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**CONVERSATION VIEWING
PARTICIPATORY DESIGN FROM
THE LEARNING SCIENCES AND
THE FIELD OF DESIGN**

Conversation between Chris Hoadley and Carl DiSalvo

The following conversation took place on April 2, 2016, for approximately 60 minutes. Jason Yip moderated the conversation between professors Chris Hoadley (New York University) and Carl DiSalvo (Georgia Institute of Technology). The conversation was moderated by Jason Yip. The main points of this discussion about participatory design and the learning sciences focused on several themes:

- How each of the discussants came to become involved in participatory design (from learning to design and from design to learning)
- The challenges of learning and participatory design, particularly as the boundaries between user/design and teacher/learner are blurring
- How participatory design can be disruptive to learning design
- The future challenges of involving stakeholders in the design of their learning environments, including how public funding shapes design and learning

From Learning to Design and from Design to Learning

Jason Yip: So what does participatory design mean to both of you, considering how it relates to (1) design and (2) learning? What does it really mean to both of you to do *participatory* design as it relates to design and to learning in general?

Carl DiSalvo: Let me take those questions individually first and then try to combine them together. For me, I came to participatory design later in my design practice and education. I did not start off doing participatory design work, but I came to it later on in my graduate degree and then really full on in my post-doc.

For me, participatory design was a way to broaden the discussion about who or might be was involved in the activities of design and it was appealing to me because it was a practice of design that was explicitly engaged with political issues. That was and is something that's important to me. And participatory design is one of the few areas of design where there is an up-front discussion about the politics of doing design, as well as the political situations that design operates in.

Participatory design grapples with the political with both a big "P" and a small "p". It's political in terms of thinking about the relationship to government, but also political in terms of thinking about issues like worker's rights, and working conditions, identity, politics, and the political aspects of the everyday. Participatory design [PD] is a way of doing design that broadens a conversation about who gets to take part.

The reason why that's important to me is that I think that the key thing about design is that what sets practicing designers apart is first a recognition that the world is constructed, and then a recognition that therefore it can be constructed differently. I think understanding a design perspective is really that simple: the world is not taken as a given. When it comes to learning, then, this perspective opens up the conversation about who gets to create learning environments and what are these learning environments? I think actually almost any endeavor of PD also includes some aspect of learning. Successful PD is when we are learning from each other in the process of reconfiguring the world.

Chris Hoadley: I guess I come at the area of participatory design in a different way. It was learning first, participation second, and design third. So, as a young technologist, I was very excited by exactly as Carl says, this idea that the world can be different than it is, and that certain people have the agency to change what exists. That's one of the things that's really enchanting about technology. As a kid, I used computers at a time when it was under the purview of experts, hobbyists, and specialists. I had a lot of access to that world through just dumb luck at a time when kids generally weren't counted in those three categories of people who had that same level of access. But I had some familiarity with the technology at a time when I was beginning to get interested in how we could use all the tools at our disposal to improve learning and education.

Over time, I grew to understand that learning was a much bigger phenomenon than education on purpose in schools. So, my perspective as somebody who saw learning as a goal and saw technology as a possible means, led naturally to me not only trying to make technologies to serve my own learning and education needs, but also being incredibly frustrated by the lack of access that other learners might have to these kinds of technologies. As sort of a privileged insider in the temple of technology, I was able to do things like programming in concert with my increasing use of technology. But as personal computing became more and more prevalent, we saw that there were a lot of people using technologies who

had no means with which to tailor, understand, or remake those technologies for their own purposes. It was in that vein that I realized that some kind of bridging was needed between the creator and the user when it comes to learning. It was around that time that I was first exposed to some of the literature on design. I was lucky enough to meet some of the early folks doing HCI [human–computer interaction] work, and also some mechanical engineering faculty who were doing work on product design, and the early participatory design conferences were just starting to happen. So, for me, that was a language that I could use to explain something that I was already seeing as a disconnect between users and makers in the learning space. I was really happy to discover that there was a long illustrious tradition.

