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Journal of Formative Design in Learning
https://doi.org/10.1007/s41686-020-00045-3

Essential Tensions in Facilitating Design Thinking: Collective Reflections

Danah Henriksen[1] · Michelle Jordan[1] · Teresa S. Foulger[1] · Steven Zuiker[1] · Punya Mishra[1]

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Abstract
As design thinking expands into educational contexts, teams engaged in the process increasingly encounter situations that involve facilitating collaborative problem-solving. In design-focused workshops and other collaborative design activities, facilitators play a key role in supporting small group interactions in order to generate ideas, structure discussions, and guide the process. Yet despite this increased focus on collaborative design thinking, there is little research to inform either facilitator roles or facilitator practices in this process. We address this gap by presenting a qualitative study that thematically examines our experiences as university-based facilitators who supported a community-wide educational design event. Specifically, we served as facilitators in a collaborative, multi-stakeholder, educational design thinking workshop that sought innovations for a local high school improvement initiative. This research is a qualitative study of our own facilitation processes based on data generated through open-ended self-reflection questionnaires and facilitator planning and debriefing discussions. Our results demonstrate that design facilitation resonates with Thomas Kuhn's (1977) notion of "essential tension." Essential tension exists within multiple aspects of design thinking roles and practices—including processes, products, discussion flow, and group dynamics. We reflect on these findings and propose implications for design thinking facilitation in future research and practice.

Keywords Design thinking · Facilitation · Design facilitation · Essential tension

Introduction

As design teams expand the functions and purposes of design thinking processes in educational settings, they increasingly encounter situations that involve collaborative design and problem-solving (Nash, 2019). Popular and scholarly design thinking processes offer a way for educational institutions to address challenges or issues of concern and to innovate their practice (Koh et al., 2015). In design-focused workshops and other collaborative design activities, small group interactions are often hosted by facilitators whose role is to help generate ideas, structure discussions, and guide the process. The responsibility of the facilitator is important to the outcomes; yet little to no research exists to provide insight into understanding the roles or challenges faced by facilitators working in such educational design-focused contexts (Mosely et al., 2018).

✉ Danah Henriksen
danah.henriksen@asu.edu

[1] Arizona State University, Mary Lou Fulton Teachers College, Tempe, AZ, USA

We present a qualitative study, thematically examining the experiences of a group of university-based design session facilitators. The authors of this paper are faculty in a university teachers college who served as facilitators in a collaborative, multi-stakeholder, educational design thinking workshop that sought innovations for a local high school improvement initiative. This workshop was part of a broader, collaborative design initiative between the university, a school district, the local community, and public or private entities (e.g., local organizations supporting the improvement of the school). The initiative endeavored to rethink and redesign a struggling local high school in a collaborating/partner school district. As authors and researchers, we sought to study our own design facilitation processes to better understand the nature of our role and the practices involved. At several timepoints during planning and facilitation, we participated in self-reflection by completing facilitator surveys and group reflection through recorded group discussions.

In this article, we aim to inform practice and improve knowledge in an area where there is little to no scholarly research. Despite increased focus on design thinking in the literature and in education settings, limited research exists to inform the practice of facilitators. In fact, we found no existing

Published online: 09 May 2020

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research about facilitation roles in design thinking—with the exception of one article (Mosely et al., 2018)—an article described as the "first paper to explore the role of facilitator in the teaching of design thinking to non-designers" (p. 177). Given increased popular application of design, more scholarly attention is needed to guide the roles and practices for the facilitators of design thinking processes.

This gap in the literature is not merely an academic gap around an unstudied topic; it also has implications for practice. Design thinking workshops and improvement or innovation efforts have increased exponentially in popular discourse and practice (Lahey, 2017). Scholars and practitioners alike have pointed to the uncertainty that participants in design thinking methods regularly encounter, as well as the challenges that cause people to get stuck (Watson, 2015). Facilitators are essential to the innovation efforts of a group as their involvement determines whether groups will persevere through design processes or get stuck, flail, and revert to the path of least resistance. Facilitators play an important role in driving the design thinking process. Our goal is to offer insights to design thinking practices. By studying facilitators in situ, we hope to help both design and education to characterize the facilitator in practice.

We suggest that the work of design facilitation contends with and navigates certain essential tensions (as described by Kuhn (1977)). Problems in education are often uniquely complex and tied to dynamic contexts in which contradictory variables come into play. Facilitating the design of approaches to such problems requires acknowledgement of essential tensions. The iterative, ongoing, and thereby formative nature of design processes is well-suited to navigating complex challenges (Buchanan, 1992). This formative study represents an initial step in an *ongoing* innovation effort in the organizational context under which we, as authors and facilitators, operate, and an initial step in our own inquiry of facilitator practice.

The emergent themes generated through our analytic processes focus on how these essential tensions play out in several aspects of the design processes, products, discussions, and group dynamics. We reflect about how facilitators are frequently pulled between differing priorities as they try to navigate complex problems that are viewed differentially by a range of stakeholders who often hold wide-ranging and conflicting perspectives.

In the sections below, we describe the context for this study and the broader school initiative as well as the specific design day event that the facilitation data/experiences are drawn from. We position this within Kuhn's (1977) construct of essential tension and in literature around design thinking in education for innovation and problem-solving. Finally, we share results from a qualitative study of our facilitation experience, and reflect on implications for research and practice.

The Context: Reframing and Redesigning School Experience

In higher education, there is discourse around the changing role of universities as drivers of change, learning, and innovation. There are increasing opportunities to engage in collaborations or partnerships for design-based improvement between communities, higher education institutions, and public or private practice endeavors. This is relevant to the context of this study, which is part of a broader and ongoing design-based innovation mission that drove this work within the college of education.

