



Identifying Research-Practice Tensions and Belief Shifts through Co-Design Processes

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Abstract: In this paper, we examine an experience of using co-design methods with Palestinian Arab educators and Learning Sciences researchers. In this research-practice partnership, we used a participatory methodology to generate new ideas for transdisciplinary STEM activities. This approach allowed researchers and educators to build trust, facilitated a better understanding of the local context, and enabled new educational possibilities to emerge through speculative design. We describe the collaborative process to create STEM learning environments for non-dominant learners in a settler-colonial context and highlight tensions we observed between research aspirations and practical constraints.

Introduction

This paper is part of a larger project that aims to study the engagement and participation of a non-dominant population of Palestinian Arab learners in transdisciplinary science activities. This is a collaboration between learning science researchers at Arizona State University and educators at Al-Rowad for Science and Technology, a community-based organization led by Palestinian Arab educators in the Haifa District in Israel. The organization is engaged in STEM education through science hands-on activities, after-school programs, and public science outreach events with Palestinian Arab youth and children in Israel. Through this collaboration, we drew on multiple design methods to strengthen the partnership and speculate about possibilities for designing equity-oriented STEM education environments in their context (Bang & Vossoughi, 2016; Dunne & Raby, 2013; Freire, 1973; Vossoughi & Gutiérrez, 2016). Through this work, we hope to expand on how participatory research with local communities can “disrupt historically shaped inequities and cultivate transformative agency from within communities” (Bang et al., 2016, p.29), position community members as experts, and strengthen research-practice partnership through critical pedagogy and dialogue. These efforts have the potential to shift power and authority away from researchers and toward collaborating with members of the local community, who have a deep understanding of the social and historical complexities at play, and the challenges and constraints underlying pedagogical decisions. As such, this work has implications for researchers who conduct research with non-dominant and historically oppressed populations.

In this paper, we describe the methodological choices we had when conducting co-design workshops to create educational experiences that consider equity, collaborative and interactive engagement, and learning with technology. In this work, we build upon participatory methods to involve participants in thinking about educational possibilities for their work (Bang & Vossoughi, 2016; Freire, 1973). In this process, we used design fiction prompts to speculate such possibilities and engage practitioners to think about expansive possible futures of their work (Dunne & Raby, 2013). We frame this work as co-design to emphasize the role practitioners can play in research-practice partnerships. We use data from notes and transcripts from three sessions (6 hours total) to examine how co-design can be used as a methodological tool that positions collaborators as experts and enable productive dialogue within research-practice partnership. In addition, we examine if and how participants, including the researchers, experience shifts in thinking about learning, equity, and pedagogy through this process.

Positionality

As our identities as researchers and practitioners are a critical component of this research, we begin with a description of our positionalities.

Areej Mawasi, Researcher: I am an insider researcher in the broader context of the fieldwork. Both my undergraduate education in Israel and graduate studies in the United States were Western and Eurocentric. My fluid learning trajectories across contexts, geographies, languages, cultures, and methods enabled me to engage in scholarship across disciplines, paradigms, and geographies (Said, 2000). Within this partnership with the organization, my role was dynamic, initially I was an outsider and viewed as a researcher who was there to observe and make recommendations. Gradually, as our communication and trust increased, my role shifted and our collaboration grew stronger. In this project, I co-designed and facilitated the workshops, conducted and shared observations, analyzed and interpreted the data, and I was the lead author on this paper.

Ruth Wylie, Researcher: I am a white woman who was born and raised in the southwest United States. I have attended public and private universities in the United States and have training in Cognitive Science, Computer Science, and the Learning Sciences. My research focuses on supporting interdisciplinary and diverse teams to tackle global issues. For this project, I advised Areej on the design and execution of the workshops, participated in interpreting the data, and drafting the manuscript.

Wisal Ganaiem: I am the pedagogy and education counselor at Al-Rowad. I have a Master's in Educational Counseling. For this study, I shared with Areej insights on areas of interest of Al-Rowad in social change and science education, overview of practices we do with instructors (e.g., professional development, STEM pedagogy), and populations we work with. I also shared feedback on the structure and topics of the co-design sessions in alignment with instructors needs, and I fully participated in the co-design sessions.

