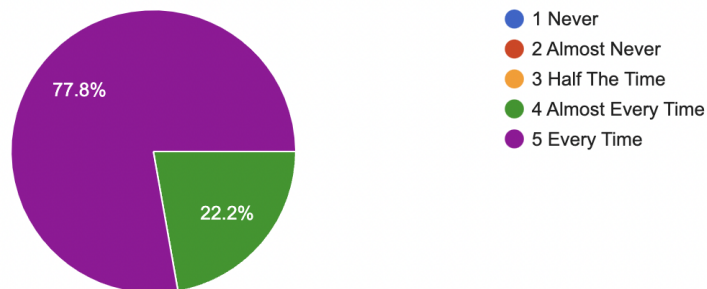


V1 - 2020

**Objective 2: Develop familiarity and practice with NGSS, particularly science and engineering practice and cross cutting concepts**

How well did the STEAM ECHO program meet its second objective?

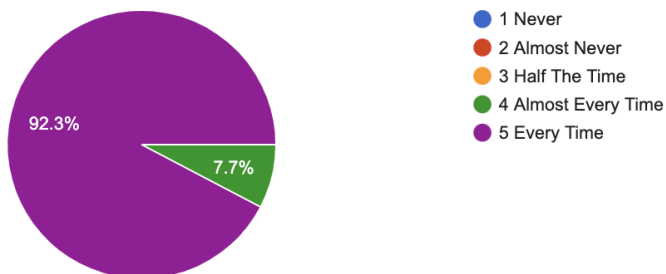
9 responses



V3 - 2022

How well did the STEAM ECHO program meet its second objective?

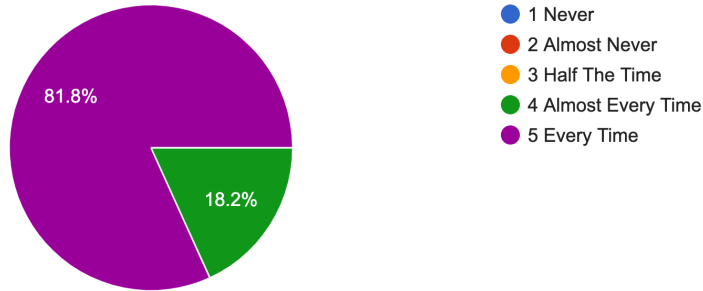
13 responses



V2 - 2021

How well did the STEAM ECHO program meet its second objective?

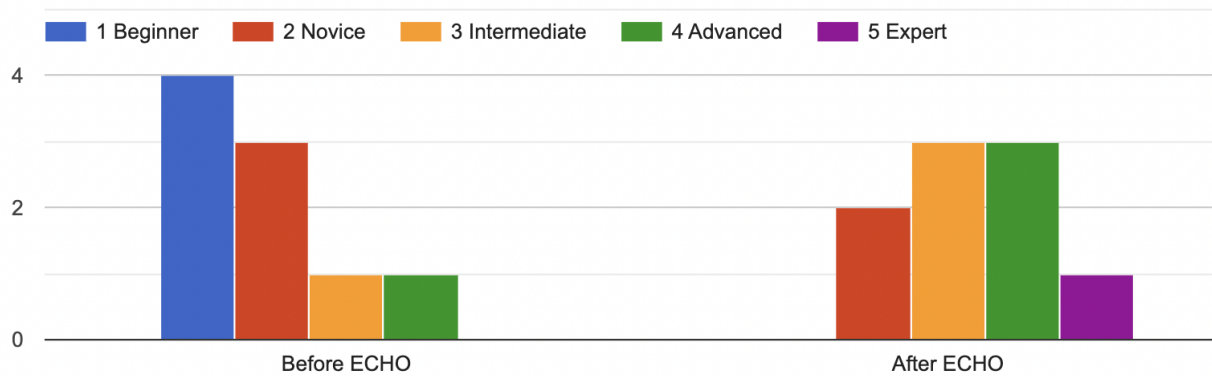
22 responses



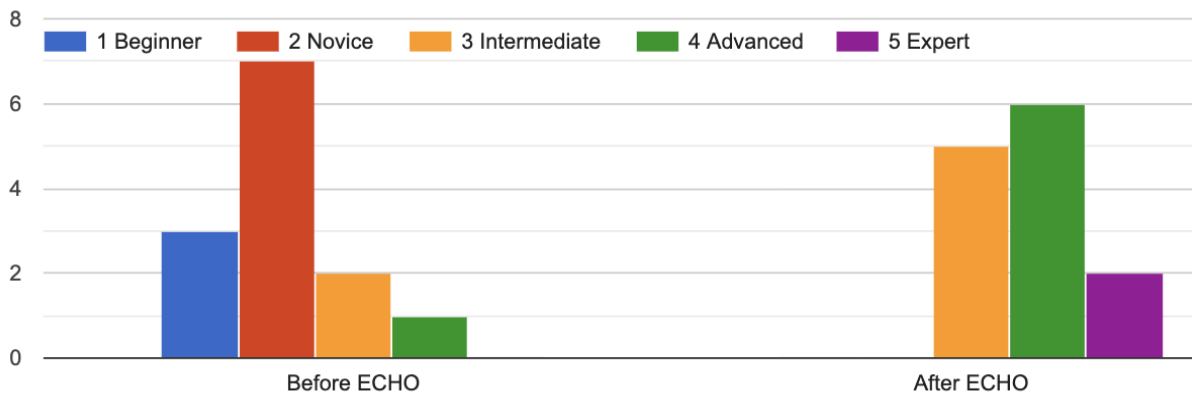
V1 - 2020

We used a Retrospective Pre-Post survey tool to determine their skill level with the following question:

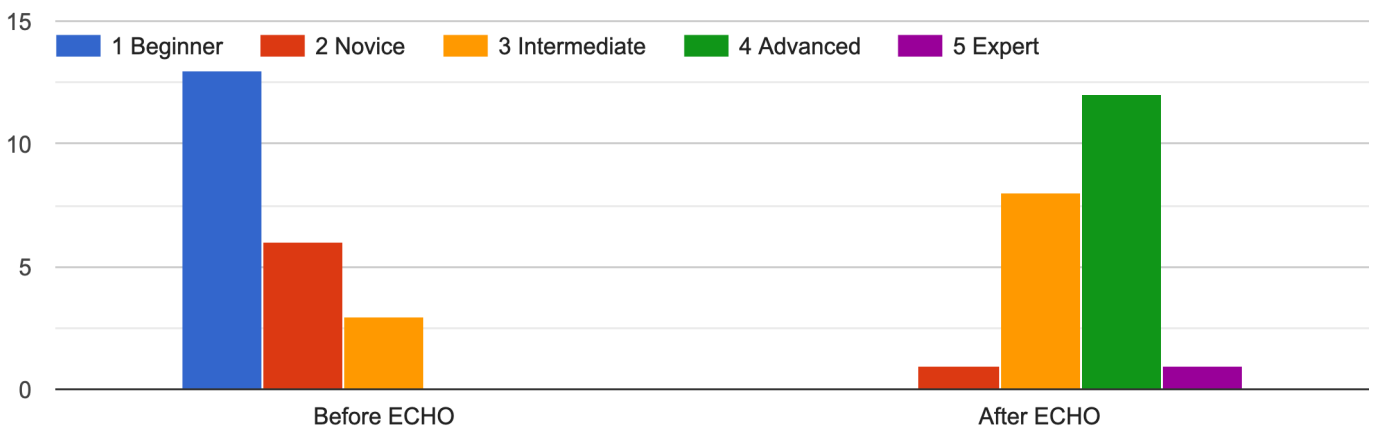
**“Please indicate your skill level in applying the NGSS Crosscutting Concepts in your lessons before and after the STEAM ECHO”**



