

Constructionism in Context: Connected Learning Across Technologies and Spaces

Abstract: Constructionist designers have used new technologies to engage learners in rich opportunities to build personally meaningful artifacts for decades. In this symposium we bring together expert designers and scholars that have successfully developed constructionist innovations using emerging technologies in a range of domains including gaming, making, and coding and in a variety of contexts including schools, the home, and in virtual world. In a panel discussion format participants will identify key constructionist principles effective at enabling connected learning approaches.

Introduction

Constructionism proposes that learning happens best when children are actively engaged in the construction of a personally meaningful artifact or projects that can be shown or shared (Papert & Harel, 1991). Constructionist designs have engaged children in the public construction of games (Berland & Lee, 2011; Harel & Papert, 1990; Kafai & Burke, 2015), participation in virtual communities (Resnick et al., 2009), and the construction of tangible artifacts and toys (Blikstein, 2015; Buechley & Perner-Wilson, 2012; Holbert, 2016). As new tangible and digital design and prototyping technologies emerge—lowering technical requirements and monetary cost of development—the constructionist design paradigm is well positioned to leverage these tools as a means of connecting learners to engage in meaningful and authentic construction activities.

In this symposium we bring together scholars that have successfully developed and deployed constructionist innovations using emerging technologies in a range of domains including gaming, making, and coding and in a variety of contexts including schools, the home, and in virtual worlds. Using a panel discussion format, participants will each have four minutes to introduce themselves and their work. Following introductions, moderators Nathan Holbert and Matthew Berland will pose questions to the panel seeking to identify key constructionist principles effective at enabling connected learning approaches. The final 15 minutes of session will offer an open Q&A format so that attendees can address questions to the panel directly. The following sections indicate participating panelists and provide a brief overview of the relevant work.

Expanding Constructionist Gaming: Make, Code, and Play

Yasmin Kafai, University of Pennsylvania

Over the last decade, video games designed to teach academic content have multiplied. The emphasis on this instructionist approach to gaming, however, has overshadowed the constructionist approach, in which students learn by designing their own games. The educational benefits of constructionist gaming—coding, collaboration, and creativity—suggest the move from "computational thinking" toward "computational participation." Recent developments support a shift to game making, including the game industry's acceptance, and even promotion, of "modding" and the growth of a DIY culture. Future directions of serious gaming should be inclusive of instructionist and constructionist approaches, promoting connected gaming in which both making and gaming play a part.

Reclaiming Feminine Practices and Materials in the Modern Maker Movement

Kylie Peppler, Indiana University

History demonstrates repeated patterns of innovation that have stemmed from traditionally feminine practices and materials. One prominent example arcs back to the history of computing, which is rooted in weaving, crocheting, and other textile crafts. Kylie examines the contemporary case of e-textiles, textile artifacts embedded with interactive electronics, and how a community built around their development has successfully recentered traditional practices and materials in computing fields. In addition to serving as an example of new technologies diffusing throughout society by merging with existing communities and

practices, e-textiles also offer a theoretical framing for understanding how to reclaim historically under-represented fields and practices in ways that disrupt stagnant practices and spur innovation.

Shaping Constructionist Learning Online

Debbie Fields, Utah State University & Sara Grimes, University of Toronto

As children's do-it-yourself (DIY) media creation increasingly takes place online, it is important to investigate the social networking forums where children create and share their own work. Debbie and Sara examine the design and structure of a large Kids DIY Media Partnership to identify the kinds of regulatory, infrastructural, and technical support systems that foster children's DIY cultural participation. By analyzing several popular cases of web community designs they also provide examples of how these designed spaces promote, support, or even limit children's opportunities to engage in making, sharing, and, critically, understanding their rights and responsibilities in what they publish.

Constructionist Learning for Families

Ricarose Roque, University of Colorado, Boulder

When engaging children in constructionist learning experiences, we often think about the individual child and what might be a personally meaningful activity to support his or her participation. However, engagement from adult caretakers such as parents can create a socially meaningful experience that can strengthen their participation. Ricarose examines a series of workshops where families create and learn together using creative technologies to highlight what facilitated their learning and developing interests. As families build projects, they also built relationships—with each other, with other families, and with computing.

Re-Constructing Youth Identities and Communities by Building Construction Kits

Amon Millner, Olin College

Too many youth miss opportunities to use STEM tools to address challenges that exist in their communities. Efforts to widen access to tools and interactive technologies have included the development of a multitude of construction kits. Many considerations go into deploying construction kits designed to lower barriers to entry for making interactive objects. Amon highlights considerations that have gone into kits that have been developed and deployed from college and community technology center collaborations - not just focused on facilitating youth making interactive objects, but also fostering identity and community development.

References

- Berland, M., & Lee, V. (2011). Collaborative strategic board games as a site for distributed computational thinking. *International Journal of Game-Based Learning*, 1(2), 65–81. <https://doi.org/10.4018/ijgbl.2011040105>
- Blikstein, P. (2015). Computationally enhanced toolkits for children: Historical review and a framework for future design. *Foundations and Trends® Human-Computer Interaction*, 9(1), 1–68.
- Buechley, L., & Perner-Wilson, H. (2012). Crafting Technology: Reimagining the Processes, Materials, and Cultures of Electronics. *ACM Transactions on Computer-Human Interaction*, 19(3), 21:1–21:21. <https://doi.org/10.1145/2362364.2362369>
- Harel, I., & Papert, S. (1990). Software Design as a Learning Environment. *Interactive Learning Environments*, 1(1), 1–32. <https://doi.org/10.1080/1049482900010102>
- Holbert, N. (2016). Leveraging cultural values and “ways of knowing” to increase diversity in maker activities. *International Journal of Child-Computer Interaction*, 9–10, 33–39. <https://doi.org/10.1016/j.ijcci.2016.10.002>
- Kafai, Y. B., & Burke, Q. (2015). Constructionist Gaming: Understanding the Benefits of Making Games for Learning. *Educational Psychologist*, 50(4), 313–334. <https://doi.org/10.1080/00461520.2015.1124022>
- Papert, S., & Harel, I. (1991). Situating constructionism. In S. Papert & I. Harel (Eds.), *Constructionism*. New York: Ablex Publishing.
- Resnick, M., Maloney, J., Monroy-Hernández, A., Rusk, N., Eastmond, E., Brennan, K., ... Silverman, B. (2009). Scratch: programming for all. *Communications of the ACM*, 52(11), 60–67.