Masaood Ganaiem: I am a scientist and team leader in research and development innovation. I grew up in Baqa Al-Gharbia and studied at a private school in Haifa. I hold a Ph.D. in immunology from Ben Gurion University in Israel. During my research career, I noticed a low number of Arab scientists in Israel. In 2013, with my wife Wisal and Arab academic fellows, I co-founded a non-profit organization called Al-Rowad for Science and Technology, with a vision to overcome the socioeconomic and geographic challenges and disadvantages in science education facing the Arab community in Israel. When we met Areej, we noticed commonalities in education perspectives and pedagogical practices; this encouraged us to collaborate on this project. Our collaboration helped us understand the potential impact of Al-Rowad's framework beyond our local community.

Participatory co-design research

For this study, we drew upon participatory approaches. Our goals were to create partnerships in which we co-construct knowledge with educators through co-design activities, challenge deficit-focused views of local communities' efforts in changing their realities and understand pedagogical practices in the learning environment from the educators' perspectives, not only through the researchers' lens. The organization volunteered to collaborate on this project because they were interested in expanding their impact through academic research beyond the local community. This work is conducted within a community-based organization, with Palestinian Arab educators. To better understand the existing practices and learning within this context, we conducted three co-design sessions over two days (6 hours total) with educators from the organization, to learn with them about the pedagogy and design of equity-oriented STEM environments for non-dominant Palestinian learners. Data for this paper includes video transcription of the sessions, design artifacts created during the sessions, and field notes.

Our partnership follows the characteristics of traditional co-design work. For example, (1) the work follows a non-linear process to implement innovations in real-world learning environments (e.g., Barab, 2014); (2) the work values interdisciplinary partnerships between researchers and stakeholders such as teachers, learners, parents, and administrators (Penuel & Spillane, 2014; Zuiker et al., 2017); (3) the work views learners and teachers as co-designers through participatory design processes that aim at thinking about educational possibilities (Bang & Vossoughi, 2016; Freire, 1973); (4) the work attends explicitly to the social, cultural, and political context in which these design activities take place (Bang et al., 2016; Bang & Vossoughi, 2016); and (5) the work uses design approaches to engage educators with thinking about possible futures within their pedagogy and learning environments design (Bang & Vossoughi, 2016; Dunne & Raby, 2013; Freire, 1973).

The co-design participants were 6 educators from the organization (2 lead instructors, 2 assistant instructors, Wisal (Third Author) as the pedagogy and education counselor, and the STEM pedagogy director and co-founder) and the first author. The sessions focused on the following themes: equity in STEM; collaborative learning; and learning with technology. During the sessions, participants engaged in discussion and presented their ideas. The sessions were followed by three design challenges to identify educational possibilities.

Preliminary findings

The findings suggest that co-design fiction can serve as a method to envision possible educational designs within an existing context. These findings highlight (1) tensions between research and practice, (2) shifts in the perceived role of researchers within the environment, and (3) shifts in what counts as learning.

Tensions-between research and practice

Educators made generative design suggestions such as integrating collaborative activities, proposing ways to add digital media tools, and suggesting modified activity flows to incorporate these activities within their existing practices. While these ideas aligned with the goals of each co-design session, we see this as an initial step. We had hoped our conversations about social and political issues within this context (e.g., diverse ways of knowing, marginalization, corruption, violence, hegemony in science) would lead to participants generating more transformative educational ideas. One possible explanation is that the educators were designing educational

possibilities constrained by the existing status quo of the context of their work and mediated by the prompts that the researchers designed (e.g., the ICAP framework (Chi & Wylie, 2014)—Interactive, Constructive, Active, Passive—for use in the design of collaborative activities). It is clear that the organization is committed to social change through their education work, but they must navigate their existing social, cultural, and political contexts in a pragmatic way to provide an entry point to science education for a large number of Arab students across many towns and cities, including unrecognized Bedouin villages.

