

Failure in Focus: Unpacking the Impact of Video-Based Reflections on Museum Educator Practices

Amber Simpson, Alice Anderson, Adam Maltese, Kelli Paul, Lauren Penney, & Monika Mayer

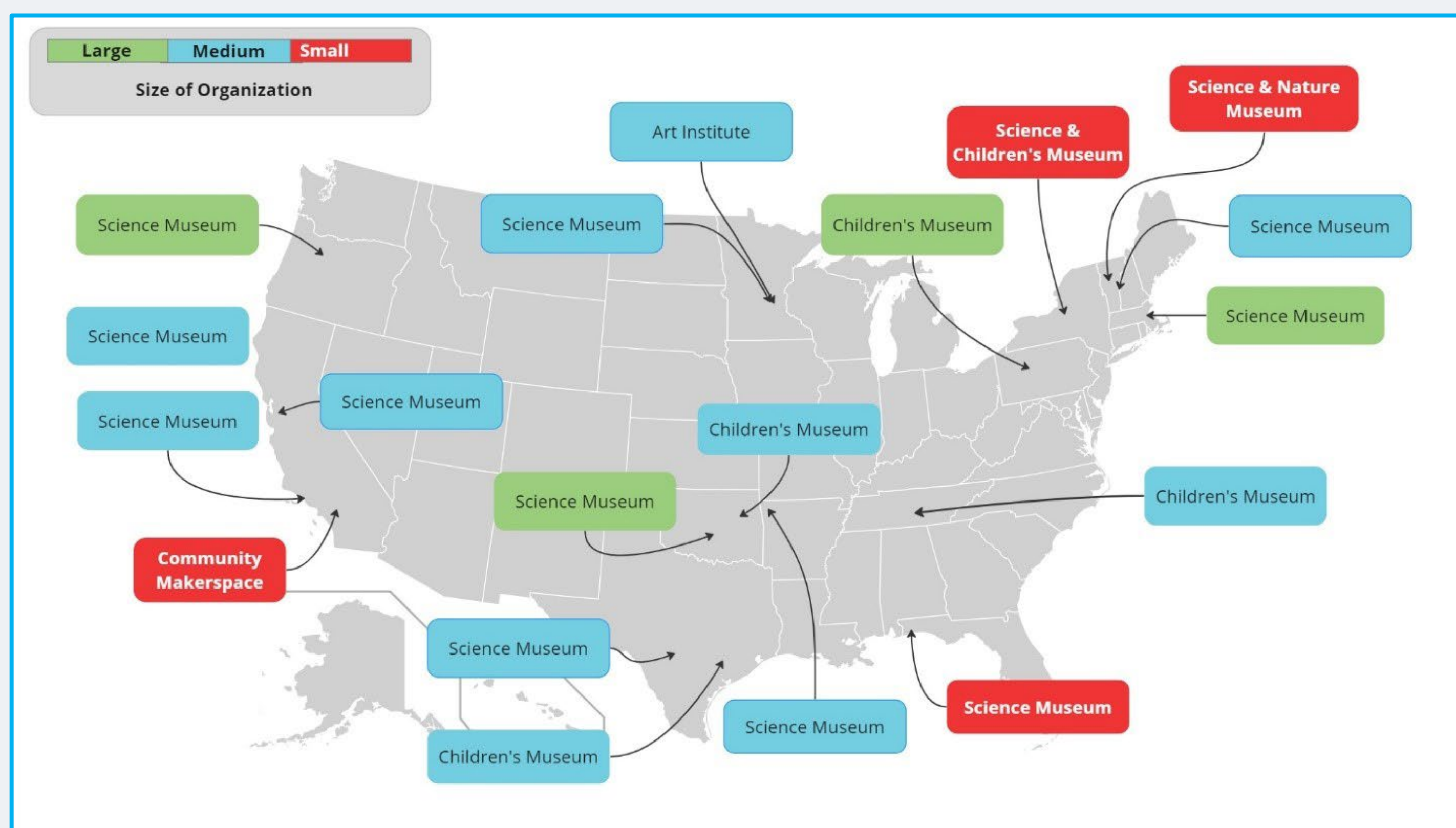
Background

- The term 'failure' often has negative associations [1], despite the current focus on failure as a driver of innovation and development in many professional fields [2].
- In engineering, failure is viewed as a normative practice of engineers, and one that should be experienced by young children within engineering design projects [3].
- While engineering increasingly is included in informal contexts [4-5], there is a lack of research or training materials related to how informal educators do or should plan and handle ongoing, just-in-time support - particularly during moments of failure.
- **In this project, we adapted, implemented, and refined a professional development program for productively attending, interpreting, and responding to youths' experiences with failure while engaged in engineering design challenges in informal learning contexts through video-based reflections.**