Speaking to the formative nature of this study, it is important to note that the college which the facilitators and authors of this article are part of, remains involved in ongoing design thinking efforts in partnership with local schools and communities to support change and improvement in education. The "design day" event described in this paper is part of a broader, college-wide, design-based initiative that serves as an "engine of innovation" for educational institutions in the state and nationally/internationally.

The initiative often tasks faculty and staff as facilitators in design-driven collaborative school improvement initiatives, a role that they may not have a background in. It is imperative that the role and practices of facilitators who engage in such design-based processes are better understood. Our goal, as individual design researchers and contributors to a college-wide initiative, is to feed what we have learned through this research back into the process, even as our design work expands. Thus, it becomes part of our broader research agendas around the spaces of design in education (Warr et al., 2020; Zuiker et al., 2019; Zuiker et al., 2017). In addition, several of the authors of this paper are also involved in collaboration and research with the design school in the same university—providing opportunities for inter-university, interdisciplinary examination of design facilitation in design thinking settings. This study, then, becomes a key component of a strategic plan to both expand and understand design-based approaches to educational innovation, and is a developmental step toward building a broader research agenda. We therefore aim to inform the experiences of related discussions of design facilitators, as elements of facilitation may apply across different contexts.

The School Success Initiative and Design Day

The *School Success Initiative* was a strategic partnership between a local school district, a local community philanthropic group, and a college of education at a large university. The district had approximately 30 schools, and 1500 teachers serving 24,000 students. The local nonprofit was an all-volunteer group of business and civic leaders dedicated to supporting the local community through youth sports, education, and charity.

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The school success initiative was driven by a sense, shared by the administration and the broader community, that the high school (as it existed at that time) was not meeting the intellectual, social, and developmental needs of the students. There was also a sense that existing projects focused on addressing student behavior and supporting academic success had not necessarily worked as well as hoped. The school success initiative was an opportunity to bring a range of stakeholders into the conversation to address these challenges in a more holistic and bottom-up manner and through that, to reimagine what school could be. The "design day" event was an early step in this initiative organized by the design team at the teachers college. The event was a collaborative effort to design innovative solutions for the high school through an open-ended design process valuing local context, diverse perspectives, intrapreneurial thinking, and iterative solution testing. The event aimed to engage a range of voices in design thinking processes, to reconsider how the high school might be redesigned.

Design day aimed to reconsider how the high school might be reimagined by engaging a range of voices in design thinking processes. It was a one-day facilitated event with participants having varied community/education stakeholder roles. The event focused on generating ideas of *what high school could or should be*. A total of 161 participants worked with a facilitator in small groups of eight to ten people. As the goal, groups represented diversity of roles, experience, and perspective. These participants included 26 students, 14 parents, 48 teachers and staff, 46 members of the community, 15 administrators, and 21 facilitators and members of the university team. Notably, many participants were also alumni of the high school.

These stakeholders worked together to imagine alternative possibilities for the high school's future through a series of activities facilitated by the design team from the college. Each group worked with their facilitator to collaborate on a series of open-ended design thinking tasks, which were developed by drawing on examples from popular models such as the Stanford design thinking or IDEO models. These activities leveraged design principles, (e.g., empathy or ideational thinking) for teachers and students to identify areas for the success initiative to focus its efforts. Facilitators guided the groups through parts of design thinking processes to help them empathize with other stakeholders, define the problem and challenges for the high school, and then ideate on how the school success initiative might address these challenges.

First, each group was asked to map out a day in the life of a high school student (or of a high school teacher) and "tag" the events in the day with positive and negative affect. This then became the foundation of the next phase of discussion, which though different across the sessions, focused on identifying a range of opportunities, challenges, positives, and negatives. The groups then discussed and tried to characterize three to five central issues on which to focus. Participants were also provided opportunities to see what other groups were doing and to "look, add, or steal" ideas. As a final activity, groups created a video-pitch of an argument for what they believed should be the overall focus of the endeavor. The mappings of a student day, key ideas, ideation lists, and other artifacts provided data points for the future of the broader initiative.

In order to help varied groups of people through the design day process, it was essential to carefully facilitate the event. Each small group had a university facilitator (the authors of this paper all facilitated) to guide them through discussions, activities, and goals. These university facilitators were faculty members who all had research interests focused on different facets of design thinking, as well as some experience in design facilitation. They prepared for the event via several hour-long meetings and workshops with the college office supporting the event. This provided them with background on the school and the school success initiative, equipped them with tips and support for their facilitation practices, and helped them come to common understanding about what was expected of them during the event.

After the event, the authors met for a debriefing session which identified a range of issues around facilitation. Of specific significance were certain essential tensions that appeared inherent in their facilitation. Before addressing our methods for studying the process and reporting our findings, we review the literature around Kuhn's (1977) essential tension, and educational design processes.

Essential Tension in Education

Educational challenges are often complex and open-ended, with many approaches and no single solution (Jordan et al., 2014). Bullough Jr. (2012) refers to this issue noting that "in education, most of the important issues come in the form of dilemmas to be managed, not problems to be solved" (p. 346). This idea of managing dilemmas or resolving and revisiting problems, as opposed to "solving" them, resonates with the notion of essential tension.