Your comments, Carl, about politics are really interesting to me, because I think at the time, I would have characterized myself as not only apolitical, but anti-political. It was really only by doing this kind of design that you start to realize that anything that's important has power, and anything that has power has politics. That includes the power to design a better word processor. So, starting to see both education and design as inherently political fields I think is one of those awakenings that people can come to at various points in their lives, or various points in their careers. It certainly doesn't mean that we have to treat everything as a contentious or zero sum situation. I think when people hear politics, that's what they assume: You mean somebody's running for election, or somebody wants to be in charge of an organization or some kind of resources. Especially when you're thinking in terms of learning, which is often seen as a generous, collaborative, selfless kind of endeavor, I think that the way that politics plays out is maybe quite different than the way it plays out in a competitive or corporate space. As such, I think learning design in the technology field especially is one of those areas where the politics could be embraced and understood perhaps earlier and less contentiously than in some other domains where the technology might have been really more entwined in a direct conflict between winners and losers. As I think back on the history of Scandinavian participatory design and its relationship to labor and social justice, I realize that these kinds of interactions or contentions are just ever-present. It's up to us whether we treat them as something to worry about.

Why Learning Can Be Difficult for Participatory Design

Jason Yip: So what's interesting with this conversation is that you both are coming from different places. So, Carl talked about starting in design and then going into learning, and Chris went from learning into design, and then politics. It's pretty fascinating to think about it, because then we sort of have these challenges with learning, because it kind of comes with this notion. So, I wanted to ask both of you what are the challenges of learning when it comes to participatory design.

Particularly as you both brought up the notion of Carl starts with design and then towards learning, and Chris goes from learning and then towards design, and the politics at play with all of this. What makes participatory design challenging, in that its goal is to design learning environments through methods that involve politics, and involves power, and involves users in that sense?

Carl DiSalvo: One of the challenging things is that, frankly, as designers and design researchers, no matter what area you're coming from, understanding learning often isn't part of our training. That's a real oversight. A lot of times I find when someone is doing PD work and they haven't come from a learning background, the conversation about learning is absent. So, there's immediately a challenge of getting designers to recognize that learning is happening, or learning needs to happen. Then there is the challenge of getting designers to realize that people other than designers actually know some things: some people know things about how learning happens. So, designers don't need to approach learning by accident. We can approach it in a really planful way that's informed by learning sciences research, and that this awareness can benefit whatever it is that we're trying to do as designers, whether we're working in a community setting, or other kinds of collaborative settings, and it can benefit whatever it is that others are trying to do through design. Really approaching PD as a challenge of learning and as an opportunity for learning, changes the way—or should change the way—in which we do design work. But the first challenge is getting designers to realize that they are involved in activities of learning.

My introduction to learning was through informal learning, not through classroom-based activities. We were trying to figure out how to scaffold learning about sensor-based technologies. The challenge for us was not so much the complexity of the technology, but rather understanding how scaffolding occurs so that we could design for it. Then we had to ask how to extend that scaffolding of understanding a technology to developing technological fluency—how do we scaffold experiences where, for example, adults are able to learn how given technology might be used to achieve some goals in their community? Through that process, we began to understand the ways in which access to technology is or isn't granted within that community, the ways in which certain voices are or are not present. All of that is a learning process. I think if we approach community-based participatory design through learning methods, we can achieve a kind of PD with a goal of enabling others, and we can get to that goal much more effectively and in a much sounder way if we take the learning aspect of it seriously.

But learning often isn't front and center in design discourse. Instead, we use other terms about discovery and innovation, which I think too often make it seem like the designer or someone should just be immediately inventive on their own, and not actually look towards research or other kinds of informed practice.

