Faculty Publications: Department of Teaching, Learning and Teacher Education

Department of Teaching, Learning and Teacher Education

Spring 3-2018

"There's Nothing Wrong with Fun": Unpacking the Tensions and Challenges of Human Centered Design for Learning with Pre-Service Teachers

Zoe Falls
University of Nebraska-Lincoln

Justin Olmanson
University of Nebraska-Lincoln, jolmanson2@unl.edu

Follow this and additional works at: https://digitalcommons.unl.edu/teachlearnfacpub

Part of the American Politics Commons, Curriculum and Instruction Commons, Instructional Media Design Commons, Junior High, Intermediate, Middle School Education and Teaching Commons, Secondary Education Commons, and the Secondary Education and Teaching Commons

"There's Nothing Wrong with Fun": Unpacking the Tensions and Challenges of Human Centered Design for Learning with Pre-Service Teachers

Zoe Falls & Justin Olmanson

Abstract:
Research into practices of making within formalized education has primarily focused on K12 settings, inservice teachers in professional development, and pre-service teachers facilitating a maker experience for K12 students. Less is known about the professionalizing impact making and human centered design can have on pre-service teachers, especially in relation to how or if the experience deepens their understanding of content, pedagogy and human centered design. This study traces a group of pre-service social science teachers' development of a meme generator to support learning history. By studying their process from inception to conclusion, we found students were less inclined to engage in deep thinking about their content and the teaching of that content in favor of a fun-focused approach to their prototype which they asserted both connected with history lovers and solved the problem of "boring content." We then theorize that students' limited amount of pedagogical knowledge, limited exposure to human centered design, and a lack of course scaffolds contributed to an echo-chamber which limited students' ability to cultivate the empathy inherent in prototyping and making. Finally we outline the instructional implications for using human centered design with preservice teachers and describe the course maker project redesigns this study prompted.

Background:
Research into practices of making within formalized education has primarily focused on K12 settings (Hira, Joslyn, & Hynes, 2014), inservice teachers in professional development (Paganelli et al., 2016), and pre-service teachers facilitating a maker experience for K12 students (O' Brien, Hansen, & Harlow, 2016). Less is known about the impact the maker movement has on pre-service teachers, especially in relation to how they relate the design experience to their developing understanding of pedagogy and content. Further, studies often focus on the end result of the project as instantiations of learning (Jones, Smith, & Cohen, 2017; Halverson & Sheridan, 2014), and not the process of collaborative making. Our inquiry examines student experiences from inception to conclusion to better understand student growth, and learning.

Making, prototyping, and human centered design for learning affords students alternative, potentially generative pathways into the ideas, theories, and concepts related to their discipline. Empathy, the intentional concentration on user's needs, desires, and goals (Zoltowski, Oakes & Cardella, 2012) is the first step in human centered design, and sets the trajectory for the entire project. For teachers, human centered design encourages them to gather information about their users, in this case, students, the challenges involved in learning a particular concept, and apply that to their design. Providing pre-service teachers the opportunity to explore the complexity of designing for learners allows them to better apply empathy in their teaching.

The Project:

Students at a major university in the Midwest who take a 200-level integrating technology into the classroom course complete a making for learning group project. Working in content-specific groups, students create, design, develop, and prototype a teaching tool, student maker experience, or learning app. Throughout the project, students are encouraged to use human centered design as a way to better understand the complexities of their content, teaching that content, their audience, and the technical challenges of realizing and refining their solution.

Methods:

As part of a multi-semester study we observed student groups across multiple sections of a 200-level technology integration course completing a project on making for learning. For the duration of the maker project we served as maker-mentors for all groups. We were participant observers (Spradley, 1980)—creating jottings that were turned into ethnographic fieldnotes (Emerson, Fretz, & Shaw, 2011). Additionally, we audio-recorded participant groups' dialogue during critiques and showcases. We collected process and showcase documents that groups compiled to outline their design thinking, unpack the tools they used, and explain design rationales and use cases for the learning tool or artifact they prototyped. Once group projects were completed, we reached out to a subset of participants for individual semi-structured interviews (Weiss, 1994; Wolcott, 2005). In this manuscript we focus on the design and making experiences of one group of preservice social science teachers who took the same section of the technology integration course in the spring semester of 2017.

