

Exploring Physicality in Out-of-School Time Learning

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Abstract: Bodily experience in learning has been an ongoing discussion in Learning Sciences. Informed by prior research on the value of embodiment, we explore bodily experience slightly differently by highlighting place-based physical attributes of youth in an out-of-school time (OST) context. Through interviewing students, parents, and OST providers, we discuss how such physicality imbued with interaction within space can capture and foster OST learning and engagement over time, supporting how parents and providers perceive OST STEM education.

Introduction and background

Learning is considered an embodied process where the body is key to acquiring knowledge and constructing shared meaning (Abrahamson & Lindgren, 2014). A vast literature on embodiment exists in Learning Sciences. For example, Lyons (2018) studied the use of technology in museums to help people make sense of exhibits and gain playful and collaborative experiences. Vossoughi and colleagues (2020) illuminated how children organized learning for the self and others using received embodied assistance in an OST tinkering program. There is another stream of inquiry where scholars probed how mobility affected learning. Marin and Bang (2018) investigated how learning occurred by observing children and parents walking in the forest. Informed by prior work, we explore bodily experience, including senses, by highlighting place-based physical attributes as physicality—how youth’s bodily interactions with space may support their engagement in OST learning. This poster comes from a larger research project where we work with students, parents, OST providers, and college admission officers to discuss how OST STEM learning can be documented via personal learning records. Our goal is to show the potential of utilizing physicality as a way of knowing *how* youth engage in OST STEM activities.

Methods

This poster reports preliminary data from interviewing 24 youths, 10 OST providers, 10 OST alums, and 4 parents from one specific OST venue, *STEM Space*. STEM Space is an OST program affiliated with a public university in the Midwestern United States to offer free college preparation guidance and academic resources for middle and high schoolers living nearby. All our recent interviews were done remotely and audio recorded. We followed semi-structured protocols to request participants to share their experiences with OST STEM learning, participation, and programming. We analyzed the interview data using qualitative content analysis (Hsieh & Shannon, 2005). As the initial step, we transcribed audio recordings into verbatim transcripts and interpretable content logs. Codes were derived from the data inductively. Each document was coded by at least two researchers following the social moderation process (Frederiksen et al., 1998; Herrenkohl & Cornelius, 2013) to address discrepancies in coding. Although social moderation is time-consuming compared to other evaluation approaches, such as intercoder reliability, we select this strategy to ensure that all possible themes are captured and recorded. We also created memos to document thoughts during data analysis and assigned pseudonyms to each participant.

Findings and discussion

Among the 48 participants, the most frequent example of physicality occurred when students recalled their college campus trips. For example, when asked about what she found valuable when participating in STEM Space, Toni said that she was impressed by her trip to the university with which STEM Space was affiliated.

I highly enjoyed the trips. I love going to other places and seeing the college. [...] I love seeing the museums; I love seeing the areas; all those experiences are very nice to me. I have never been to a big campus [...] Finding those spaces I could go to, like “this will be my space; that will be my space,” just understanding what I am comfortable with is very good. (Toni)

This view is echoed by several other students, including Karla, Alicia, Veronica, Shelia, Lydia, Tanya, and Melanie. Apart from youth, several parents and OST providers shared the same positive perspective of these college and field trips and summer camps. One illustrative parent example is Beth, a mother whose two daughters have both taken part in the STEM Space program for years. When asked whether she thought her children learned something about STEM, Beth appreciated that the Earth Camp included “a lot of hands-on experimentation” and

the learning supplies sent by STEM Space: “I thought it was well planned because the kids are just sick of Zoom. [...] The teacher had set it up was very much hands-on [...] that really, really worked.” In a similar vein, we saw appreciation for physicality from OST providers. Jessica, an experienced OST provider in charge of earth and environmental sciences outreach programs for high schoolers, recalled how she employed physical activities to encourage problem-solving and peer cooperation in her program.

The first thing we do is go to the adventure center on campus; there are high ropes course and the climbing wall. We tell them [youth] to focus on cooperation and problem-solving, and we’ve never had interpersonal conflicts with our groups. At night, we often sit by a bonfire on the beach [...] where we will have our counselors talk about their paths [...]. (Jessica)

I don’t want them [youth] to memorize anything; I don’t want them to pass a test. [...] I want them to feel “I can take an intro course; I’ll be empowered to feel a little bit better about it; I can travel to some of these spaces and feel comfortable.” [...] I want them to feel comfortable hanging out with the kids who feel comfortable in these spaces. (Jessica)

Here, Jessica raised an essential point where she brought the meaning of sense of belonging to the fore in an OST setting. According to her, the feeling and the sense gained through physical events with peers made these OST learning activities profound. Plus, Jessica interpreted her OST STEM program as a springboard to promote skills like problem-solving, teamwork, and reflection. Particularly, what Jessica portrayed that she hoped to bring to youth, i.e., confidence and community building, are well mirrored in her design of physical activities in the program. Based on the data, we contribute to a different lens to discuss bodily experience inseparable from how we interact with space, including sight, hearing, touch, and beyond, and what it means for human learning. Like how body language is considered vital to facilitate knowledge acquisition, we suggest that physicality can capture other dimensions of learning, making it valuable as an innovative information channel to unpack OST learning.

Conclusion

In this poster, we present physicality, which highlights place-based physical attributes, as a potential lens to gauge *how* youth participate in OST activities. We show that although physicality may be hard to quantify, it can be a useful naturalistic indicator of student learning and engagement over time. It helped youth envision and prepare for the future, supporting what parents and providers perceived OST STEM education. A deeper look at the literature is needed to solidify the theoretical underpinning of this line of conversation. We plan to continue data collection and analysis while iterating the qualitative coding to generalize relevant results to put into practice.

References

- Abrahamson, D., & Lindgren, R. (2014). Embodiment and embodied design. In R. Sawyer (Ed.). *The Cambridge handbook of the learning sciences* (pp. 358–376). Cambridge University Press.
- Frederiksen, J. R., Sipusic, M., Sherin, M., & Wolfe, E. W. (1998). Video portfolio assessment: Creating a framework for viewing the functions of teaching. *Educational Assessment*, 5(4), 225–297.
- Herrenkohl, L. R., & Cornelius, L. (2013). Investigating elementary students’ scientific and historical argumentation. *Journal of the Learning Sciences*, 22(3), 413–461.
- Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277–1288.
- Lyons, L. (2018). Supporting informal STEM learning with technological exhibits. In F. Fischer, C. E. Hmelo-Silver, S. R. Goldman & P. Reimann (Eds.). *International handbook of the learning sciences* (pp. 234–245). Routledge.
- Marin, A., & Bang, M. (2018). “Look it, this is how you know:” Family forest walks as a context for knowledge-building about the natural world. *Cognition and Instruction*, 36(2), 89–118.
- Vossoughi, S., Jackson, A., Chen, S., Roldan, W., & Escudé, M. (2020). Embodied pathways and ethical trails: Studying learning in and through relational histories. *Journal of the Learning Sciences*, 29(2), 183–223.

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