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NEXT STEPS

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This book began with the idea that participatory design (PD) was being used as technique in the field of the learning sciences with more frequency. As both participatory design and the learning sciences grew in the number of researchers, we observed interdisciplinary dialogue occurring conferences such as Interaction Design and Children (IDC), Special Interest Group on Computer-Human Interaction (SIGCHI), Computer-Supported Collaborative Learning (CSCL), and the International Conference of the Learning Sciences (ICLS).

However, as we started compiling this book, gathering these chapters together, and conversing with researchers from both the fields of design and the learning sciences, we observed far more divergent ideas about participatory design than we had anticipated. Both disciplines have a rich history that includes their own practices, theories, and methods, and yet we observed very little discussion occurring between scholars and practitioners in the learning sciences and those in participatory design. Although more researchers are coming together in conferences and publication venues, we do believe both groups are not actually engaging in shared dialogue. For instance, we did not see agreement as to what constitutes participatory design in the learning sciences, what the role of learning is in participatory design (and vice versa), and what participatory design methods and techniques are important for learning considerations. The conversations between designers and learning scientists particularly highlight how these different perspectives can be challenging for people working at the intersection of learning sciences and participatory design.

Initially, we had hoped to gather some of the best practices where these two fields meet. Instead, we uncovered a set of challenges that need to be addressed if participatory design is to be used by learning scientists in a manner that supports

the values that have emerged from the history of participatory design as a practice. From the perspective of design, these chapters highlight the need to better understand, accommodate, and integrate research on the diverse ways people learn. From the perspective of the learning sciences, these chapters highlight the opportunity to more fully engage the methods of participatory design in order to work more closely with the range of participants that shape learning, including students, teachers, administrators, parents, and other community members.

Despite some of the differences, we do see potential that this work between the two fields can address four strategic issues. First, we need to better identify the shared perspectives, values, and politics between the two fields; the ways in which we might use these share perspectives as a foundation for participatory design practices involved in learning; and where and how those values and perspectives diverge. Second, we need to address the challenges of working across the two disciplines, explore how these challenges might be mitigated, and transform them into opportunities for more productive participatory design outcomes. Third, we must actively seek ways for the field of participatory design to adopt inclusive practices that accommodate and celebrate the diversity of learners that the field of learning sciences works with and promotes every day. Finally, we see potential for learning sciences studies to serve as contexts in which researchers from both fields can employ and extend participatory design techniques that inform our understanding of the perspectives of a wide range of participant stakeholders (children, parents, teachers, librarians, administrators, policy-makers, et al.).

Shared Perspective/Politics/Values

At first blush, the shared perspectives of participatory design and the learning sciences seem readily apparent. Both fields value inclusivity, sharing an ideological stance that champions giving a voice marginalized communities, and that actively engages those who are often the most impacted by design decisions, regardless of context. Both fields also share values tied to democratic access to fundamental resources, such as education and accessible tools. Yet, implicit tensions emerge when examining the chapters in this book that should be addressed openly to enable the learning sciences and participatory design fields to work together in more explicit, truly interdisciplinary partnerships.

While the learning sciences does promote more accessible and inclusive learning environments, there is an unspoken assumption in much of its work that learning needs to operate within existing structures of formal education. In many cases, these formal educational structures are based upon institutionally prescribed, authoritative constructions and constraints that both contain and are required to demonstrate specific outcomes, implicitly placing certain types of behavior and learning goals as more valuable than others. In contrast, the practice of participatory design as it is imagined from the Scandinavian perspective looks to design the structure of a system through the participatory process, including participants,

such as workers, who have historically not had a voice in the design of the system they work under. We see a number of ways to address this these tensions.

First, we ask, "*What are participants learning in the participatory process and how do they benefit by participating?*" We see evidence of empowerment, such as Chapter 6 (Polman), in which teachers participated in the design of learning experiences whose initial conceptions were given to them by academics. The teachers' participation gave them the agency and authority to shape their students' learning experiences in ways that could both meet their needs and build upon their strengths, rather than depending solely on the initial academic designs. Or in Chapter 12 (Boys and Light) where participatory design disrupts the understanding of mobility, and in the many examples of children's empowerment in learning that they can be the designers of learning experiences throughout the book. In Chapter 15, McNally and Guha share several lessons learned and pragmatic approaches for incorporating content expertise in participatory design projects such that all participants, regardless of their initial knowledge and experience, can contribute to, and learn from, the design of technologies and experiences that span many diverse content areas. In all three of these chapters, participant learning in participatory design is not just about improving design skill sets, but also about a shift in identities as designers. AU:1

This leads us to ask, *"Who we are educating with participatory design?"* Is the purpose of participatory design the edification of the designers of the learning experience, pedagogical theorists and experts, teachers, administrators, communities, or can the participatory design process also be an integral part of the learning experience for learners? Who are we inviting to participate in our participatory design in learning efforts, and whose values and institutional or societal structures are we prompting these participants to design toward? The questions that comprise this strand can inspire learning scientists and designers alike to reflect upon the values that we bring to our design and learning work and help mitigate any implicit power dynamics among learning sciences researchers, designers, and participants.