V3 - 2022



## V2 - 2021

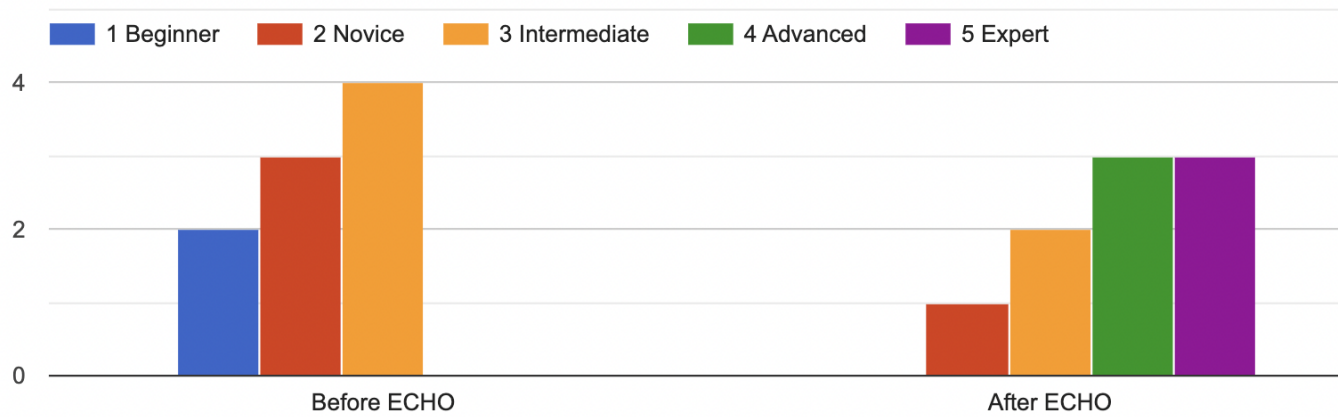


## V1 - 2020

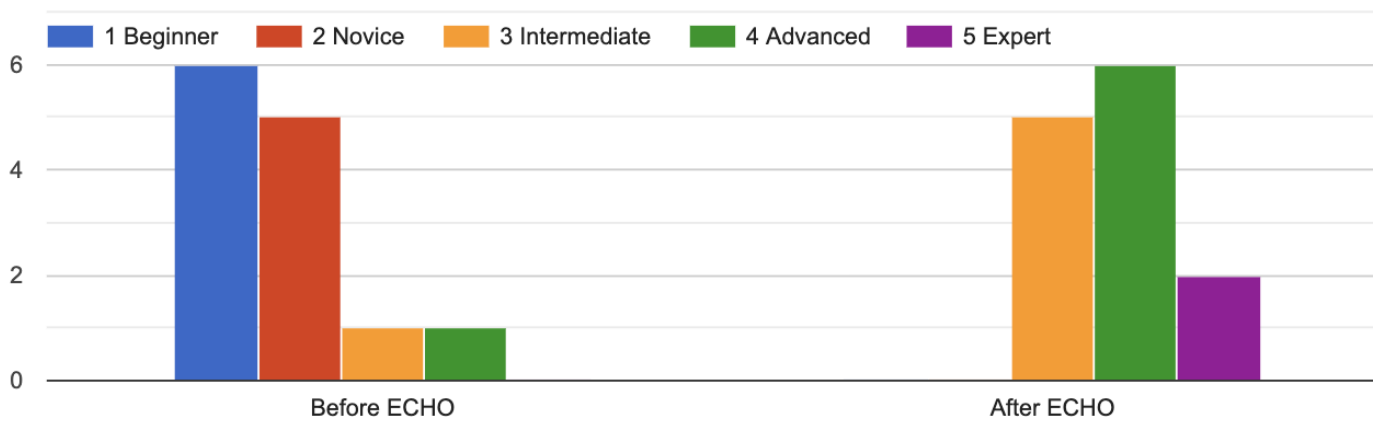
We used a Retrospective Pre-Post survey tool to determine their skill level with the following question:

**“Please indicate your skill level in applying the NGSS Science Practices in your lessons before and after the STEAM ECHO”**