Research Question

How did a reflective, video-based professional development impact museum educators' professional growth around youths' experiences with failures during engineering design challenges?

Participants

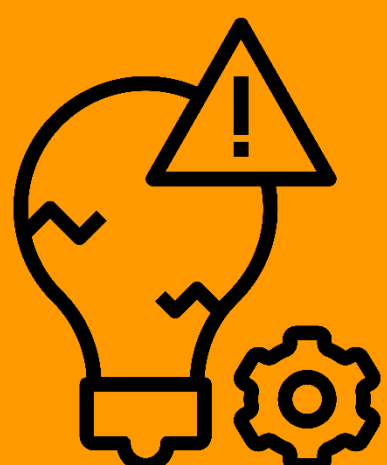


Methods

Data Sources: (a) post-interviews with museum sites, (b) final presentations from museum sites, and (c) evaluation reports

Data Analysis: (a) focused on quotes that addressed the research question, (b) added a descriptive code, a word or phrase, and (c) grouped descriptive codes that were common in nature into patterns

Our study highlights the potential for a video-based professional development cycle to positively shift how informal educators support youth through failure experiences in engineering design challenges, as well as build a community of practice - with a focus on failure - among educators.



Theme 1: Shift in educators' perspectives on failure

And I think that the thing that stood out for me is just like a *shift in the comfort with the word failure* and how I feel like I could actually help facilitators who have the same gut reaction as me think around that now. (Linda, lead facilitator)



Theme 2: Gain new instructional practices

I've definitely *learned to not give them [youth] the solution, but to help them* - your job as an educator is to *guide them to finding the solution themselves*. I think it's important to not teach them what to think, but teach them how to think. (Grace, informal educator)



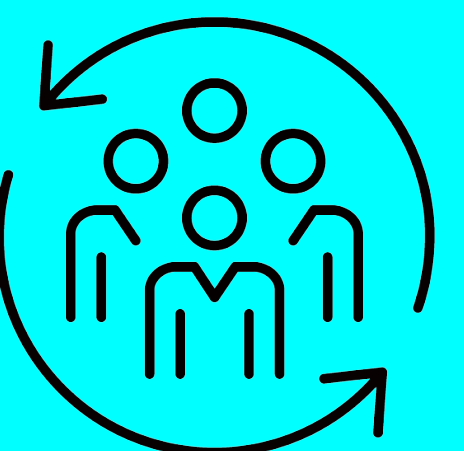
Theme 3: Foster a collaborative community of educator

In addition to *establishing learning, being vulnerable, and trusting of one another*, it also gave us a *common experience* as a relatively new team to reference. Now *staff laugh about something being a failure* when things don't go as planned and are more able to move on from those setbacks with more humility and grace than before. (Katie, lead facilitator)