Our chapters and conversations offer several touch points that shed light on the many facets of cultural and individual values that can positively influence an introspective approach to inclusive, expansive learning and participatory design efforts. In particular, DiSalvo and DesPortes's chapter on value-driven learning underscores an ideal that as we engage in participatory design for learning with individuals from different cultures, ethnicities, and socioeconomic sectors, we must remain sensitized to values and perspectives that can attune us to our own blind spots regarding what and who we ****think**** we are trying to design ***for*** and ***with***: "*the neighborhood tour attuned us to some of the value systems at play . . . [and] gave us as researchers a glimpse into the experience of being a young African American male and how other members of the community might perceive them in negative ways*" (Chapter 13, emphasis added). Similarly, Hourcade (Chapter 9) came to realize throughout his team's multiyear efforts of engaging in participatory design with children diagnosed on the autistic spectrum that he and his colleagues had much to learn about the perspectives and needs

of their child co-designers, but they relished finding ways to stay flexible as they adapted and accommodated PD techniques for a wide range of autistic behaviors and skill levels. Uchidiuno and colleagues (Chapter 5) emphasizes how children and parents come together from diverse perspectives and experiences to shape design of learning technologies. Future work in participatory design and learning will need to address not only who comes together to design, but how does inclusion become a focus. Can neurotypical children work together with neurodiverse children to create an inclusive learning environment? Can policy-makers work together with classroom teachers and students together to craft agendas for learning?

Finally, we must ask, *"Is the role of participants the same when designing for learning?"* The structure of schools and the requirement for meeting certain learning objectives challenges many of the values of participatory design. Similarly, the contemporary market imposes demands on product and service development cycles that thwart a sustained commitment to participatory practices and value. While many would suggest that changing these structures and requirements is not possible and possibly not desirable, if we follow the historic development of participatory design, as Ehn laid out in Chapter 2, from the teachings of Paulo Freire, then disrupting these structure and requirements is the fundamental charge of participatory design. Indeed, to assume that we cannot change our environment (whether that is a market, a school, or, increasingly, the collapse of education into market economy thinking) is antithetical to the very foundation of design that assumes that other situations are possible and achievable. How can we as learning scientists, working with the value systems and structures of various different cultures, both respect those cultures and look to disrupt them with radical design methods? A number of cases in this book address this tension, but in Chapter 8, Louw et al. explicitly identify these conflicting value systems and speak to ways that participatory design can navigate these relationships—serving the values of multiple stakeholders. As they state:

> Our claim is that design-led modes of inquiry are especially needed to respond to ambitious visions of educational transformation and funding directives, which leave much unresolved detail to be determined and realized by local practitioners, leaders, and learners.

In his conversation with Allison Druin, Jon Kolko touched on the challenge of findings ways to use expansive participatory design techniques for ideation within the time-sensitive, market-driven constraints of a corporate, product-focused environment. Relatedly, when conversing about the constraints of more traditional educational approaches and learning outcomes, Chris Frauenberger and Chris Quintana considered the relationship between the learning sciences and participatory design efforts along a continuum rather than an either/or:

Chris Quintana: Stakeholders are often brought together around a specific design idea to support a specific type of learning, and the work becomes, 'Let's design

that thing.' There's less freedom to bring people together to say, 'What is it that we want to design?'

Chris Frauenberger: [T]here is this tension there. I think maybe along this dimension you can move up and down, between total control over the learning and full participatory design ideals.

Working Together

The authors in this book demonstrate how participatory design in the design of learning experiences is often taken on as an interdisciplinary effort, where an expert in one field, design or learning sciences, integrates the other discipline into their work. However, there remain few examples where learning scientists and designers partner closely and equally. We suggest that to move forward in integrating participatory design and the learning sciences, the time is ripe for more in-depth cross-disciplinary work, with the full expertise of both fields brought together on projects. This poses a number of challenges and potential opportunities for unique collaboration.

Before exploring how these two fields can work more closely together, we must first understand what they have to offer each other. In Chapter 12, Betsy DiSalvo and Kayla DesPortes describe how the use of participatory design helped to inform the designers of learning experiences about the values of participants, shaping the educational program to not only capture the interest of young people, but also to sustain that interest over time. In Chapter 11, Maurer and Bonsignore identify how industry has found value in using participatory design methods with a sustained cohort of children and adult co-designers who strive to carefully align engagement with more structured learning sciences' outcomes as they develop new educational products. And in the case study in Chapter 7, Gelderblom outlines the use of project-based learning theory that is deeply informed by ongoing participatory design with a class. But these are limited cases, and all of them call for a deeper exploration of ways to legitimize each field to the other, and to bring the theory and rigor of each field to inform the other.

