Infrastructuring for Participatory Design of School Technology Practices: How Students Refined Design Practices

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Abstract: This paper analyzes the ways in which student partners in a school-based participatory design project (Le Dantec & DiSalvo, 2013) constructed and refined the design practices. Two researchers collaborated with a group of high school students with a shared goal of designing school technology practices that were meaningful to the students. Informed by theories of infrastructuring in participatory design (Le Dantec & DiSalvo, 2013), the collaboration explicitly sought to re-mediate the social relations in the design of school technology practices. Four themes emerged in relation to the ways students sought to construct and refine the design space: *Relevance to Student Interests*; *Opportunities for Responsibility and Growth*; *Expansion and Refinement of Activity*; and *Ensuring Use*. Implications of the findings are discussed.

Purpose of the study

This paper analyzes the ways in which student partners in a school-based participatory design project (Le Dantec & DiSalvo, 2013) constructed and refined design practices. Informed by participatory design literature that argues for the need for *infrastructuring*, the continuous refinement of the collaborative activity among stakeholders of participatory design partherships (Le Dantec & DiSalvo, 2013), the author partnered with a small group of students and teachers through two academic years between 2014-2016 to design technology practices that were responsive to the needs of local school stakeholders. In the context of this partnership, participants were both explicitly and implicitly encouraged to refine the practices of the partnership. The paper offers a thematic analysis of the ways in in which the student participants recommended shifts to the design activity over time in order to better understand student perspectives on how participation in collaborative research and design endeavors may be better supported.

Challenges in school technology integration

The drive to introduce up-to-date technology resources in K-12 settings has been met with considerable obstacles, exemplified, for example, by Los Angeles Unified School District's (LAUSD) well-publicized challenges in rolling out its 1-to-1 iPad program. An evaluation of the iPad rollout by Margolin and his colleagues (2014) found that most schools that received the hardware along with instructional software did not have the adequate infrastructure, organization, and training to shift teaching practices through the newly acquired tools. This was particularly unfortunate, considering the many affordances of educational technologies such as the iPads and related software, which allow students and teachers to interact across physical learning ecologies, pursue self-driven learning, and experience learning in multimodal texts (e.g. Peppler & Kafai, 2007; Barron, Gomez, Pinkard & Martin, 2014). More concerning is the fact that in spite of evident systemic constraints to shifting school technology practices, the discourse surrounding these challenges often placed the blame on LAUSD students, majority of whom come from traditionally marginalized backgrounds, as deviant "hackers" that were unprepared to utilize these tools (LA Times, 2015).

The episode highlights two concerns pertaining to integrating technology in schools. First, the episode echoes arguments made by a number of researchers that the way technologies are introduced to schools must pay attention to the sociocultural contexts in which they are being introduced to, and conceptualize practices that respond to unique needs across those contexts (e.g. Barron et al., 2014). This necessitates processes of technology integration in schools that can make aspects of the local context visible. Second, related to the first point, but needing particular emphasis, is that like most schooling practices, school technology use is valued, and mediated by broader social power structures (Selwyn, 2016; Delpit, 2006). The fact that LAUSD students were thought of as "deviant", echoing broader deficit views of this very student body, suggests that technology use at schools have the potential to reproduce problematic social discourses and power relations. Therefore, as researchers such as Selwyn (2016) argue, echoing earlier researchers across educational contexts (e.g. Delpit, 2006), *who* is represented, and *how* they are represented in the process of technology integration design are greatly consequential for educational equity. How students, especially those from nondominant communities, are represented in this process holds particular weight because of their traditional non-representation in educational design processes (Delpit, 2006).

Participatory design and infrastructuring for student participation

Infrastructuring in participatory design (Le Dantec & DiSalvo, 2013), the iterative refinement of the social activity to support democratic stakeholder participation in the design process, provides a useful methodological framework towards addressing the issues identified above. In particular, developing knowledge around how student participation in the design of school technology practices can be facilitated, and how that in turn mediates various outcomes relating to use and social structures in schools, can guide how school technology integration processes can be made more equitable for students. Participatory design as an approach to educational design focuses on the redesign of social relations between stakeholders to develop more equitable educational practices. While a number of researchers have partnered with students and children in educational technology design, such as Schwartz's (2015) study of how the Funds of Knowledge of immigrant Latino/a students informed the design of a technology-mediated literacy curriculum (Schwartz, 2015), using infrastructuring as a design framework offers a unique perspective on how these partnerships may be built and modified while simultaneously facilitating the development of concrete design outcomes that are situated in the context of use.

With the need to better understand how student participation in school technology design might mediate shifts in a school's design and technology practices, this paper asks the research question: *In what ways did student participants in a school-based participatory design project (Le Dantec & DiSalvo, 2013) seeking to develop localized technology-mediated learning practices change the design infrastructure?* By examining this research question, the paper hopes to provide insights into the characteristics to the design activity that are sought by students, and help encourage students to engage in the design of school technology practices.