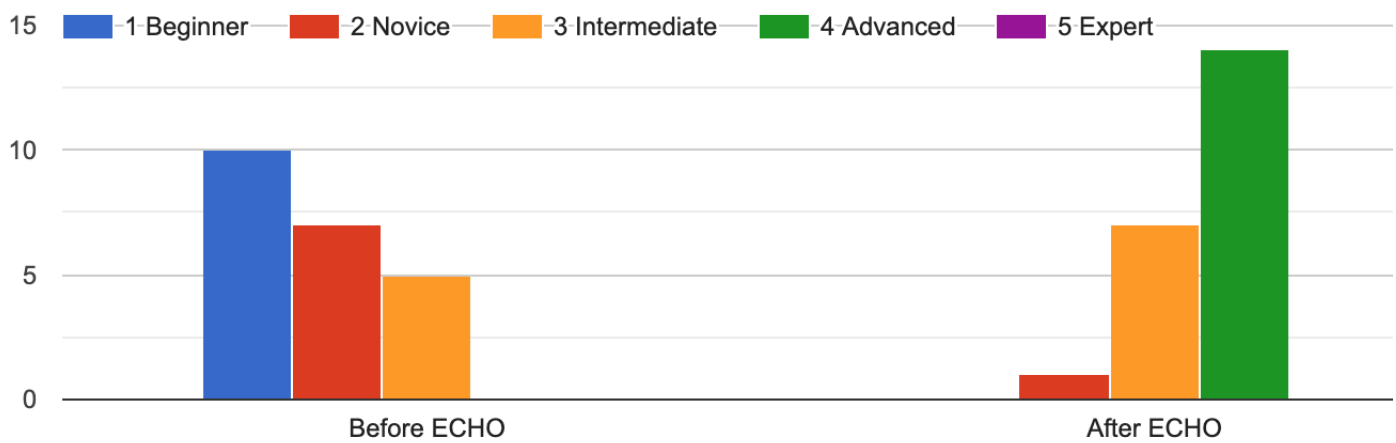




V3 - 2022



V2 - 2021

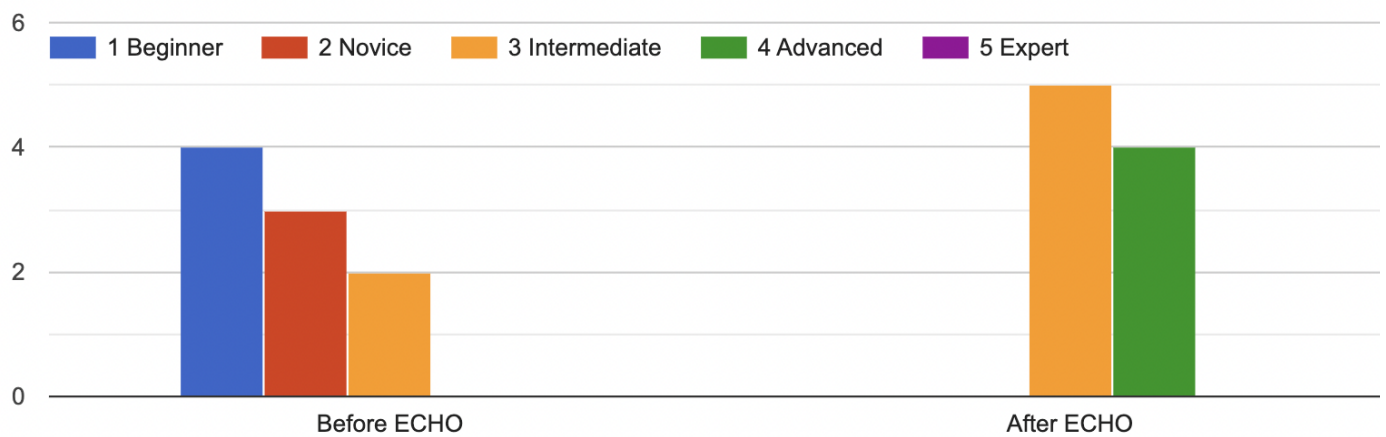


V1 - 2020

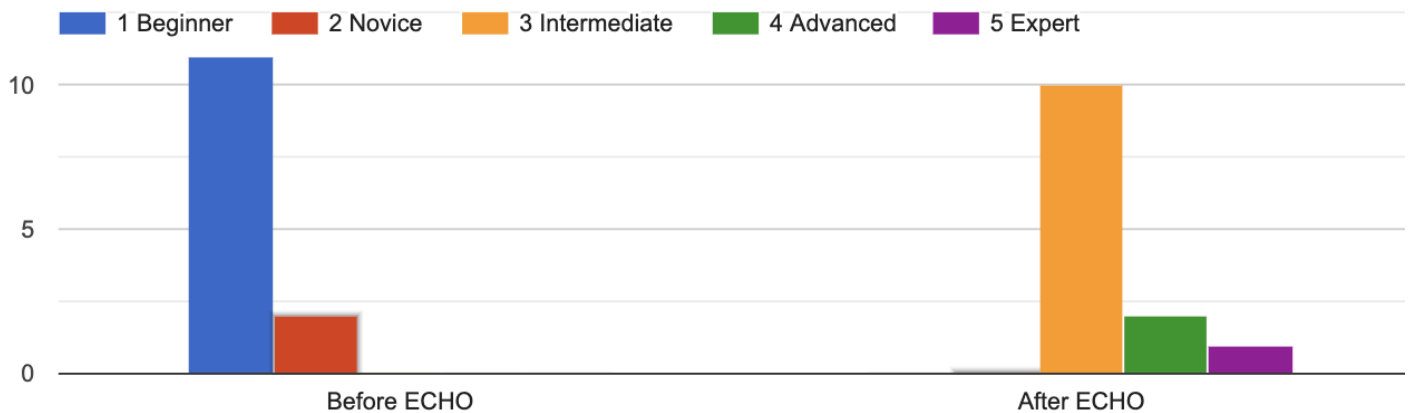
In all years we found a strong movement from Beginners towards Intermediate and Advanced, and in V2 and V3 there was movement all the way to Expert.

We used a Retrospective Pre-Post survey tool to determine their skill level with the following question:

**Please indicate your skill level in applying the New Mexico Core Arts Concepts in your lessons before and after the STEAM ECHO:**



V3 - 2022



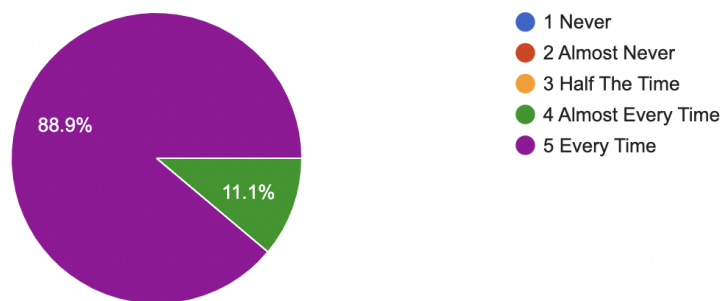
V2 - 2021

We did not ask this question during the V1 pilot, as we did not explicitly address the art standards met by each of the lessons presented. The results for V2 show strong movement from Beginner to Intermediate, with a small reach into Advanced and Expert.

**Objective 3: Create a supportive professional learning community in which teachers can safely practice and refine their STEAM lessons and contribute constructive feedback**

How well did the STEAM ECHO program meet its third objective?

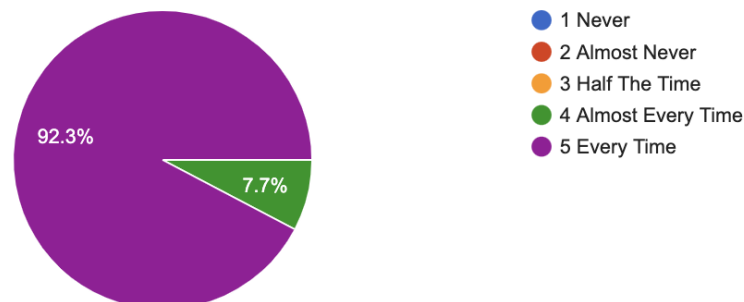
9 responses



V3 - 2022

How well did the STEAM ECHO program meet its third objective?

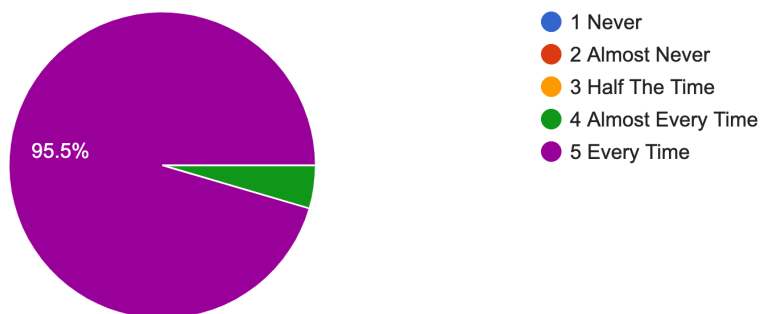
13 responses



V2 - 2021

How well did the STEAM ECHO program meet its third objective?

22 responses

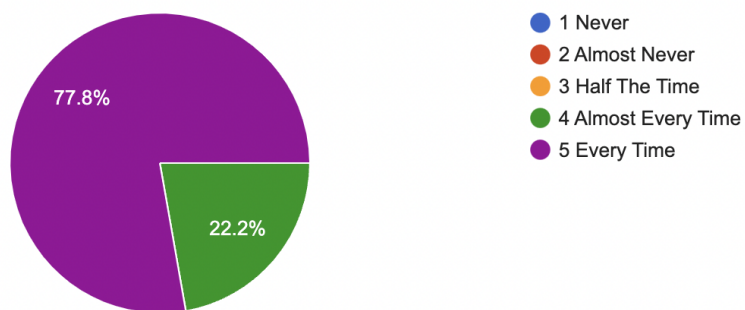


V1 - 2020

**Objective 4: Co-develop and share a valuable resource library of high quality Standards-based STEAM lessons and tools for teachers to use**

How well did the STEAM ECHO program meet its fourth objective?

9 responses



V3 - 2022

How well did the STEAM ECHO program meet its fourth objective?

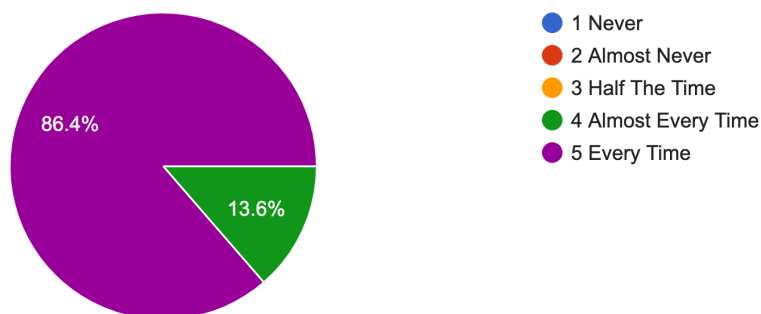
13 responses



V2 - 2021

How well did the STEAM ECHO program meet its fourth objective?