Perceived role of researchers within the environment

As mentioned above, Areej is from the local community where the organization functions. Areej had not previously been involved in work with the organization. Because of her status as a researcher and her training in the United States, the educators originally viewed her role as an expert, consultant, or evaluator. When asked their expectations for the co-design sessions, educators initially expressed that “they want[ed] to learn from [her] so they can improve,” but also, “they know that [she is] here to do research.” This shifted when Areej emphasized that she was there to learn *from* them and *with* them through a co-design process that aims to co-construct knowledge. For example, when Areej shared a slide with observations and emerging themes from previously observed practices, participants were surprised and questioned if Areej had been analyzing them as they completed the workshop activities. While the conversation was humorous in tone, it suggests that participants perceived the research process as something that is done “on people” rather than “with people.” Throughout the co-design process, it became clear that the researcher was interested in working with the educators and to co-construct knowledge and expectations. Areej frequently sought feedback on her interpretations and perceptions. Through this process, trust was built and conversations became more open to constructive critique. One participant reflected, “the source of critique and how it is done makes a difference... if Areej shares suggestions, it is clear to me from the talk that it is for improvement.” Session transcriptions suggest that the educators were able to shift their perceptions of the Areej’s role and began to view the co-design sessions as a collaborative experience, while also increasing their level of trust. At the end of one session, Areej shared her preliminary observations and encouraged the members of the organization to continue exploring these themes in order to share principles with other organization or in other learning environments. In response, two participants said, “around the world,” referring to conversations about using their expertise working with non-dominant learners to benefit other contexts. This shift in discourse changes the view from that of a researcher studying the educators to that of the researcher collaborating with and learning from them. Despite the initial power dynamics between researchers and practitioners in the context, the co-design process built trust and helped educators from the organization position themselves as active collaborators rather than simply passive participants.

What counts as learning

The educators’ sense of what counts as learning also shifted throughout the co-design process. In our discussions, we talked about learning-by-doing in an out-of-school context (e.g., knowledge of a peasant farming their land, a woman organizing her spices in patterns). One participant disagreed about whether or not these examples constituted learning. The participant argued that these examples were people “robotically” doing things without thinking, while another described how his Palestinian illiterate grandmother, who is from an ethnically cleansed village of Al-Damun (see Zochrot - Al-Damon, 2014), creates mathematical geometry and patterns through sewing and embroidery that “a Doctor in Math cannot do.” This example demonstrates that the educator’s grandmother was not simply engaged in passive apprenticeship; she was creatively making and constructing new ideas and art using mathematical knowledge that she was able to transfer to others to maintain her village’s history, culture, and knowledge. This example provided a possibility for the first participant to think about diverse ways of knowing, and this change in perspective was reflected in his descriptions later in the sessions, where he noted that he sees such examples as creating new things beyond what was taught. We believe such an exchange was possible because of the examples Areej shared with the practitioners in an attempt to engage them in decolonial discourses about science education in this context.

Conclusions and implications

The design research process is often described as iterative, interventionist, and involving retrospective analyses (Barab, 2014; Bannan-Ritland, 2003; diSessa and Cobb, 2004; Collins et al., 2004). While researchers have different views about the appropriate level of participant involvement in decision-making, these perspectives are informed by researchers’ epistemologies, observations, participant feedback, and data collected across design cycles. We view iterative, interventionist, and researcher-centric approaches as problematic for work with non-dominant populations and community-based educators. Using a top-down colonial approach, centering researchers’ voices or the priorities of funding institutions, and focusing on “research and scientific outcomes”

minimizes participants' contributions and reproduces research and design that does not cultivate the knowledge and wisdom that local communities and educators already have. As we continue to engage in design research in the Learning Sciences, we argue for the following practices: (1) researchers' priorities should be shifted towards collaborative learning with educators. For instance, involving instructors in the co-design process, as a way to learn about their pedagogical practices, share with them about the theoretical and implications of such approaches, and co-design educational possibilities collaboratively (e.g., Bang & Vossoughi, 2016); (2) building trust by involving the leaders and members of organizations in decisions related to research activities (e.g., discussing with instructors, logistical decisions, involving parents in the study); (3) understanding the existing practices of the educators and community; and (4) engaging in designing learning environments where we dialogically exchange expertise with educators and community members.

Design research amplifies collaboration between multiple stakeholders (e.g., researchers, educators, instructional designers, policymakers, parents, students) (Zuiker et al., 2017). Such collaboration enables the design of tools and the implementation of studies that meet multiple goals (Bannan-Ritland, 2003). Education systems and learning are complex; therefore, designing and developing interventions to improve learning requires diverse research methods that involves perspectives of nondominant local communities and participants. Such perspectives are not always considered in the design process, particularly in contexts where education systems are oppressive, racist, and engaged in discrimination against non-dominant populations. Through our work, we attempted to create a research-practice partnership where we brought together learning scientists and practitioners. These diverse perspectives enable a deeper understanding of the local context and its social, cultural, and political aspects that shape the local community practices.

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