Kuhn (1977) introduced the idea of essential tension to characterize the competing, necessary, and vital tensions that occur within scientific paradigms. He noted that incongruity, paradox, contradictions, and tension are ongoing aspects of the history of scientific research. Such tension may involve any number of competing constructs; for example, in the sciences, tension might be seen as the impetus for change vs. the urge to maintain status quo, the need for supportive collaboration vs. intense competition, the demand for risk-taking vs. thoughtful caution, and so on.

The notion of essential tension illustrates dynamic and *unavoidable* contradictions that occur in spaces of growth, inquiry, and change. Hackett (1990) noted that science in the academy is bound by tension: the intrinsic vs. instrumental values in science, independence vs. dependence, or traditional

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vs. non-traditional approaches to authority. Fujimura (1996) highlighted the double-edged sword of efficiency, standardization, and speed within research paradigms, noting, "For all their use in enabling and empowering, they are simultaneously associated with limitations, loss of flexibility and customizability, and obstructions and delays in other processes" (p. 112). Others have identified the temptation that people often feel to wish essential tension away, because tensions reflect ambiguity and unclear answers that can lead to indecision (Hackett, 1990, 2005). But such tensions are *essential*, and should not be wished away. They are inherent and necessary, as coexisting albeit representing different "truths" and perspectives within fields. Moreover, Kuhn (1977) suggests that such essential tensions are essential for scientists and communities of scientists to maintain for productive scientific progress (D'Agostino, 2009).

Essential tension can emerge within any area of complex human-centered problems. For instance, Karumanchery and Portelli (2005) highlight the construct of essential tension to characterize the contradictions between and within the democratic values and bureaucratic structures of Western educational systems. They reflect on such tension as a process of *navigation* and negotiation, or "walking a tightrope of sorts" (p. 329) between norms, values, and structures that are simultaneously competing and essential.

The idea of essential tension reflects the reality of the context for this study, and sheds light on our roles and reasons for being part of this endeavor. As faculty members within a college of education, we had a unique position in this event: to serve as design facilitators without the same personal stake in the process and outcomes as the school stakeholders did. As facilitators, our job was to bring knowledge of the design process and to facilitate discussion among stakeholder groups. This required us (as is elaborated in the findings) to facilitate in ways that accounted for the tension to be used as a productive tool in the design thinking effort. At times, that meant encouraging participants to be generative and forward thinking while also holding them back from solutions, or managing tensions of time constraints while seeking to ensure all voices were heard and represented. Through our experience, we began to collectively understand that there are no simple solutions or perfect practices; rather, we share a sense of the facilitator role as being characterized by managing or navigating a range of essential tensions. Furthermore, facilitators must bring a keen awareness of the complexity of their contexts, to be prepared to improvise and adapt to emergent complications and complexities, as well as to a diversity of possible framings of the problem at hand and variety of solutions that emerge. It was also helpful to us as facilitators to understand the connections between design and education.

Design Thinking in Education

Herbert Simon, the "founding father" of design, suggested that design applies to any area of human thinking that requires innovation and new solutions stating:

Everyone designs who devises courses of action aimed at changing existing situations into preferred ones. The intellectual activity that produces material artifacts is no different fundamentally from the one that prescribes remedies for a sick patient or the one that devises a new sales plan for a company or a social welfare policy for a state (1969, p. 130).

In noting how "everyone designs" provided that their goals include "changing existing situations into preferred ones", the connection to educational problems becomes clearer. Design is integral to any work that aims to devise solutions that improve situations.

The field of education has increasingly used the term "design thinking" to apply design processes to problems in teaching, learning, and other areas of educational practice (Norton & Hathaway, 2015). Educational research and practice have seen growing applications for design-based approaches, which vary greatly. At the broadest level, the meaning of the term design thinking generally reflects the thinking processes used in design work. These processes can be eclectic and varied, but have common or guiding themes that undergird the varied contexts of design work (e.g., empathy, problem definition, and ideation) (Cross, 2011).

Several popular design models have aimed to embody these common themes. Scholarly design discourse through the latter half of the twentieth century sought to understand the processes of professional designers, viewing the field of design as a science unto itself (Simon, 1969). But more recently, a branch scholarly design discourse—innovative design discourse—has popularized common themes of design as a streamlined set of processes (Johansson-Sköldberg et al., 2013). Some of the resulting models, such as the IDEO model, or the Stanford d.School model of design thinking, focuses on similar skill sets and processes used by practitioners and stakeholders to address complex problems and creative solutions (Plattner et al., 2010).

Although design applications for education have been highly touted, there are still few examples of applied research on design thinking in education (Henriksen et al., 2017), and even less around the role facilitators play or the challenges they face (Mosely et al., 2018). This article focuses on a self-reflective inquiry about our roles as facilitators of groups working through these design processes. In the next section, we describe our approach to the research followed by a discussion of findings.

Method

This empirical, qualitative study is a self-report of facilitators' experiences, perspectives, and takeaways stemming from

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design facilitation. We sought to inquire into our own "lived experience" by interrogating our own practices and experiences (Moustakas, 1994). Because the first four authors were all researchers and facilitators in this setting (and the fifth developed and led the event), it presented an opportunity to do embedded research from both an "emic" and an "etic" perspective (Gaber, 2017). This dual perspective reflects our roles as insiders from the college with a hand in managing the day-long facilitated event as well as an outsider looking into the school context.

Our data was generated by five facilitators (the first four authors of this study, and also another facilitator who contributed his self-report facilitator data with ours). As noted by Creswell (1998, p. 65), in-depth qualitative studies often revolve around small samples of "up to ten" participants—a focused sample that aligns with this self-reflective investigation.