22 responses



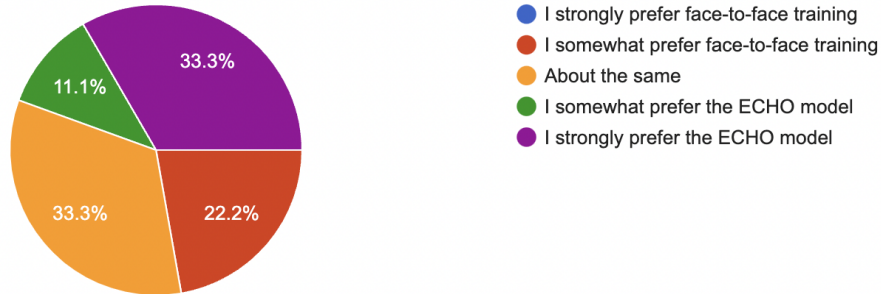
V1 - 2020

In V2 we improved our usage of the Padlet tool to host our [resource library](#), with a better organization of content and a dedicated public URL [steamecho.world](#) that likely contributed to the 100% response that the program met its 4th objective completely. However in V3 the slightly lower result may have been due to the lower accrued value because of the smaller number of lessons shared in the library.

How did your experience with the STEAM ECHO program compare with receiving professional development face-to-face?



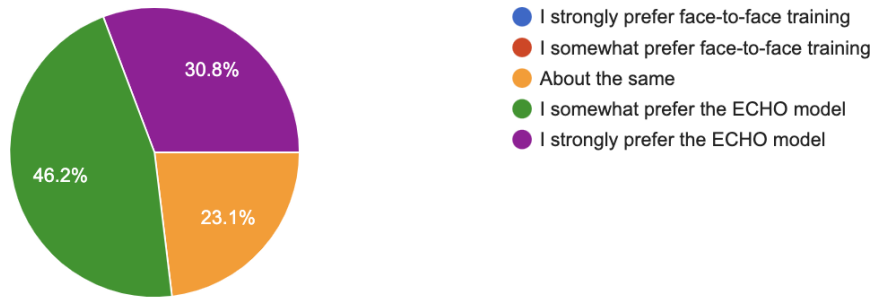
9 responses



### V3 - 2022

How did your experience with the STEAM ECHO program compare with receiving professional development face-to-face?

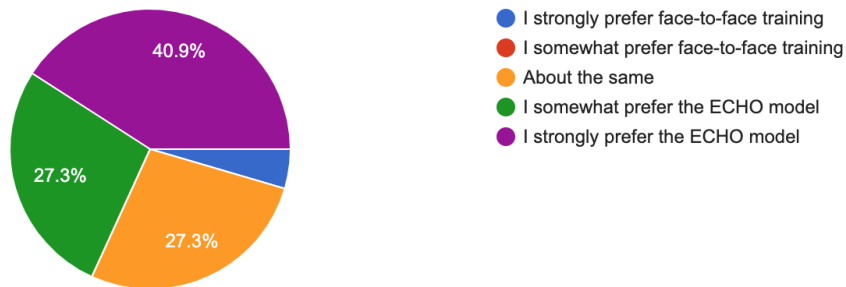
13 responses



### V2 - 2021

How did your experience with the STEAM ECHO program compare with receiving professional development face-to-face?

22 responses

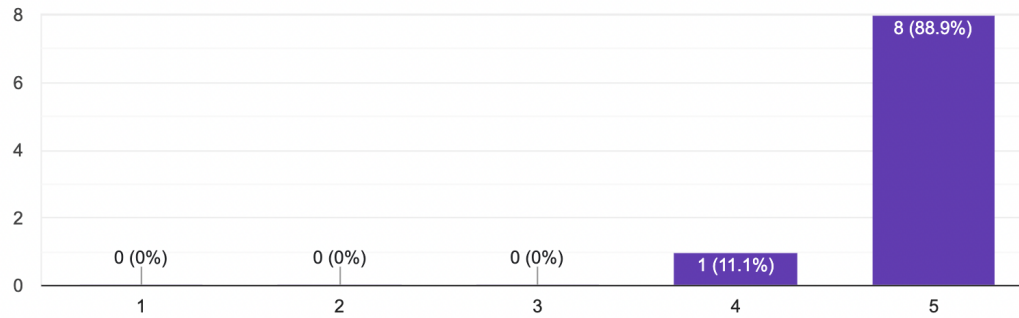


### V1 - 2020

I would attend future STEAM ECHO programs, similar to this one but with a different focus.



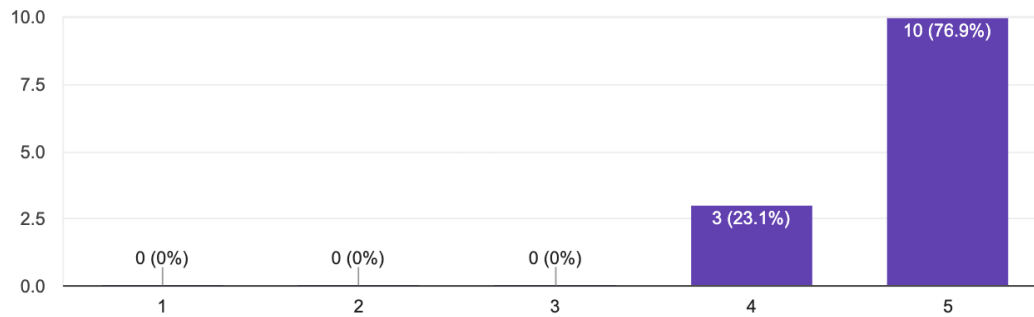
9 responses



### V3 - 2022

I would attend future STEAM ECHO programs, similar to this one but with a different focus.

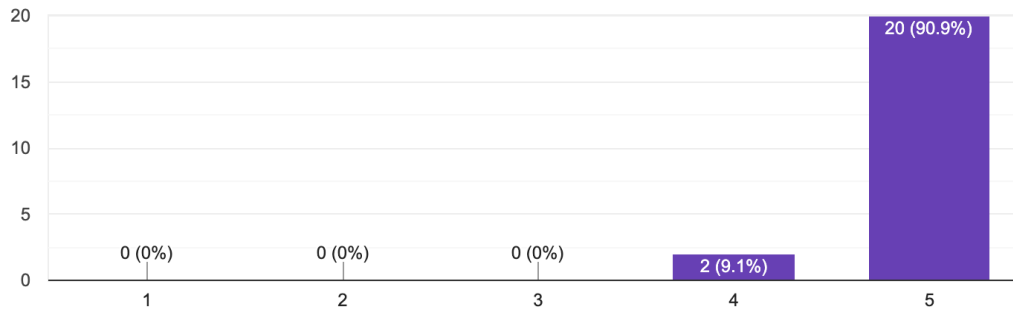
13 responses



### V2 - 2021

I would attend future STEAM ECHO programs, similar to this one but with a different focus.