Methods

Study background

The site, a public university-partnership school in a large urban school district in California with 80% Latino and 14% Asian students, and 55% of students classified as "Limited English Proficient", reflected broader challenges of technology integration across urban schools. It had recently acquired a learning software named Schoology, an online Learning Management System (LMS) as well as hardware such as Chromebooks and Apple computers, gradually transitioning to a 1-to-1 laptop to student ratio. Such investments were met with inconsistent practices and uncreative use due to the lack of training, buy-in, and coordination across the school stakeholders. Students had indicated that these new tools were mostly used for submitting assignments, receiving grades, and taking quizzes.

Responding to the school site's needs, the author of this manuscript partnered with a small group of high-school students and teachers to carry out a participatory design research project (Bang & Vossoughi, 2016) to design school technology practices. Participatory design as a research method was chosen due to the assumption that a method aimed at collaboratively re-mediate educational practices by addressing the sociocultural aspects of a problem space, including the political and institutional dimensions of the design work (Bang & Vossoughi, 2016) would allow for theoretical insights into how school technology practices responsive to local context. During the 2014-2015 school year, an advisory class of 15 high-school students and their advisory teacher, along with the author formed the initial design group. In its second year (2015-2016), responding to feedback from the initial group of students, the collaboration moved to an after school space with an added emphasis on students to engage with their own personal interests. The students gradually transitioned to a new group of 12 students who continued the collaborative design work. Meetings generally consisted of checking in with students to generate feedback on the structure of collaboration, design goals, and design outcomes, as well as work-shopping prototypes of student designs including an ePortfolio system to facilitate more holistic evaluation of students, an archive of "college-going interviews" of seniors to make college-going knowledge more visible, and a video gaming tournament centered on the development of safe spaces for students. Most importantly, all aspects of participation by students were voluntary.

Data collection and analysis: Design infrastructure as an activity system

This analysis examined field notes and design artifacts form design meetings, as well as participant interview responses from the two-year study. Data points where students either made recommendations to shift the infrastructure of design, or took actions that concretely shifted the infrastructure of design were isolated, and descriptive coding was utilized to summarize the nature of the recommended or acted upon shift. These descriptions were then grouped into larger themes that generalized the refinements students made regarding the design practices of the partnership. To identify instances of students making recommendations to, or actively

shifting the design practices of the partnership, the collaborative endeavor was viewed during analysis as its own unique activity system that had its own set of design goals, tools and symbols, participant roles, community, and expectations (Engeström & Sannino, 2010). Instances of students refining this activity system was identified when students referred to any these aspects of the design activity system and recommended changes or directly acted to change an aspect of the activity system. Both explicit recommendations and direct action were captured for this analysis because the analysis is primarily interested in the design infrastructures students wanted to see.

Findings

The findings from the study will be presented in two parts. First, a representative vignette that encompasses the themes that were identified across the general data set will be shared. After the vignette is shared, the five themes that were identified, *Relevance to Student Interests*, *Opportunities for Responsibility and Growth*, *Expansion of Activity*, *Refining Infrastructure*, and *Ensuring Use* will be described using the vignette.

Vignette: Transitioning to an after school program

At the beginning of the second year of the participatory design work (2015), four students from the original design group met with the first author to discuss potential improvements in the way students engaged with the partnership. The first year had concluded with a professional development (PD) session organized by the students with administrators, teachers, and university researchers as an audience. This reflected an earlier session where students articulated a desire to share their designs with teachers because they "needed to learn how to use some of these tools" and they "were able to decide what happened in classrooms". The design goal of the first year was to develop practices that were meaningful to students using Schoology, a learning management system (LMS) that the school had recently purchased, but in the view of teachers and students still in its infancy of use at the school. Consequently, at the PD session, students presented their designs which all utilized the new LMS, such as an ePortfolio system to facilitate more holistic evaluation of students, an archive of "college-going interviews" of seniors to make college-going knowledge more visible, and an introduction to the "calendar" feature on the LMS. However, about five students had lost interest in the design work through the first year, and did not present at the PD session.

At the onset of the second year of the partnership, five students from the original group who had volunteered to offer feedback on the first year's collaboration met with the author with the goal of articulating ways to improve the design methods. Asked why some students seemed to become disengaged from the previous year's work, the students unanimously agreed that the design goal, to develop "school practices" was too limiting, and that students needed to do work that they felt "passionate" about. As a result, the group decided to ask future participants to initiate their involvement by engaging with an issue or activity they felt passionate about, and use digital tools to more deeply engage with their passions with an eye towards using the outcomes of this work to inform teachers of technology practices that are meaningful to students. With engaging in "passion-driven work" through digital technology as a central thrust of the design group, the collaboration moved to an after school space with a mostly new group of twelve students who each initiated various technology-mediated, passion-driven projects, such as creating an e-sports (gaming) community, continuing the development of an ePortfolio system, and building a financial literacy website.