Upon being invited to facilitate at the event and receiving research approval, we began gathering data in several forms and at different stages of the process. Our role as facilitators was that of outsiders to the situation—we were not aligned to the nuances of the school context, and the outcome of the event had no bearing on our professional lives (other than as an act of university/community service).

To organize self- and group-reflection, all data collection tools were co-designed during several meetings in which the group of facilitators/researchers agreed upon the types of prompts and question framing needed to elicit the desired evidence. We specifically developed open-ended, self-reflection questionnaires (see Appendices 1, 2, and 3) to gather our facilitator expectations before and perceptions after the workshop as well as a delayed reflection to capture remembered elements and processes. To complement self-reflection with group-reflection, we audio recorded a prospective, pre-event group planning discussion and retrospective, post-event group debriefing discussion (each approximately 45 min). In addition, we drew on publicly-available artifacts generated during the workshop, to aid our memories of events. This set of data allowed us to individually and collectively reflect about and study the entirety of our experience.

As an initial step in making meaning of the data, each researcher used a coding template to engage in several rounds of thematic coding. This step allowed each of us to develop our own thematic codes and "meaning units" (Moustakas, 1994). Then, we met as a group to discuss and negotiate a collective foundation of emergent ideas. These rounds of analysis yielded several categories or aspects of design facilitation.

Our coding approach was a hybrid of both "top down" and "ground up" coding (Fereday & Muir-Cochrane, 2006), though it relied most heavily on "top down" a priori coding using a theory-driven approach with a focus on Kuhn's (1977) concept of essential tension. In this top-down a priori approach, we initially familiarized ourselves with the data by reading through it and making individual notes and ideas (Creswell, 2005). We quickly centered around the notion of essential tension as the guiding theory in the data, and determined to use this idea in driving our analysis. The process of further breaking the data into the categories discussed as essential tension in design facilitation required some emergent coding and discussion. This was done during individual rounds of analysis dedicated to identifying categories within which these tensions emerged. This was followed by group peer-debriefing sessions (Creswell, 1998) to discuss and decide how we could focus on these categories using a coding worksheet to facilitate this process. Altogether, we generated different types of data, both collectively and individually, before, during, directly after, and after a delay in our facilitation work. This allowed some measure of triangulation in our focused sample. As Greene and McClintock (1985) point out, there is methodological value in the complementarity and consistency of different types of data that thematically point in the same direction.

Findings: Spaces of Tension in Design Facilitation

Using Kuhn's (1977) conception of essential tension, we found that such tension emerged in every group, though its manifestation could be different depending on the contextual idiosyncrasies that each facilitator experienced. In brief, these tensions were inherent and inescapable to the facilitator role. The variation across these contexts allowed us to recognize the different ways these tensions could be characterized and categorized. Drawing our thematic analysis, these tensions arose in four key "spaces:" in relation to the design process, the design products/artifacts, the group dynamics, and the discussion flow.

Design Processes

The ultimate goal of design processes is to generate and reach solutions. But at the same time, it is important that participants not jump to solutions too quickly (i.e., "solutioneering"), to ensure that they understand and consider the problem from multiple angles and consider various possibilities. This presents facilitators with an inherent tension in engaging people in a process framed around generating solutions to the problem, yet simultaneously holding them back from thinking too concretely about solutions before the problem has been framed. As one facilitator noted:

It was tough to keep a small group of solutions-oriented people away from jumping at solutions initially. It seemed to be an instinctive response, and I continually sought to pull back from specifics to point to the underlying idea or issue they were getting at. It's a challenge to draw on all voices when some voices have expertise or emerge more strongly.

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It left me with a question around how to diversify the perspectives and ideas at such a table and avoid obvious solutions.

Solution jumping is inevitable and cannot be avoided, yet facilitators aimed to hold people back when they attempted to jump to solutions, at least until a common understanding of the problem was on the table, as one facilitator described in the challenge:

I struggled with the solution mindsets and the eagerness to elaborate on one idea at the expense of generating other ideas…but I felt like the group exchange illuminated conditions at the school; in particular, one group member was the leader of an organization that was co-leading the event and looked for concrete programs and other plug-in solutions…I addressed this by withholding facilitation as much as I could to allow the other participants' perspectives to drive the discussion. It was my sense that the discussion genuinely illuminated the dynamics at [the high school].

Like Barab et al.'s (2002) notion of essential tension as revealing "illuminative dualities" in communities of practice, this comment actually illustrates several areas of tension felt by facilitators. One of these is clearly the tension in the design process of dealing with solution mindsets. A related tension is that within time-bounded tasks, design processes ask people to be as generative as possible in ideating widely—yet facilitators balance this with the opposite pole of giving people opportunities to expand and elaborate. Some group members want to talk more and facilitators do not want to quash them. At the same time, we need to monitor the balance of power in discussion to allow all participants opportunities to contribute. In the case above, it made sense to the facilitator to hold back, because other voices *were* coming through. But in another situation, depending on how the tension is playing out, a facilitator might need to step in more heavily. Facilitators must maintain constant awareness and monitor potential tensions at play. This also means helping participants to navigate turn-taking during design thinking activities that are relatively brief—namely to be generative and expansive with ideation yet succinct, even pithy, in articulating ideas.

The most effective path toward a common understanding of a problem is through dialog and discussion in which people have time to think, share, and discuss an idea. Yet facilitators often have limited time to promote productive ideation. This sets up another unavoidable challenge, and there may be no single common solution that works for every facilitator or every group across every context. As a facilitator commented:

The job of facilitator is about staying aware and conscious of the nature of their work in navigating tensions—tension of time, discussion, and the need for balance. In trying to pull people away from solutions at certain points and then toward them in others, in allowing them more time to describe but also pushing them for many quick ideas.