22 responses



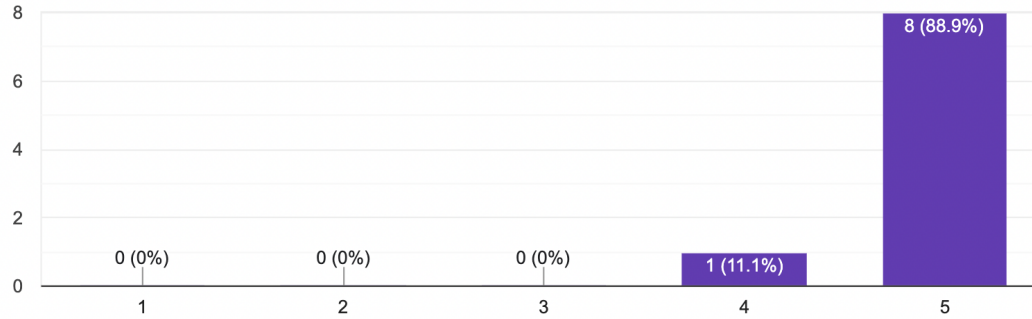
### V1 - 2020

(1 = Strongly Disagree; 5 = Strongly Agree)

I would recommend the STEAM ECHO program to a fellow teacher.



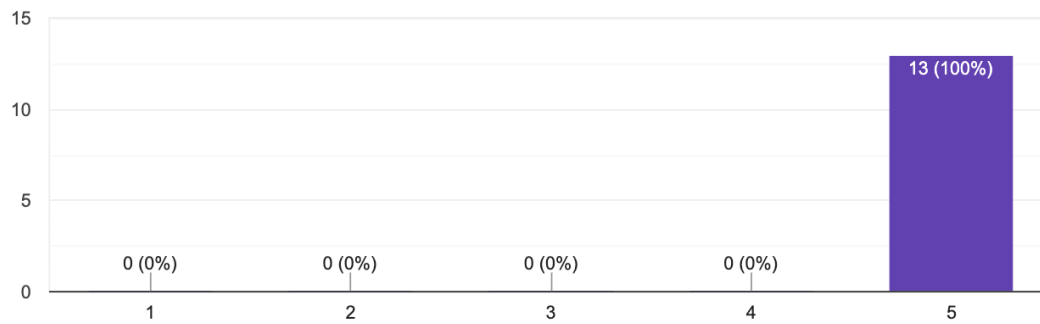
9 responses



### V3 - 2022

I would recommend the STEAM ECHO program to a fellow teacher.

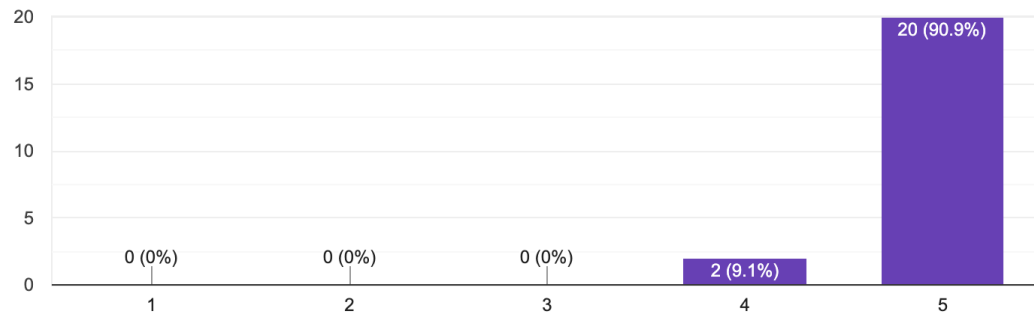
13 responses



### V2 - 2021

I would recommend the STEAM ECHO program to a fellow teacher.

22 responses



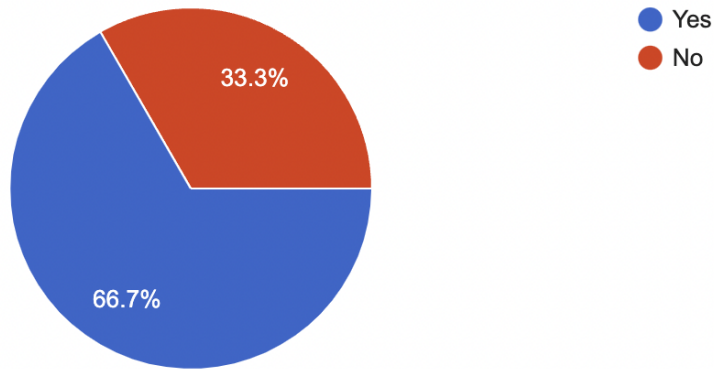
### V1 - 2020

(1 = Strongly Disagree; 5 = Strongly Agree)



Did you share the information you learned from the ECHO sessions with your professional peers in your school?

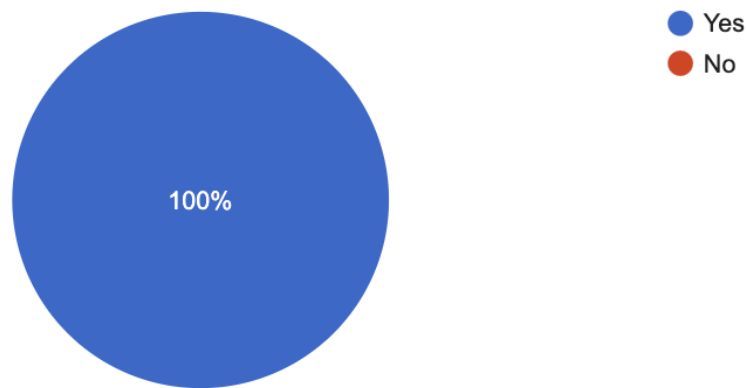
9 responses



V3 - 2022

Did you share the information you learned from the ECHO sessions with your professional peers in your school?

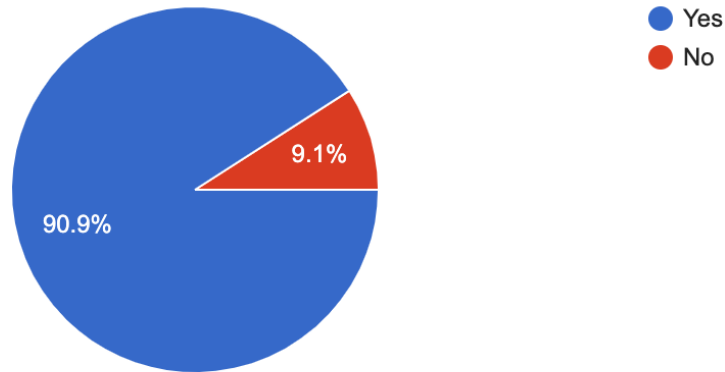
13 responses



V2 - 2021

Did you share the information you learned from the ECHO sessions with your professional peers in your school?