Themes from student recommendations to refine design infrastructure

Relevance to student interests

The student recommendation to foreground student "passions" in the design process described in the vignette is representative of how students consistently sought to center their interests as they designed school technology practices. Many of the student recommendations referred to the need to make the design process enjoyable and engaging by ensuring opportunities for students to connect the design work with interests developed in and out of school, such as fictional writing, gaming, photography, and financial literacy.

Opportunities for responsibility and growth

Students in this vignette are beginning to view themselves as authority figures within the design partnership. For example, the students who gathered to reflect on the previous year's partnership took on an additional responsibility to improve the quality of the partnership, while earlier in the year, students constructed an opportunity to position themselves as experts in relation to teachers by organizing a professional development session. Once again, students frequently sought, or created opportunities for themselves to develop skills necessary to, and take on greater responsibilities in the design process.

<u>Expansion and refinement of design activity</u>
Another observation made throughout the design partnership, and observed n the vignette is that students played an active role in constructing the ways in which infrastructuring occurred. In other words, students sought to develop ways in which they can participate in the refinement of the design process. While this is an *a priori* aspect of participatory design processes like this, it is noteworthy that students actively sought out, and created opportunities to participate in this process.

<u>Ensuring use</u>
Finally, students sought to participate in design processes that would ensure the use of their designs in school. For example, the professional development session that the students planned at the end of the first year was partly due to the recognition that teachers hold significant authority within the school to utilize the designs that were developed by students. Students modified the design process through a rationale of ensuring use of the designs.

Conclusions and implications: Promises and complications of infrastructuring

The findings in this paper suggest that student participation in this design partnership echoed existing research on participatory design, learning, and human-computer interaction. Existing research has found that students seek out learning opportunities that speak to their interest across ecologies (Barron, 2006), that students engaging in participatory inquiry and design seek out learning and greater responsibility in the context of the work (Kirshner, 2007), and that participatory design work often leads to designs that are rooted in the local context (Bang & Vossoughi, 2016), as well as providing opportunities for activity systems to expand beyond their original boundaries (Engeström & Sannino, 2010). What is noteworthy about this study is that students seem to have endorsed the value of these concepts in the context of participatory design. Therefore, in future participatory design endeavors with students, some of the themes identified in the findings can support the development of frameworks to support the formation of student participatory design spaces.

The findings also serve to complicate the notion of "equity" and "democracy" in design processes. As is evident in some of the findings, and particularly in the vignette, the themes identified in this analysis interacted in complex ways that prevents any observer from making definitive judgments on the quality of participation and equity in the design process. There were times, as seen in the vignette for example, when students would sacrifice a level of agency over their designs with the desire to make the designs accessible to a greater number of students. On the other hand, some of the modifications to the design practices that were recommended by students and subsequently taken up, such as facilitating the design activities to include work related to their personal interests, suggests that involving students in the construction of collaborative practices positions them in a position of relative authority. These complications suggest the value of continuously reflecting on and refining the characteristics of participatory design processes as they unfold.

References

Bang, M., & Vossoughi, S. (2016). Participatory design research and educational justice: Studying learning and relations within social change making.

Barron, B. (2006). Interest and self-sustained learning as catalysts of development: A learning ecology perspective. Human development, 49(4), 193-224.

Barron, B., Gomez, K., Martin, C. K., & Pinkard, N. (2014). The digital youth network: Cultivating digital media citizenship in urban communities. MIT Press.

Dantec, C. A. L., & DiSalvo, C. (2013). Infrastructuring and the formation of publics in participatory design. Social Studies of Science, 43(2), 241-264.

Delpit, L. (2006). Other people's children: Cultural conflict in the classroom. The New Press.

Engeström, Y., & Sannino, A. (2010). Studies of expansive learning: Foundations, findings and future challenges. Educational research review, 5(1), 1-24.

Kirshner, B. (2007). Introduction: Youth activism as a context for learning and development.

Margolin, J., Hauser, A., Heppen, J., Blum, J., Haynes, E., Chavez, S., ... & Rickles, J. (2015). Evaluation of LAUSD's Instructional Technology Initiative.

Peppler, K. A., & Kafai, Y. B. (2007). From SuperGoo to Scratch: Exploring creative digital media production in informal learning. Learning, Media and Technology, 32(2), 149-166.

Selwyn, N. (2016). Minding our language: why education and technology is full of bullshit… and what might be done about it.

Schwartz, L. H. (2015). A funds of knowledge approach to the appropriation of new media in a high school writing classroom. Interactive Learning Environments, 23(5), 595-612.