Data analysis:

We analyze the data on a per-group, per-discipline, and per-project basis. As we have done in previous studies, we draw from artifact analysis (LeCompte & Preissle, 1993; van Gog et al., 2007) and discourse analysis (Gee, 2005) to create a multi-directional analysis (Olmanson et al., 2016). We employ an iterative analytical approach (Anfara, Brown, & Mangione, 2002) that involves generating and assigning base codes to all data elements. These codes are subsequently grouped by code topic and frequency to form a themed code map. The groupings guide further chunking and theming which form the basis for findings and theory development (Strauss & Corbin, 1998). Artifact-based multi-directional analysis has been demonstrated to support the identification of salient elements in similar types of naturalistic research contexts (Olmanson et al., 2016).

Findings and Data

For the maker project, students were challenged to design and prototype something new and innovative to help students gain a deeper understanding of a concept within their content area. Groups self-selected based on disciplinary focus. During the five week maker project, the groups spent the majority of two class sessions, approximately six hours, on idea generation before moving into design and redesign phases. Instead of meeting in the normal classroom, the class met in the college's design studio which is outfitted with couches, chairs, whiteboards on wheels, and other tools to encourage group collaboration as well as a 3D printer, laser cutter, sewing machine, embroidery machine, and prototyping supplies. During the project students had fifteen total hours of class time to spend collaboratively working on their project. In this paper we examine data collected from a social sciences group who named themselves the William Jennings Bryan (WJB) group. The group included three male and two female pre-service secondary education students; all were provided pseudonyms.

The research team included the graduate student instructor for the course being studied (Zelda and first author) and the faculty supervisor for all sections of the course (Jorn and second author). We use Zelda and Jorn in the sections below when describing actions and dialogue captured in fieldnotes and transcripts. We use 'we' when describing our perspectives and insights after the fact or outside the moment of data collection. Zelda and Jorn spent their time rotating between the groups, checking in with each group four or more times per class session. During our visits, we would provide support in human centered design, and ask questions to encourage continued thinking within the groups.

Empathising in an Echo-Chamber: Designing for the Choir
Groups found ideation uncomfortable. Instead of allowing time for their ideas to breathe, groups rushed the brainstorming phase because, as group members described it, having an idea to focus their energy on gave the group momentum, and allowed them to move forward with the project. Ryan told us that having an idea "was definitely something that made everything easier...once we started running with an idea, even one of the ones that failed, it was like, oh, I can breathe because I'm not...in a giant space." In their desire to have an idea and feel the sense of progress it provided, they would often return back to an idea maker-mentors and classmates nudged or urged them away from—typically due to an underdeveloped sense of the learner experience and understanding of the learner's needs and desires within their design— more on this later in the findings section.

With limited design experience and no mandate from the instructor that groups solicit the perspectives of others, students primarily designed with themselves and not a diverse array of learners in mind. This is consistent with literature on novice student designers (Zoltowski, Oakes & Cardella, 2012). When explaining the idea behind the meme generator prototype, Nolan told us that he "just enjoy[s] looking at history things." In thinking about ways to engage students in history, Nolan considered students like him, and thought history memes would get "them excited to learn about history because I'm a nerd, I love history, I like random facts that mean pretty much nothing but to me, it's a lot of fun." The WJB group heard two overarching voices as they developed their meme generator. Their own group which encouraged their ideas because they *liked it*, and believed that having fun solved the design challenge of history as boring, and the dissenting voice of the maker-mentors (Zelda and Jorn) who played the role of critical friends—consistently and repeatedly asking for deeper thinking about content and pedagogy.