22 responses

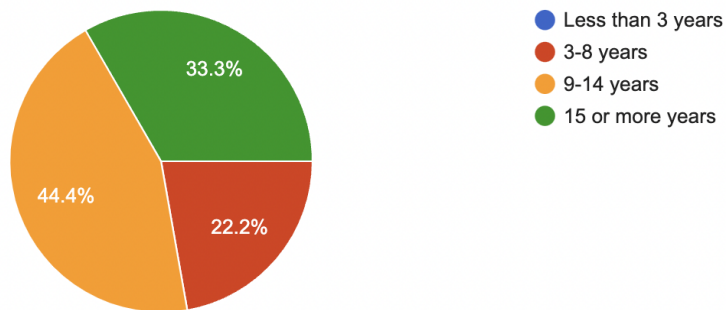


V1 - 2020

Participant Demographics:

How many years have you worked in K-12 Education

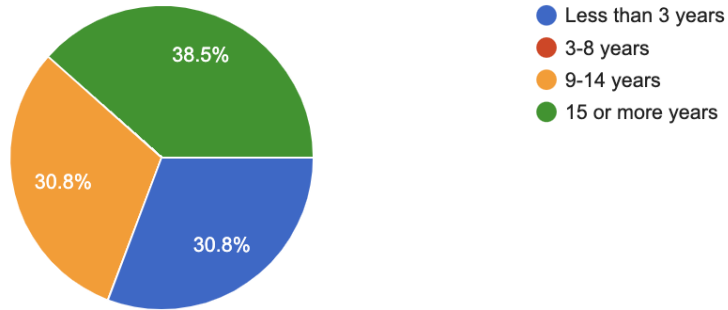
9 responses



V3 - 2022

How many years have you worked in K-12 Education

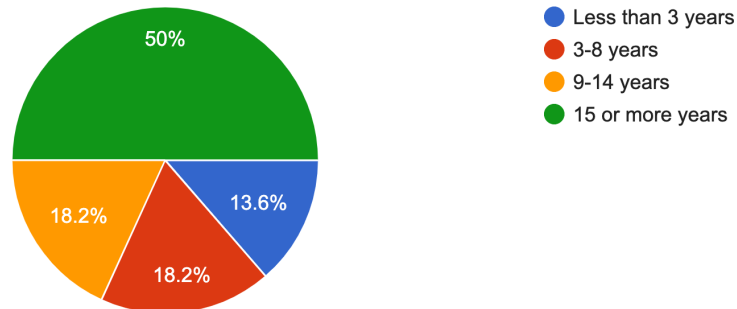
13 responses



V2 - 2021

How many years have you worked in K-12 Education

22 responses



V1 - 2020

## **Conclusions**

The STEAM ECHO model used in this project represents a unique and highly effective approach to professional learning. The model resulted in the construction over time of each participant's knowledge and understanding of New Mexico's new science standards - regardless of where they started from. This approach allowed participants to apply the standards under different circumstances, while asking probing questions and allowing participants to build a strong justification for their answers. We found that these answers became more nuanced and sophisticated after about 6-8 STEAM ECHO sessions. The STEAM ECHO model included creating a safe space for teachers to "try out" their ideas and self correct along the way. In this way, the platform used - virtual versus in-person - became less important than the results of the experience. In fact, Zoom provided greater access and convenience than a series of in-person events would have.

The STEAM ECHO session consisted of a lesson presented by a participant, as part of the goal to co-create a useful resource library of STEAM lessons. Each lesson was then reviewed by the community of learners through the lens of the Next Generation Science Standards, for Scientific and Engineering Practices and Crosscutting Concepts, and the NM Core Arts Standards. The project served to introduce or solidify NGSS concepts to the group of participants, who largely identified themselves as beginners to the standards. It also introduced many participants for the first time to the Arts Standards. The virtual context was novel enough at the start to create a needed "reset" in the cultural norms of education professional development. The opportunity to use remote learning tools was said by our participants to be very useful for the ensuing era of remote continuous learning. Though focused on the NGSS, the example of remote learning co-development using the ECHO model poses many possibilities for our state and beyond.

## **Partners and Sponsors**

The STEAM ECHO project was a collaboration between several organizations. The Fractal Foundation - a signed partner with Project ECHO - was the program leader and identified the subsequent collaborators. Explora was a key partner, and an expert facilitator who is highly trained in STEM professional development for teachers. His participation in both the design and execution of the program was indispensable. Explora also served as the fiscal agent for the program's main sponsor, Air Force Research Lab of New Mexico. The Golden Apple Foundation of New Mexico provided valuable advisory support, as well as helping us recruit participants via their email list of teachers. The Parnall Law Firm also graciously provided support to help develop and implement the program. The ECHO Institute provided invaluable mentoring and support to help us design, implement and evaluate the STEAM ECHO project. We gratefully acknowledge the support of all our partners and sponsors who helped make this pilot project such a success.

# Appendices

Appendix A: Next Generation Science Standards - Science Practices and Cross Cutting Concepts

Appendix B: Case presentation form - lesson plan template

Appendix C: Selected feedback reflection responses from participants

## Appendix A

### Next Generation Science Standards - in a Nutshell

#### Scientific and Engineering Practices

<p><b>1. Asking questions (for science) and defining problems (for engineering)</b></p> <p>A basic practice of the <i>scientist</i> is the ability to formulate empirically answerable questions about phenomena to establish what is already known, and to determine what questions have yet to be satisfactorily answered.</p>	<p><i>Engineering</i> begins with a problem that needs to be solved, such as "How can we reduce the nation's dependence on fossil fuels?" or "What can be done to reduce a particular disease?" or "How can we improve the fuel efficiency of automobiles?"</p>
<p><b>2. Developing and using models</b></p> <p><i>Science</i> often involves the construction and use of models and simulations to help develop explanations about natural phenomena.</p>	<p><i>Engineering</i> makes use of models and simulations to analyze systems to identify flaws that might occur or to test possible solutions to a new problem.</p>
<p><b>3. Planning and carrying out investigations</b></p> <p>A major practice of <i>scientists</i> is planning and carrying out systematic scientific investigations that require identifying variables and clarifying what counts as data.</p>	<p><i>Engineering</i> investigations are conducted to gain data essential for specifying criteria or parameters and to test proposed designs.</p>
<p><b>4. Analyzing and interpreting data</b></p> <p>Scientific investigations produce data that must be analyzed to derive meaning. <i>Scientists</i> use a range of tools to identify significant features and patterns in the data.</p>	<p><i>Engineering</i> investigations include analysis of data collected in the tests of designs. This allows comparison of different solutions and determines how well each meets specific design criteria.</p>
<p><b>5. Using mathematics and computational thinking</b></p> <p>In <i>science</i>, mathematics and computation are fundamental tools for representing physical variables and their relationships.</p>	<p>In <i>engineering</i>, mathematical and computational representations of established relationships and principles are an integral part of the design process.</p>
<p><b>6. Constructing explanations (for science) and designing solutions (for engineering)</b></p> <p>The goal of <i>science</i> is the construction of theories that provide explanatory accounts of the material world.</p>	<p>The goal of <i>engineering</i> design is a systematic approach to solving engineering problems that is based on scientific knowledge and models of the material world.</p>
<p><b>7. Engaging in argument from evidence</b></p> <p>In <i>science</i>, reasoning and argument are essential for clarifying strengths and weaknesses of a line of evidence and for identifying the best explanation for a natural phenomenon.</p>	<p>In <i>engineering</i>, reasoning and arguments are essential for finding the best solution to a problem. Engineers collaborate with their peers throughout the design process.</p>
<p><b>8. Obtaining, evaluating, and communicating information</b></p> <p><i>Science</i> cannot advance if scientists are unable to communicate their findings clearly and persuasively or learn about the findings of others.</p>	<p><i>Engineering</i> cannot produce new or improved technologies if the advantages of their designs are not communicated clearly and persuasively.</p>

#### Crosscutting Concepts

<p><b>1. Patterns</b></p> <p>Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.</p>
<p><b>2. Cause and Effect: Mechanism and Explanation</b></p> <p>Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain new contexts.</p>
<p><b>3. Scale, Proportion, and Quantity</b></p> <p>In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.</p>
<p><b>4. Systems and System Models</b></p> <p>Defining the system under study – specifying its boundaries and making explicit a model of that system – provides tools for understanding and testing ideas that are applicable throughout science and engineering.</p>
<p><b>5. Energy and Matter: Flows, Cycles, and Conservation</b></p> <p>Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.</p>
<p><b>6. Structure and Function</b></p> <p>The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.</p>
<p><b>7. Stability and Change</b></p> <p>For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of the system are critical elements of study.</p>

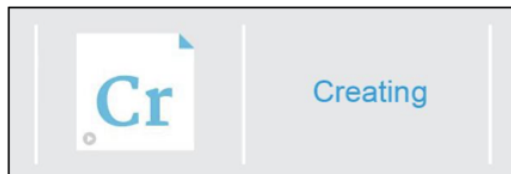
# NMPEd

## New Mexico Core Arts Standards

The New Mexico Core Arts Standards ensure valuable student and community learning and instruction and the inclusion of New Mexico's rich history and culture. All instances within the national core arts standards where content standards, benchmarks and performance standards reference history or culture shall be interpreted to include New Mexico history and culture. References to artwork shall be interpreted to include local and New Mexico produced artwork. The department and local education agencies shall provide guidance and technical assistance to support the integration of New Mexico history and culture in consultation with tribal leaders.