In the earlier comment, the facilitator had a reason for a more participant-centered facilitation approach that allowed the group to drive the discussion. But one might imagine a different dynamic where a facilitator could find the discussion lagging and time passing, and thus might step in more heavily by pushing to elicit a range of ideas. There is no single correct approach. The point is that facilitators can be better prepared to manage such situations by seeing them for what they are—an essential tension that resists formulaic or common answers, which requires recognition of competing goals and norms, and agility in facilitation.

Design Products/Artifacts

The process of facilitation was superimposed with the goal of designing solutions and resulting artifacts from the day. In fact, participants were clear on the goal from the start—that they were to participate in a day that would help them gain clarity about the situation at the high school in question, find solutions, and even propose meaningful actions to improving student engagement by changing the learning environments with the larger goal of student success.

The tasks of facilitation groups during design day were not aimed directly at meeting the larger goal. Instead, through a series of connected activities, the goal was to generate an empathic understanding knowing that solutions would emerge. At times, the facilitators and participants both struggled with the tension between staying true to the process at hand and the desire to think about, express, and prompt discussion of personal ideas for larger solutions. Facilitators tried to help participants attend to the present task and to produce artifacts based on the given criteria. One facilitator felt frustrated and impatient during group activity time and noted, "During the problem statement definition, people kept wanting to move to solutions and I struggled to communicate the need to turn these into clear problem statements to work from, without shutting the person down." Another facilitator provided insight about how the progression of the agenda might have played a part in this tension:

In the first couple of activities it was difficult to get people not to give solutions but focus on issues/problems. Everyone was throwing out solutions, but not problems, and then people were even building on those solutions. Having the phrase "ok, but what are the underlying problems there? and how can we frame this as a problem?" was helpful.

The feelings surrounding this tension were strong for one facilitator who stated, "I didn't expect to feel that way so I didn't have good ways of coping with the feelings." Forewarning participants about the emotional charge of this work and equipping facilitators and participants with coping strategies when feelings get intense may be helpful to design work.

Six of the small group activities were meant to produce artifacts that represented the diverse interests, backgrounds and expertise, and perspectives of the individuals invited to the design day event. As one facilitator noted, "I took my

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facilitation role seriously so I opted to try (tactfully!) to help the group stay on topic and produce the desired outcomes of a particular conversation, and solicit everyone's ideas. This was no easy charge for me." The range of diversity created a tension that was unavoidable and also obvious to facilitators.

Additionally, facilitators sometimes noted a tension when expectations for the artifact were not fully communicated or were ambiguous (often intentionally, given that design processes have an open-ended, creative approach). As one facilitator noted:

At times, I felt like I lacked a clear picture of the level of specificity for the artifacts. My group often spoke conceptually about relationships and engagement and less about actionable steps or design, which I thought would be a more useful discussion because it would remain grounded. It seems that more conceptual discussions are less accessible to other stakeholders who retrospectively engage the artifacts.

This necessary openness of criteria sets up a tension among participants. Within a community of practice (Wenger, 1998), participants aim to come together in conversation to reify the common message through some sort of group-generated artifact. Here, reification of a group's discussion, decision, or proposal (i.e., the artifact) aimed to provide a succinctness and indication of action that was generated through discussion could be shared, and was portable.

Design thinking processes are crafted to be generative through a sequence of facilitated small group processes. The outcome (i.e., a reified artifact) of one process informs the next process. One facilitator noted tension about being focused on the current task while the "big picture" or end-game weighed on participants' minds. This facilitator expressed the need to know the larger process and specifically how any artifact generated would inform the next step(s).

As facilitators, we noted a tension between the charge of the group to deliver a product, and to facilitate a natural, process-oriented day with participants who (in the majority of cases) had never met. This aligns with Karumanchery and Portelli's (2005) notion of essential tension as "walking a tightrope of sorts" (p. 329) between norms, values, and structures that are simultaneously both competing and essential. This was especially true with a desire for school governance that represents notions of democratic citizenship and participation in an age where invasive reforms are promoted. Still, by the end of the day, facilitators expressed being pleased that final products, such as the video-pitch for a future area of focus, represented the perspectives of those in their groups. According to one facilitator, "I feel good about the three issues we identified. Those were the best articulations of our ideas."

Discussion Flow

Group discussions are a primary means for participants to empathize with the multiple perspectives of varied stakeholders, to more deeply understand and think in terms of the many sides of problems, and, eventually, to envision design possibilities. Therefore, facilitating discussions among the members of different stakeholder groups is a key component of collaborative design processes. In relation to these general points, the flow of discussions emerged as a key category for describing our self-report data about the sequence of activities during the design day event. Discussion flow specifically characterizes facilitators' reported efforts to support groups in thinking together as they engage in each activity and as they progressively develop empathy, understanding, and insight across activities. As a category, discussion flow accounts for our self-report data before and after the event.

In anticipation of the event, facilitator self-report data considered what design facilitation might require. Discussion flow is reflected in these reports in two ways. First, reports considered basic facilitation skills that facilitators recognized such as "keeping people on-time and on-task." Second, discussion flow surfaced in relation to relatively more complex mindsets like "think[ing] relationally" and "create[ing] synergy quickly." Facilitators subsequently report walking tightropes (i.e., Karumanchery and Portelli (2005)) in terms of both aspects of discussion flow.