Chris Hoadley: I would wholeheartedly endorse that idea that learning is pervasive and that designers may ignore it at their peril. Again, drawing on the historical perspectives in HCI, there was a time when learning and HCI were seen as intersecting in exactly two places. One was the learning curve that people needed to traverse to get to be able to use the technologies, and the other was the application of computer technology interfaces in educational settings where there's an explicit goal of school learning. I think when we look at the phenomena of learning, the most general definition is human change and development over time. I think we can see that it's one of the central processes that describes the human experience. So, supporting that process as people are learning, whether it's learning facts for a school exam, or perhaps more poignantly, things like learning how to deal with a difficult illness, or learning how to achieve ones' career goals, or learning how to become a better parent. These are the kinds of things that aren't your traditional school book subjects, but are definitely areas in which technology and other designed artifacts have been used to try to empower people. The successful designs are ones that change what people do. One can reasonably expect that the individuals who change what they do are themselves changed. That is learning. Given that we do have this rich and robust literature from decades of research on how people learn, it's a powerful set of perspectives and research-based techniques that we have for supporting people that designers can have in mind as they think about their users or their clients.

But in the world of participatory design, there's this special attention given to role differentiation and whether there is this designer on high and this user down below receiving benefactions from above. There is a parallel idea in education that learning is a struggle between a goal to respect democratic ideals of how knowledge comes into being, to respect constructivist ideas about how people are the masters of their own learning, versus the literally paternalistic models in which we do schooling. Back in one of the first courses I took on education, there was a somewhat heartfelt consideration of this issue, an excerpt we read from A. S. Neill, who's most famous for creating a form of democratically-enabled schooling in which children had just as much of a say in how the school was run as the adults did. Learning is this interesting paradox, because on the one hand, you can see that there might be something where somebody knows better and wants to transmit that knowing to someone else. On the other hand, there's an inherent reduction in autonomy if someone else gets to decide what you're supposed to learn. So, the political was always there in learning from day one—maybe not from the first learner, but certainly from the first teacher—there were some kind of politics around expertise and differences of expertise, and how that creates barriers between people. Sometimes those are productive barriers. Sometimes they're not. Regardless, they need to be sort of buffered and managed. The kind of contested role, the relationship between teacher and student in that

sense is mirrored in a relationship between designer and user. So, in the learning space, it's been sometimes said that this is an area where participatory design wouldn't work, that we should use words like informant design instead, because people aren't able to fully participate in the design process. But I would say that all individuals bring to bear a different set of abilities and predispositions with which they can participate in an effective design process. One of the things that I think sets apart participatory design, which resonates well with the culture of education, is this idea of deep respect for the individual and for their dignity and autonomy. Again, of course, a lot of the best educational systems also respect the autonomy and dignity of individuals. It's not always easy. It is tempting to sort of expediently jettison that idea when it seems inconvenient. But on the other hand, it's a core value, I think, for a lot of people in both the fields of designing and education.

The Blurring Boundaries between User and Designer

Jason Yip: Carl, do you have a response to that, to anything that Chris has mentioned?

Carl DiSalvo: No. I agree with what he's saying. I would say I think that one of the challenges that we're seeing in PD now is an expansion of the field that actually speaks to some of the things that Chris mentions where the role between the designer and the user has always been questioned. In fact, there were times when it was easier to question that because those roles were clearer, because designers were creating products or systems. Users were the people who were literally using them. Increasingly, what you see in PD projects, particularly PD research, is engaging with communities in much more informal ways in which there isn't a clear product or service. It may be a question of looking at a particular issue and beginning to work with that community and say, "How do we develop capacity around that issue? How do we develop literacy?" And I think increasingly, that word literacy is becoming important in the PD community. How do we develop literacy so that we can make decisions about the things that are being designed?

One of the challenges here is that not only questioning the role between the designer and the user, but those individual roles themselves are changing, where the designer is less and less of the person who's actually making the system. Instead, she may be making something that rests on top of the system or interfaces with the system, or as a service built on top of the system. Because of the way that technology is developing, and because of the ways that our systems are becoming more responsive, and because of things happening with algorithms which could take us in another direction, in some ways you actually have designers beginning to talk about change in the direction of when design happens. This has actually

long been a discussion within PD and it's coming up again to say as users use this system, as people make use of these systems, to what extent are they themselves actually redesigning then by the ways in which they're interacting with them? I think what you end up with is a situation that's very complex, because in some ways, PD has succeeded in blurring those boundaries between the designer and the user. The condition of technology has blurred them even further. So, you end up with a situation that's a bit of a mess, but kind of a productive mess, particularly when you see that what the goals that we're shifting towards now are.