**ARTISTIC PROCESSES ~ Creating, Performing/Presenting/Producing, Responding, Connecting**

**Anchor Standards!** *These anchor standards below are parallel across arts disciplines and grade levels and serve as the tangible educational expression of artistic literacy. – National Coalition for Core Arts*

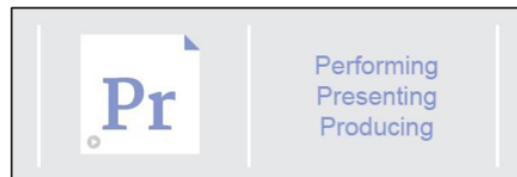


Conceiving and developing new artistic ideas and work.

**Anchor Standard #1.** Generate and conceptualize artistic ideas and work.

**Anchor Standard #2.** Organize and develop artistic ideas and work.

**Anchor Standard #3.** Refine and complete artistic work.



Realizing, interpreting and presenting artistic ideas and work.

**Anchor Standard #4.** Select, analyze and interpret artistic work for presentation

**Anchor Standard #5.** Develop and refine artistic techniques and work for presentation.

**Anchor Standard #6.** Convey meaning through the presentation of artistic work.

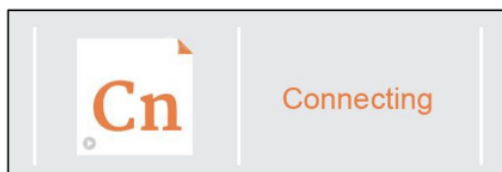


Understanding and evaluating how the arts convey meaning.

**Anchor Standard #7.** Perceive and analyze artistic work.

**Anchor Standard #8.** Interpret intent and meaning in artistic work.

**Anchor Standard #9.** Apply criteria to evaluate artistic work.



Relating artistic ideas and work with personal meaning and external context.

**Anchor Standard #10.** Synthesize and relate knowledge and personal experiences to make art.

**Anchor Standard #11.** Relate artistic ideas and works with societal, cultural and historical context to deepen understanding.

# Appendix B

Case presentation form - sample lesson plan template:

<https://docs.google.com/document/d/1S6eygZmgfoFWgmYKYrB3MHR-km3RwTLQQCTacMjcmh8/edit#>

# Appendix C

During the final session we asked participants to reflect on the impact their participation in the program had had, as well as opportunities for improvement. See the full responses at [steamecho.world](http://steamecho.world).

**Parting Thoughts**  
Made with big dreams

**As a result of SteamEcho I...**  
I was not very familiar with STEAM & this completely opened my mind to what it looks like in a classroom. Every week a new door opened!

**Comfort and Adventure**  
I feel much more comfortable getting out of my content area and incorporating different approaches and skills.

**I gained a much deeper understanding of the Science Practices. And I learned so many great lesson ideas**

**I have more confidence in developing STEAM lessons for my Middle School students.**  
I have learned so much from everyone during this PD. It has

**Something I really liked...**  
**The Value of this Steam Echo class for me....**  
I really appreciated having a cohort of fellow teachers who were willing to share their inspiration and lessons and ideas and feedback. It was an amazing PD and I am so thankful to have had my time and effort recognized and compensated by the sponsors. The leaders and coordinators were so helpful and willing to give of their time as well.

**How friendly and generous everyone was with their time, creativity, and expertise. So impressed by this community!**

**Snippets and Full Lessons**  
I really loved how I could use snippets of the lessons shared as

**Something I thought we could improve, or it would be better if...**  
**Videos of the Presentations were available.**  
I know at some point we started to record the presentations, but I think it would be so great to go back and be able to watch a 20 minute presentation again.

**Voting**  
The cellphone voting was difficult for me - my carrier maybe?

**I second the videos!**  
I agree—being able to go back and rewatch a video when I am ready to adapt a lesson would be amazing.

**Videos and coming back to lessons**

**Other parting thoughts**  
I will miss everyone so much!

**Gratitude**  
I feel so appreciative of the cooperating teachers and their willingness to share. I am also grateful for the accessibility of all of this material - which has been a gift in a year like this.

**Would have been great to participate in person-fun group of people & fun lessons!**

**I've really enjoyed all of you.**  
This has been such a nice opportunity to interact with other educators who are fun and dedicated and inspiring. Thanks so much to all of you!

This is me...STEAM Enriched!

Selected feedback reflection responses over the course of the 12 sessions are shared below.

### **What was helpful about today's session?**

Great to see how lessons & the centers we participated in were modeled and relate to the Practices and Cross Cutting Concepts

I enjoyed the lesson and the connections between art and mathematics!

The depth of knowledge that is in this room! So honored to be a part of this pilot

Facilitating discussion was helpful. Having someone direct was helpful. Sharing extensions to the lesson were good.

Thanks to Jeff for going first. It was nice to see an example before we have to jump in. The technology was so easy to use and much less intimidating than I thought it would be.

Excellent lesson and extension ideas! So many connections between subjects, thank you

The entire lesson is really interesting. I'm excited to incorporate it into my lessons and hopefully get my entire grade level and others on board to try it too!

Having the resources available for us on the website so we can just download and print. Thanks

Hearing the ideas for modifications and extensions

I really enjoyed the art as well as the geometry aspect of it. The whole fractal concept to me is really intriguing!

I love that this lesson can be simple, complex, independent, or collaborative. It helps me fit it into my curriculum easier.

I am finding the conversation about which CCCs and SEPs fit very helpful practice.

It was helpful to see a scaffolded lesson that led to something very complex.

I love the extra resources people are sharing!

Even though I was presenting I learned so much and now have an opportunity to change this lesson and ideas for the better!

I always come away from the ECHO sessions driven to do more with what is presented. It is refreshing to know that others have the same questions and just need "seeds" or ideas and we can create great curriculum for our students

Listening to all the different ideas and perspectives for enhancing the lesson discussed.

I really enjoyed today's lesson. It's creative, innovative, and would be extremely interesting to my students. I have already purchased the books that she referred to during the presentation and look forward to applying this lesson with my students!

The entire lesson was so thorough. I loved how it was a truly cross-curricular unit.

It is always great to see students so engaged! It is a great reminder that science and/or engineering are great ways to encourage creativity and problem solving!

This lesson was super user-friendly and applicable to so many levels of instruction. I thought it was a fun activity that really teaches the kids about force and motion.

I thought it was a nice reminder about how when we put a lot of thought into our lessons it can transform them from an average lesson to a superior one!

The lesson was engaging and detailed oriented. I enjoyed the technology incorporated with the lesson.

The use of math, science and art all in one lesson. The students practiced finding the area of various shapes while investigating the law of conservation of matter to ultimately make an art piece.