Our facilitator reflections were held immediately after the event and helped us expand upon pre-event reports. In relation to time and tasks, one facilitator observed basic facilitation challenges, noting that "we ended up so tight on time that we only got a few [artifacts] written." This situation reflects a basic tension between finding-things-out and finishing-things-up during design activities. Facilitator self-reports also consider these basic skills in relation to the design of activities themselves. For example, another facilitator summarized the influence of sheet paper and movable notes for documenting discussion. "We began by writing [ideas] directly on the paper but, in hindsight, I wish [my group] had written on stickies so that [written ideas] could be moved around in time and from negative to positive." Discussion flow demands facilitators are skilled at evaluating and directing discussion in real time, but also preparing and improving activities progressively over time to support the flow of discussion beyond a single moment.

Meanwhile, our post-event data also characterized discussion flow in terms of more complex mindsets that support deeper, progressive discussions. In thinking relationally, one facilitator characterized deliberate questioning techniques such as "provoking the group to engage and posing questions to elaborate their thinking." Engagement and elaboration were also important notions in facilitator perceptions of discussion flow from earlier activities to later ones.

To illustrate this, two facilitators observed similar discussion patterns during the event's first design thinking activity, journey mapping, which was a technique aimed to help the group identify the typical school experience for a student (i.e., their journey through the day). In each group, facilitators

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described how participants tended to exclusively focus on the perspectives of the individual in their group who represented the particular role being mapped (e.g., mapping a day in the life of a *student* in one group which became more student-centered, and a *teacher* in the other, which ultimately resulted in being more teacher-centered in perspective). The facilitator in the student-focused group noted that "having one specific [student] user to rely on meant that […] our journey map became a detailed picture of his own particular schedule (of classes, sports, after-school activities, etc.)—which was helpful and important, but also not necessarily representative of most other students' days." The facilitator in the teacher-centered group noted that, "as [the teacher] focus continued, I recall asking the two students at our table to share their perspective on a teacher's day too."

These two facilitators intervened in similar ways to expand the focus in relation to ongoing group discussion. Based on these facilitation interventions, one observed afterwards, "I sensed a contrasting dynamic to the journey map. More group members contributed directly to the artifact and the discussion was less linear and facilitator-centered." The other noted, "In some sense, most of the activities that followed this point flowed out of things that we learned or established in our journey map." Still later, the same facilitator further noted, "We went back through some of the same things we'd been talking about since the journey map, and it was clear that our group kept coming back to [three themes]." These perspectives on both the mapping activity and the flow of discussion stemming from it reveal the reciprocal influences of engagement and elaboration in the flow of discussion from earlier activities to later ones. As such, discussion flow requires not only skillful facilitation from one moment to the next but also something akin to a mindset that considers discussion both within and between activities.

We found that discussion flow shaped design processes with respect to empathy, understanding, and insight, requiring facilitator's real-time contributions in order to guide the flow of discussion. Discussion flow also appears to involve a more general ability to think relationally. Thinking relationally enables facilitators to re-frame or re-orient contributions of certain participants in some instances or, in other instances, to propose connections between activities and artifacts. It reflects an essential tension in design thinking between the urgency to keep things moving toward each activity's tentative insights (i.e., finishing things up) and the demands for generativity in terms of stakeholder contributions that lend both understanding and insight (i.e., finding things out).

Group Dynamics and Interaction

We observed that facilitated design processes appear to be rife with tensions related to negotiating group dynamics and interactions among participants who brought diverse roles, perspectives, and agendas. In our data, we clustered tensions related to group dynamics and interactional patterns into three subthemes: negotiating inequitable talk turns, fostering psychological safety, and asserting appropriate control of the conversation.

An assumed value of most collective problem-solving processes is that they be democratic and equitable in unearthing and valuing perspectives of multi-stakeholder groups (Joy et al., 2019). Negotiating inequitable distribution in the frequency and length of participants' talk turns created a tension for the facilitators. We needed to meet participants where they were while eliciting the multiple stakeholder perspectives needed to foster productive design empathy and generate emergent solutions. Drawing on all voices presented a challenge as the participants brought diverse perspectives and personal proclivities, but also varying levels of expertise. The majority of facilitators reported a dominance of educator perspectives within the diverse design groups they were leading, with teachers speaking more frequently and at greater length than other members. This was especially noted when groups were assigned the task of developing a journey map of a generic high school teachers' day and non-teacher stakeholders deferred to the teachers. With over-reliance on teachers' ideas, the other roles and perspectives were marginalized. Facilitators worried that this produced a "somewhat limited picture":

In retrospect, I think that the group's discussion generated insight into the perspectives of the teachers present at our table rather than insights from the unique perspectives on teachers each group members held.

Other facilitators worried that patterns of interactional dominance could lead to disengagement by participants who may be positioned as having less knowledge on a given problem.

Responding to group interactional patterns, facilitators reported "wrestling" with high-talkers in attempts to redistribute talk time. Facilitators also explored ways to "prompt" and "nudge" low-talkers, encouraging their contributions when they perceived they might be particularly relevant or "when we were lacking their particular perspective from the conversation." Participants also contributed to ensuring everyone had a voice, as group members engaged in "caretaking" of low-talking participants, making conversational space and taking their ideas seriously. Finally, facilitators experimented with physical tools, asking participants to write ideas on post-it notes before sharing and synthesizing them or voting for ideas with sticky dots.

These types of challenges may be grounded in the fact that a facilitated design process is not a typical experience for most participants. The sheer novelty of the experience alongside the amount of idea sharing suggests there is a degree of intellectual and emotional risk. In our case, the situation may have been viewed as a threat to psychological safety for individuals and a negative influence on the group dynamics. We would posit that such risk could be heightened when participants are

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working on a real problem with a real history in *their* community—because the potential solutions could have effects on the participants themselves.