The first of these explorations asks, "How can we encourage learning scientists and educators to engage the design field, and to recognize that design and participatory design are disciplines in their own right, with rigor in practice that should be attended to?" To answer this question, we believe that the learning sciences must first acknowledge that the field of design exists and it is not simply a byproduct of their research. As Chris Frauenberger notes in his conversation with Yvonne Rogers and Chris Quintana (Chapter 17), participatory design is *"not just about designing your artifacts"* or developing "some learning tool [to fit within] the learning context"; rather, *"there is an interesting overlap where participatory design has something to say about engagement and motivation that would be interesting for the*

learning sciences" (emphasis added). By looking more closely at design research and theory, learning scientists can benefit from existing approaches that not only balance input from participants and designers alike, but also encompass the perspectives and input of a diverse range of stakeholders. Examining previous work on participatory design can help learning scientists with techniques for eliciting input, working with various participants, and interpreting findings. As Liz Sanders points out in Chapter 16, she initially developed techniques for participatory design as an individual, slowly adding more tools with each new project. Learning scientists need not start from scratch; instead they can take advantage of, and build upon, previous work from the field of design.

The second question we should ask is, "How can we encourage the participatory design field to be more cognizant of the history and theories of the learning sciences to help inform and assess the learning aspects of participatory design ventures?" Designer-led case studies often recognize that learning is an implicit and important aspect of the design process, and such case studies are an integral part of design instruction; however, researchers may be glossing over opportunities for deeper inquiry into the mechanics and inner workings of learning processes and behaviors, while some designers may not consider learning theory at all. Learning theory can help to inform the structure of participatory design activities and contribute to designs overall, by providing theories of motivation, techniques for scaffolding a design experience, and approaches for engaging participants in metacognition. Moreover, being cognizant of theories of learning and empirical studies of learning requires a sustained engagement, because these theories develop overtime and empirical studies shed light on new, emerging contexts. It is not enough to simply reference Lave and Wenger (1991) or use terms such as *scaffolding* when referring to learning and design. What's needed is a deeper commitment to understanding the evolving field of learning, not out of some sort of deference to that field, but out of respect to those we are designing with and for. This by no means is a trivial task. As Yvonne Rogers states:

> It's a challenge for the learning sciences, HCI, and participatory design to rethink what we thought we had nailed in regards to learning. Because, I think learning does change. So, I don't think it's necessarily a case of one field or area taking from another.

Finally, we suggest asking both fields of participatory design and learning sciences consider the following questions: "Is there a unifying theory of PD for learning? Does PD need a theory of learning and design?" While the learning sciences uses phrases such as *Design-based Research* and the field of participatory design uses the term *learning* without much thought to the deeper theories behind design or learning, the continual interaction between the two fields calls for us to ponder the potential of unifying theories that can contribute to our understanding of

inherent linkages between the two fields, or offer explanatory power regarding reasons why design and learning are used together so frequently. Moving forward, we envision opportunities for researchers from both fields to answer these questions and others, such as: do we see ways to demonstrate that participatory design is a strong methodological candidate for design in the learning sciences? Or is participatory design viable to the learning sciences because it involves stakeholders in a democratic fashion? As the world becomes more interdisciplinary even as it grows more rich in diversity, will the perspectives of PD and learning sciences become more divergent or convergent? As learning is being moved to large scale platforms, such as online classes, will there be a place of participatory design or is PD always a small scale endeavor for local environments? How will this impact of technology and others change how we think about engaging participants in design?

To answer these questions, we argue it seems necessary to make learning science research and participatory design research more accessible to researchers in each field. Do we begin with seeking to publish in each other's venues, with cross-disciplinary workshop, or are there other ways to promote and sustain an active, continuous exchange between the fields? How do design and learning theories come together and influence each other? So while we first embarked upon this book to demonstrate the interdisciplinary ties between participatory design and the learning sciences, our greatest finding from the readings is that the two disciplines have only just begun to scratch the surface of understanding and respecting each other. We walk away from this book with more questions than answers. Much of the history of both fields is based upon democratic and pragmatic goals to give more opportunities for people to participate in their own learning and reality. Moving forward, if we can find convergent theories and practices, the fields of participatory design and learning science can better serve the motivations of their foundations.

Author Queries

AU:1 As in Ch. 1, please check all in-text chapter number changes for accuracy.