I really loved the math connection. During the discussion, there was a lot of input and ideas.



## **What do you still have questions about?**

During the time until we meet again, what can I do to come better prepared for discussions? I don't feel I am contributing to discussions as much as I would like. That could be to my lack of knowledge about NGSS.

My only question would be how could you work with fractals and another shape? Like could you do a fractal with squares or some other shape?

How to correlate the New Mexico specific standards to the NextGen standards.

Not knowing the core curriculum expectations I am not sure how students make sense of the concepts in a more general way.

This ECHO was like an NGSS phenomena and started making me wonder what the physical and chemical properties of certain art materials were and how they create different marbles paper designs. This also made me want to research turbulent fractal patterns in weather such as air masses and hurricanes. I was thinking of how marble designs form in nature and what minerals make up different pigments naturally.

Do STEAM lessons have to incorporate all 5 areas?

I wonder what would make the webinars more engaging? I do enjoy watching videos of students engaged in lessons. I'm thinking of my own presentation.

No questions, I appreciated the flexibility of the the facilitators

For me, I just need sometime to process and review her lesson plan, and the books. :) I'm sure I will have questions at that point!

I would like to see if students could create a paper/board/powerpoint that explains their design along with a video.

I guess I could use more details at times on the lesson plans.

no questions, they were answered during the discussion.

How to use Google classroom in this lesson. I think journaling was used, but I am not too familiar with how to do that. It gives me something to look into now.

I am still wondering about whether or not density changes... density is a physical property, if the density actually changes, then it would have undergone a chemical change, if not, then shrinking could be a physical change.

Nothing. Today was a thorough lesson plan again.

## **What are your next steps? In what ways might you apply what you learned?**

I will meet with my team teacher and start brainstorming how we can tweak this lesson to fit in with our grade level standards.

I am going to do the lesson with my class during math to apply measurement and proportions

I will pocket this information for future lessons! It is great! Possibly when we do our unit on the human body.

Next steps would be thinking of a lesson I would like to present and which practices to focus on now that I'm becoming a lot more familiar with them.

I will definitely start sharing these lessons in grade level collaborations that are coming up and in our vertical team meetings.

We have been working with measurement, perimeter and area using graph paper to represent linear and square units so this lesson ties in perfectly. I will have the students measuring and then recording lengths on graph paper to draw themselves to scale.

My next steps are to teach the lesson. I think it was a great way to go about teaching symmetry as well as scales, and also conversion for my 5th graders. I would also extend it into an informal explanatory piece for the kids to explain their thought processes to me.

I'm going to speak with our math teacher to see about doing one as a family math night activity.

I will be teaching this lesson to my gifted classes and taking pictures to share with this group. Thanks

Work on making adaptations to the lesson, perhaps focusing on different cross cutting concepts

I will present it in class, probably next week. I also will likely present this to the staff at my school.

I am trying to figure out when to use this with my 5th grade math intervention students and how they might take it back to their classrooms and teach about fractals!

I would like to revisit the theme of patterns as developed by our beginning of the year fractivities when we go on to study weather patterns, erosion, and surface area of the lungs.

I am actually planning on using this activity this week. Every week I have the students do a different hands on activity and then use the activity as the topic from which they write. Our schools 90 plan is focusing on improving the students writing. I was wondering what activity the students were going to do this week and now I have one for them.

For me, the next steps would be to become more familiar with the practices and cross cutting concepts to engage and make meaningful contributions to discussions. I'm thinking of maybe finding a teacher to participate in weekly lessons, or attending after school coding clubs.

This is a great activity for our Makerspace and will be integrated into the ART area where we will transform the 2D into 3D and see what creativity happens!

I am going to start sharing with my teachers some of the lessons that have been presented. My focus is Reading with one group for math so I need a way to share these great ideas to my great teachers!

I am going to look through the 5th grade standards especially the Earth systems to see how I can bring this activity into my classroom.

I have started to share some ideas with my staff but am trying to figure out how to share more!

I want to use this as a mini lesson to do a community building game with my 6th graders. They love engineering activities. We could compete for accuracy and distance, or make the pom pom launchers into a team/partner sport of catch.

I would love to have a quick rocket activity up my sleeve, and I love that this one can be done in a short amount of time. I am going to consider it as an inquiry project.

I will read the included lesson plan very carefully. I am also looking forward to implementing the four different tasks in the group work.

I would like to implement this into my STEAM block.

This lesson inspired me to try to incorporate art into more of my science and math lessons.

These sessions help me think deeper about my own lessons and how to make them more multi-dimensional

For my middle school students, I think I will apply this lesson during testing time, this will help students have fun and still learn something new.

I saw in today's lesson a way to combine many different subject areas that I had never really seen before. I am motivated to try to incorporate these ideas into my own lesson planning.

### **What could we have done better?**

I honestly don't know. I loved today!

The technical issues were on my end, not yours, so nothing.

I really can't think of any ways to make it better right now.

Nothing. I liked the format and the moderations was great.

I don't think there is anything. I truly enjoyed the lesson and the other comments. It was well planned and the timing seemed appropriate.

I think all of you do a good of keeping us informed and providing a communication platform. I wonder if more participants would be willing to reflect or respond to questions posted on Padlet.

It was very well explained and seeing and having our own fractal made a great impact on "what it is" and "what else" can you see it used for. Nothing could be done better for me!

Nothing, great discussion of scientific practices!

Nothing. I think this was the best discussions that we have had so far. I think people are getting more comfortable with the content and one another. I can't wait to see how we grow and we continue the Echo.

I think what you're doing is great. I like Slack and having the different channels to join.

The issues are mine not yours. The sessions are opening in another window and the Poll Everywhere text works vs. the app so I think I've got it now. Thank you!

Done well...just wondering, though, can these sessions be shortened to one hour long?

I can't think of anything that needs to be done better. Thank you for creating this great forum for educators to share lessons!

I wonder how we can motivate others to participate?

I just need to do a better job of reading the lesson plans ahead of time. I always need time to process... it helps me participate better!

Nothing. Thank you again for having this group!

Nothing, everyone was very helpful and ready to input ideas.

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- As a result of Project STEAM Echo I \_\_\_\_\_

I feel more comfortable in using the Next Generation science standards. I also feel confident with our current situation to be able to do some sort of on-learning with Zoom (which I appreciate immensely!) I am also excited again to reinvent the wheel of my science courses for next year. I also really like Zoom as a collaborative platform for professional development.

I am motivated to do more with my class. I am encouraged and inspired to try new lessons. I have just experienced the best PD ever! I am going to miss the collaboration with the multiple grade levels and multiple teachers from across our state.

I have a plethora of new resources and lesson ideas. I was a part of an online teaching community composed of professionals who really care and continually improve.

Am more comfortable using zoom and teaching online. This is very helpful given the current situation with social distancing.

I will no longer be afraid of Science; I will take risks in my classroom; I will continue to collaborate with peers and colleagues.

I feel comfortable taking the lead on science pd. I feel like a "mini-expert" on ZOOM. I feel lucky to collaborate beyond my traditional groups!

As a result of Project STEAM Echo I learned not only new content, but new ways of connecting content, connecting ideas and concepts, also a culture, method, and tools for connecting in this critical time.

I am excited to begin assisting in implementing the Next Gen Standards in science. I am also thrilled to add some new content to my STEAM Fridays.

I am more familiar with the Next Generation Science Standards, I am more comfortable using the Zoom platform, and I have gained a plethora of amazing and engaging science lessons from education professionals across the State.

I am continually reviewing standards as I prepare lessons and going over standards with students.