People participating in a collective design process that is focused on a problem of mutual concern to their community are not objective bystanders; rather, they all have made contributions to the problem (even through non-participation) and view proposed solutions through a personal vantage point. All stakeholders have something to lose and some may have something to prove. In design settings, circumstances that bring people together foster fear, anxiety, and defensiveness, as we sensed was the case for many members of the community.

Risks associated with collaborative design may be further heightened in groups where participants have interconnected roles or power hierarchies within educational organizations. In our case, facilitators recognized some participants were positioned in particularly powerful ways during design day (e.g., members of the business organization paying for the event; district leaders who helped set the agenda), while others were positioned in vulnerable ways (e.g., teachers seeking (re-)employment with the district). The confluence of these interpersonal dynamics creates a tension for facilitators trying to foster group dynamics that maintain psychological safety while eliciting diverse perspectives.

Collectively, our group of facilitators came to recognize that we had jointly underestimated the degree of participants' fear, apprehension, and discomfort, and the extent to which the design day event was a high-stakes experience for the people in attendance. Group dynamics in a facilitated design process pertain to interactions among participants, and between participants and the facilitator. As facilitators, we collectively experienced a tension associated with enacting our role in appropriately authoritative ways. Facilitators expressed that asserting appropriate control was akin to walking a line between, as one facilitator put it, "asserting/interrupting a discussion without shutting people down, while also being respectful of what any person is saying and generative about promoting new ideas." We feared being too "leading," too 'hands off," or "overruling" participants.

Facilitators can experience feelings of emotional vulnerability in their roles as well. In written reflection and collective debriefings, we expressed feeling "timid," "awkward," "nervous," and "uncomfortable" about redirecting knowledgeable practitioners and community members who were volunteering time. Facilitators were concerned with how they were perceived by participants (e.g., as outsider, bossy, bold, overtalking). These fears could be exacerbated by interactional dynamics in which facilitators noted one or more participants sought to direct the conversation in ways that usurped the facilitator's role (e.g., "I felt some insecurity about whether he was taking over because I was doing a poor job"). In such cases, facilitators might struggle with how much to exert their position and how much (and when) to step back.

Despite our collective uncertainty, the facilitators agreed that authoritative facilitation and coping with feelings about directing group dynamics or navigating interactional patterns were learnable "skills," which could be improved with practice. Navigating these challenges may require facilitators to engage in self-reflection about their own internal states and struggles, as demonstrated when one facilitator noted, "More and more I realize that to facilitate well isn't about discrete skills, but about navigating tensions in our own behavior to manage the different points in a conversation."

Implications and Discussion

We have sought to identify key components of the facilitation process or facilitator's role in guiding design thinking workshops. Our findings are organized into four key categories framing facilitators' work: design processes, design products/artifacts, discussion flow, and group dynamics. Notably, the overriding theme that characterizes all of these categories and the nature of design facilitation is essential tension (Kuhn, 1977). The notion of essential tension emerges in a range of ways that pull through many aspects of how a design facilitator's role plays out in the design process. In fact, essential tension in design thinking begins even more broadly than that, in the very nature of design thinking models themselves.

The nature of design work in practice is messy, nonlinear, and idiosyncratic (Buchanan, 1992; Cross, 2011). In the very act of engaging in the design process with given steps, tasks, or prescribed activities or stages, facilitators are caught in a tension between the linearity of design thinking as presented, and the messy, iterative complexity of design thinking as it often emerges in the real world. Both of these conflicting aspects of the situation are true and necessary, but they also start the process off with an essential tension that runs through the work of a facilitator. This tension can emerge in any number of ways—balancing generativeness vs. efficiency in soliciting ideas, encouraging ideation while also holding solutions back, and/or the more logistical challenges of balancing talk-time and competing demands.

For facilitators in design thinking settings, there is a dynamic process of playing with flexible structures, going back-and-forth between boundaries and order, narrowing and opening, and trying to support freedom and creativity but also efficiency and productivity. The tension between structure vs. flexibility (or linearity vs. messiness) was just one of many tensions that emerged as inherent in the design process. It speaks to the essential nature of how Kuhn (1977) originally framed the pull between such differing poles and norms.

The school improvement setting for this study is representative of the type of challenging and complex problems we often use design thinking to address. In such scenarios, problems are often framed in terms of solutions (e.g., "the problem

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is that we need more devices in the school" or the "problem is that teachers need more time"). This is important and reflects a tricky and unavoidable tension that design facilitators must navigate. As a problem is being framed, naturally, the set of possible solutions comes along as well. This conundrum is reflected in part of Rittel and Webber's (1973) definition of a wicked problem:

The information needed to understand the problem depends upon one's idea for solving it. That is to say: in order to describe a wicked-problem in sufficient detail, one has to develop an exhaustive inventory of all conceivable solutions ahead of time…Problem understanding and problem resolution are concomitant to each other" (p. 161).

Tensions such as this one (avoiding solution mindsets while simultaneously trying to encourage people to generate ideas about the problem and its causes) are central to the design facilitator role. They present an inescapable challenge for facilitators of design tasks/processes, the artifacts that result from them, the flow of discussion, and the dynamics of the design group. Facilitators must understand that while we seek to prevent people from jumping to solutions in order to fully investigate the problem—it is also instinctive and inevitable for each person to participate from a solution-oriented mindset, with solutions in mind based on their understanding of the problem. Or as Rittel and Webber (1973, p. 160) put it, "the formulation of the problem, *is* the problem."