The focus on self as an extension of human centered design created a space where students held onto ideas despite pointed critique potentially because there were no complicating voices, aside from the maker-mentors who may have been easier to resist because the tensions maker-mentor as critical friend, and maker-mentor as teacher, responsible for project grades. By inadvertently cultivating this echo-chamber, the project itself led groups to self-empathize instead of engendering a more robust human centered design process wherein they sought out and determined learner needs by interacting with people within their prototype's use demographics.

Too Funny to Fail
"It is funny. It is funny. History is funny." Nolan's statement highlighted the WJB group's steadfast focus on the humor inherent in the meme designs and historical facts they chose to include. It also characterized their primary desire for their users to have fun. At every stage of the project, Nolan reiterated the group

goal "...to make history fun through memes, you know." He also said "the use of popular memes just makes learning sorta fun."

As a teaching tool, Nolan said, "we [WJB group] wanted to be very clear that we find this stuff a lot of fun so we don't want this class or this app to be mainly focused on the learning aspect…we wanted to make sure that there was a part of our app that...focuses on just looking at things and laughing because they're historical." Nolan told Zelda learning about history, the focus of the course project, was not part of their idea design as he stated later using almost identical language saying, "we don't want this app to be focused on the learning aspect, we wanted it to focus on the fun aspect."

Even in the memes they chose, the design focus began with humor, then content was added. Randy described his process in developing the app prototype: "Because I found a super funny meme it was: duel Aaron Burr, they said. It will be fun [they said]." The knowledge he used to create the memes came from facts already known: "I had the background knowledge of Alexander Hamilton duels Aaron Burr and dies in the duel and that was something that I thought made it incredibly funny and I'm like oh, that's pretty funny, so I put that in…"

Both Zelda and Jorn encouraged them to, as Zelda said to the group, " think more about student engagement, about student interaction, about the actual learning they want to have happen." Both witnessed, as Zelda wrote in her observations, the way they focused on, "ways to make their content fun, almost at the expense of any actual learning or focus on content." Also noting the lack of, "balance between students having fun and students learning."

Figure 1. Three memes included in the Memestory prototype app.

Research and Project Design Implications and Future Work

This inquiry work traces the William Jennings Bryan group's progress through all phases of the maker project from initial ideation to final showcase presentation. Several themes emerged through analysis of this single case study. Overall we found a start-to-finish examination of a five week learning design and making project to be useful in better understanding the challenges faced by these and perhaps many pre-service teachers in designing and making learning tools or applications for their future classroom contexts. Typically the literature on making and design for teachers and pre-service teachers focuses on how to get started, a few teaching tips, and then concentrates on the end product. Our focus on group planning and dialogue throughout the project afforded us insight into the cyclic tensions between students new to human centered design and project requirements that demanded a great deal of synthesis at the

intersection of their growing but still underdeveloped understanding of content, pedagogy, and technology. Students resisted calls by maker-mentors to refine or abandon ideas that were deemed to be underdeveloped or lacking in terms of a focus on learning. As project co-designers, we also acknowledge the difficulties students encountered in navigating design, content, pedagogical, and technological landscapes within a project that required a high degree of synthesis but was only loosely structured and non-directive in nature until groups selected a design trajectory.

Based on these findings, we have redesigned the maker project to more explicitly scaffold the empathy phase in human centered design by fostering a space that invites outside voices, and encourages students to look beyond their classroom for feedback. Additionally, we have added a pre-project briefing during which we discuss with groups both the useful role maker-mentors play as critical friends and the tensions students are likely to feel in the uncomfortable "giant space" of developing ideas. We theorize that these changes may interrupt the desire to latch onto an idea simply to escape the perceived void of not having a clearly defined project to pursue.