Theme 4: Reflect upon and invest in their own self growth

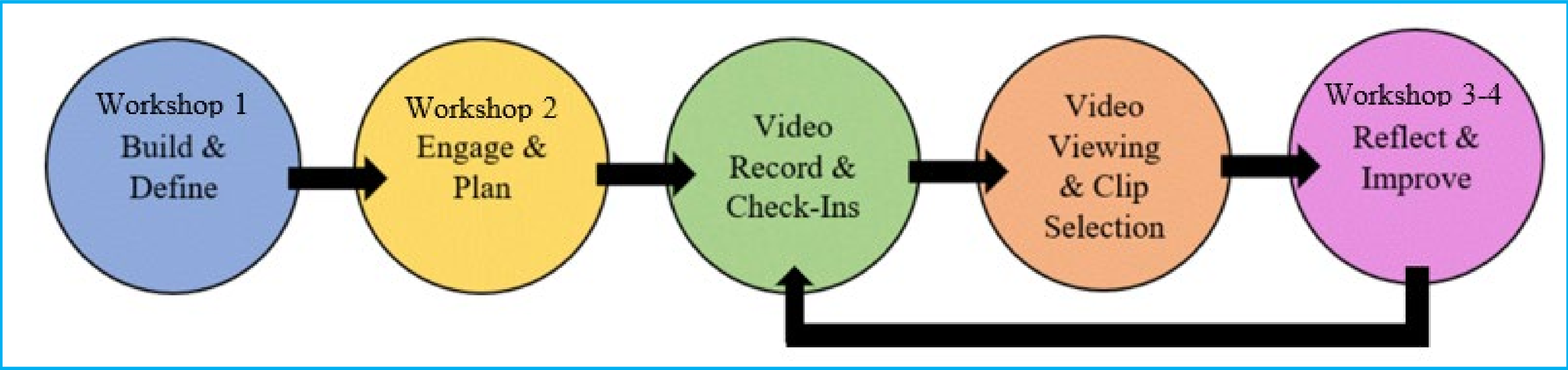
I was able to think *critically about my actions*. Normally I just go about my day and take things as they come without really thinking too hard about them. Now, when I facilitate, I constantly am checking in with myself about the effect of my actions and strategies. In other words, *I am significantly more meta-aware*. (Hope, informal educator)



Theme 5: Sustainability of the professional development

We plan to *integrate failure stories and reflective conversations* into our morning huddles with our team, giving the team the chance to talk about experiences, dig into stories from peers, and provide a safe reflective space for each other. (Acer, lead facilitator)

Professional Development Cycle



Workshop 1	Reflect on personal experiences of failure and collectively define failure through an engineering activity and discussion prompts.
Workshop 2	Explore failure from the youth's perspective, especially within the engineering design challenge that would be the subject of the educator's video reflection. Brainstorm ways to respond to youth's moments of failure during the challenge and emphasized effective and non-effective language.
Video Recording	Record a minimum of one hour of educator interactions with youth during an engineering activity.
Video Viewing	Choose 1-2 clips, each not exceeding 3 minutes in length, to present to their peers. Focus on how they responded to and addressed failure moments of youth or the particulars when experiencing failure moments as educators.
Workshop 3-4	Share video clips with peers with an aim to reflect on their pedagogical approaches to failure as evident in the clips, and to formulate improvement goals. Build upon and/or challenge informal educators' perspectives of failure moments and how they often responded in-the-moment.

Future Plans

- **DIY group:** Explore how our project website and resources supports the professional development cycle with a new cohort of museums with little direct interaction from our research team. We are interested in how these resources “live on” and are used beyond the project funding period.
- **Settings outside of museums:** Explore how the website and resources can be used as part of and to support professional development in other types of informal settings (e.g., libraries, clubs, etc.).

References

[1] P. S. Lottero-Perdue, “Elementary student reflections on failure within and outside of the engineering design cycle,” *American Society for Engineering Education Ann. Conf. & Exp.*, Seattle, WA, 2015.

[2] X. Tian and T. Y. Wang, “Tolerance for failure and corporate innovation,” *The Review of Financial Studies*, vol. 27, pp. 211-255, 2014.

[3] M. M. Johnson, G. J. Kelly, and C. M. Cunningham, “Failure and improvement in elementary engineering,” *Journal of Research in STEM Education*, vol. 7, pp. 69-92, 2021.

[4] Y.-L. Chen, K. Murthi, W. Martin, R. Vidliksis, A. Riccio, and K. Patten, “Experiences of students, teachers, and parents participating in an inclusive, school-based informal engineering education program,” *Journal of Autism and Developmental Disorders*, vol. 52, pp. 3574-3595, 2022.

[5] M. Marcus, D. I. Acosta, P. Tõugu, D. H. Uttal, and C. A. Haden, “Tinkering with testing: Understanding how museum program design advances engineering learning opportunities for children,” *Frontiers in Psychology*, vol. 12, Article 689425, 2021.



This material is based upon work supported by the National Science Foundation under Grant No. 2005927 (Binghamton University) and Grant No. 2005860 (Indiana University). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Project Website