Essential tension cannot be sidestepped or perfectly solved. In fact, the tension is desirable and appropriate, in that different needs simultaneously exist in the same task or process. One might hope for tried-and-true best practices for facilitators to rely on. But this hope belies the very nature of the complex problems that design aims to address or how essential tension presents fluid and shifting challenges. Thus, there is no simple solution to navigate such tension, beyond trying to situationally and flexibly allow for emergent ideas, while keeping an eye to the structures (e.g., time demands or task requirements) with which we work.

Throughout our work, a few potential or possible approaches to certain issues emerged (e.g., having participants write ideas on sticky notes and vote on them in order to balance talk-time and ensure voices are heard, or having some visual designator of the facilitators' role). But the important point is not in any one particular approach or solution dealing with any tension—but the very fact that facilitators need to enter into the process with an awareness that such tensions may be present. This relates to developing a mindset for dealing with tension as an act of navigation, helping facilitators become aware of and deal with tension without derailing the process. In awareness, facilitators develop a greater propensity to reflect both *in* action, and later *on* action, and develop more agility in managing tension (Schön, 1987).

It is important to understand that the role of a design facilitator is not as simple as an obvious surface description of guiding the discussion or helping participants construct artifacts and solutions. Of course, the facilitation role involves these things too, but all of the tasks and goals of the facilitator are overlaid with the bigger picture requirement that they understand and become aware of some of the tensions that might be at play, and maintain awareness and agility in navigating these. "Navigating" provides an important descriptor because it characterizes how a facilitator might view their role in order to help them move and balance between the opposing poles in any given tension.

Conclusion

We have explored and analyzed the role of facilitators in a specific design thinking setting, through an analysis of in-depth, self-report data drawn from the design thinking facilitation experiences of the authors of this study report. In doing so, we have sought to improve understanding of the role of facilitators in dealing with essential tension. As Mosely et al.'s (2018) article was the "first paper to explore the role of facilitator in the teaching of design thinking to non-designers" (p. 177), this study offers another fundamental and important step in this area. Yet, further and ongoing research is needed to thoroughly interrogate this complex and shifting role.

Our findings suggest that design facilitation work resonates with Kuhn's construct of essential tension. The goal of a facilitator in a design thinking context is to support participants in addressing complex problems by guiding the process of design thinking both in tasks and discussion. In doing so, the facilitator also becomes a navigator of tensions "on the ground," so to speak. The fact that such tension is indeed emergent based on relevant variables and situated within a real setting means that facilitators must be agile and develop a mindset that helps them play out their role as being defined by such tensions.

This essential tension plays out in core aspects of design processes, products, discussions, and group dynamics, illuminating the role of facilitators as shifting between different goals, needs, and priorities. It also points out the need for facilitators to shift and balance between these poles. This resonates with the very nature of design as a construct unto itself, which is both intuitive and analytical, constrained and open-ended, and imaginative and pragmatic—and overall, driven by the same kinds of competing challenges and tensions that facilitators face along the way.

Acknowledgments We would like to acknowledge and thank the community members, the local education nonprofit, and the school district administration and leadership for their support. This event would not have been possible without the support of the dean of the college, as well as the members of the development, marketing, and event-planning teams for helping to organize the design day event.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Appendix 1. Design day facilitators pre-survey

(Note: This survey was administered via a web-form and consisted of four open-ended prompts to gather facilitator expectations before the workshop.)

1. Thinking about the process defined for us by the lead facilitator, of the knowledge, skills, and/or behaviors you possess (your talents), what do you see will be your single biggest strength during the interactions with your small group?
2. What aspect of your role as a facilitator are you most excited about?
3. What aspect of your role as a facilitator are you most anxious about?
4. Do you have strategies to help you with this concern? If so, what are they?

Appendix 2. Design day facilitators post-survey

(Note: This survey was administered via a web-form and consisted of five open-ended prompts to gather facilitator perceptions directly after the workshop.)

Today's design challenge was an effort on your part to follow a prescribed facilitation process within a small group. The lead facilitator and others directed the process. You had a team made up of a variety of stakeholders. Reflect about your role in the facilitation process, and specifically your influence on their contributions.

1. *Success*: Within your small group and as related to your role as facilitator, what was the most successful process, event, or interaction of the day? What do you think made it successful? (Think in terms of your behaviors as well as any environmental elements)
2. *Struggle*: What aspect of your role of facilitator did you struggle most with? Why do you think that was the case?
3. *Adjustment*: How did you attempt address this struggle (if you did)? How successful were you at making this adjustment?
4. *Lack*: In reflecting about the experience, were there any knowledge, skills, or behaviors that you lacked? If so, what were they?
5. *Professional development*: Assuming this process will take place again in the future, possibly with another school or district, what professional development activities might help you be a more effective facilitator?

Appendix 3. Reflections on the design day event

(Note: This survey was administered via a web-form and consisted of three open-ended prompts to gather facilitators' delayed reflection about remembered elements and processes.)

Please take some quiet time to reflect about these three questions.

1. Write a descriptive/interpretative narrative on the multiple phases of the design processes at your table, as influenced by your memory of the experience and by reflecting on group artifacts (1st person account reflection).
2. Write a descriptive/interpretative narrative on the individual people/personalities/roles at your table, in terms of anything that impacted the process.
3. Write a descriptive/interpretative narrative on the group dynamic/collective at your table, as influenced by the people present and the context of the event.

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