Conclusion

Our close examination of an unabridged group design process illuminates the challenges related to carrying out a group maker project, both for the learner and for the instructor. It underscores the complicated nature of facilitating a maker project for pre-service teachers, and the dynamics involved in creating a balance between supporting student learning, and critiquing student work to provide a constructive learning environment. Our focus on the challenges, setbacks, tensions, and learning through failure provide a new perspective from which to examine maker projects in higher education. Based on these initial findings, we plan to expand our focus both across design iterations of the maker project and across content area groups to more fully understand how students new to human centered design and making for learning might be better supported during content area making projects. This work is an initial step in demonstrating the potential contributions inception-to-conclusion inquiry can make in terms of gaining insights into the role of making and human centered design for learning in teacher education in particular and higher education more generally.

References

Anfara, V. A., Brown, K. M., & Mangione, T. L. (2002). Qualitative analysis on stage: Making the research process more public. *Educational Researcher*, *31*(7), 28–38.

Emerson, R. M., Fretz, R. I., & Shaw, L. L. (2011). *Writing Ethnographic Fieldnotes, Second Edition*. University of Chicago Press.

Gee, J. P. (2005). *An Introduction to Discourse Analysis: Theory and Method*. Psychology Press.

Halverson, E. R., & Sheridan, K. (2014). The maker movement in education. *Harvard Educational Review*, *84*(4), 495–504.

Hira, A., Joslyn, C. H., & Hynes, M. M. (2014). Classroom makerspaces: Identifying the opportunities and challenges. In *2014 IEEE Frontiers in Education Conference (FIE) Proceedings* (pp. 1–5). IEEE. Retrieved from http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=7044263

Jones, W. M., Smith, S., & Cohen, J. (2017). Preservice Teachers' Beliefs About Using Maker Activities in Formal K-12 Educational Settings: A Multi-Institutional Study. *Journal of Research on Technology in Education*, *49*(3–4), 134–148. https://doi.org/10.1080/15391523.2017.1318097

Koehler, M. J., & Mishra, P. (2009). What Is Technological Pedagogical Content Knowledge? – CITE Journal. *Contemporary Issues in Technology and Teacher Education*, 9(1), 60–70.

LeCompte, M. D., Preissle, J., & Tesch, R. (1993). *Ethnography and Qualitative Design in Educational Research*. Academic Press.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry* (Vol. 75). Sage.

O'Brien, S., Hansen, A. K., & Harlow, D. B. (2016). Educating Teachers for the Maker Movement: Pre-service Teachers' Experiences Facilitating Maker Activities. In *Proceedings of the 6th Annual Conference on Creativity and Fabrication in Education* (pp. 99–102). ACM.

Olmanson, J., Kennett, K., Magnifico, A., McCarthey, S., Searsmith, D., Cope, B., & Kalantzis, M. (2016). Visualizing Revision: Leveraging Student-Generated Between-Draft Diagramming Data in Support of Academic Writing Development. *Technology, Knowledge and Learning*, *21*(1), 99–123. https://doi.org/10.1007/s10758-015-9265-5

Paganelli, A., Cribbs, J. D., "Silvie"Huang, X., Pereira, N., Huss, J., Chandler, W., & Paganelli, A. (2016). The makerspace experience and teacher professional development. *Professional Development in Education*, 1–4.

Spradley, J. P. (1980/2016). *Participant Observation*. Waveland Press.

Strauss, A., & Corbin, J. M. (1998). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. SAGE Publications.

van Gog, T. (2007). Data Collection and Analysis. In D. Jonassen, M. J. Spector, M. Driscoll, M. D. Merrill, & J. van Merrienboer (Eds.), *Handbook of Research for Educational Communications and Technology*. Routledge.

Weiss, R. S. (1995). *Learning From Strangers: The Art and Method of Qualitative Interview Studies*. Simon and Schuster.

Wolcott, H. F. (2005). *The Art of Fieldwork*. Rowman Altamira.

Zoltowski, C. B., Oakes, W. C., & Cardella, M. E. (2012). Students' Ways of Experiencing Human-Centered Design. *Journal of Engineering Education, 101*(1), 28–59.