I think at least in PD less and less how do we enable someone to use something and more and more the question about how do we work together to understand what the capacities and issues of something might be? What's interesting to try to tie this in a loop back to learning, I think this is one of the reasons why again and again in PD, we have been fascinated with the American pragmatists, particularly John Dewey, but some of the other ones as well. I think this is one of the reasons why we keep coming back to it. It started off with discussions of experience and how do we understand the experience, and then discussion of learning and how do we understand learning and education. Now, there's a number of us who are really fascinated with these questions about publics and how do we bring groups of people together around issues. To me, there's something telltale about the importance of doing throughout both of these fields and the ways in which they overlap.

Chris Hoadley: It makes me think of the emergence of critical pedagogies and emancipatory learning philosophies in education. I think this messiness of who's the learner, who's the teacher, and what's the curriculum: in the olden days, those were a little tidier. Explicitly blowing up those roles is part of the advancement in trying to increase people's engagement with, and agency within, systems of education and learning. When it comes to design, we've gone full circle. There was a time when everything was sort of hand-crafted, and everybody was making their own stuff. Ideas were transmitted, but there was not a sharp distinction between the makers and the users. Then through the industrial age, we've seen incredible role differentiation in division of labor where the designer became separated from the craftsperson or the user.

We're at a point now where we're beginning to see tools being made that, again, put choices about how to change the way the world is, and how to remake the world in a different image, into everybody's hands and not just the hands of those with enormous amounts of capital with which to manufacture goods. Especially in the digital space, this kind of radical decentralization of creative power has arguably spawned the "dot com boom" and the technology economic revolution. But I think we're only just beginning to see the ways in which participatory digital culture is upon us and how things are going to be, again, very much more democratized in the 21st century, much as the enlightenment in Europe helped decentralize the institutions of knowledge to popularize the creation and

sharing of knowledge, and take it out of the hands of literally a priesthood. We may be on the cusp of a similar kind of phenomenon in the 21st century when not just the means of creation, but the inclination and skills of creation being held by many instead of by the few.

Disruption of Learning through Participatory Design

Carl DiSalvo: I agree. I'm going to throw a "but" in there. I want to begin by saying I agree and I'm excited by seeing these things. There was a conference at The New School last fall (November 14, 2015) on platform cooperativism. But the idea was if you look at what's happened with either social networks or the sharing economy, and the fact that those are actually built on very simple, oftentimes digital platforms, how we are beginning to see new uses come about where people are creating their own, for example, sharing platforms, their own social media platforms that might have very different sets of underlying ethics that drive them.

To me, those are the kinds of things that we're beginning to see in the digital space as people become more literate about the limitations and expectations of the current systems that we have, and as the people understand what they are agreeing to, for example, when they use Google, or Facebook, or any of these things, and then trying to build their own systems to say, "How do we want this world to be different and build our own systems?"

I think it's important to remember is PD is really a very small part of the field of design. At the institution I'm at now, I actually don't think we have a participatory design class. When I was a graduate student, we didn't have a Participatory Design class. PD was not covered in my Design Methods course in HCI. It wasn't because people necessarily disagreed with it. So it's still important to remember that that's still not the prevailing perspective in design. In a way, I would say at least it seems that the majority of education, at least in the States, seems to be a fairly top-down structured thing. I remember that these are still sort of niche encounters with both design and with learning. I think one of our challenges is to grow them, and to grow them in authentic ways so that they continue to be both participatory and frankly have the capacity to also continue to be critical, so that as people are participating and people are learning, they're still participating in learning in ways that are authentic and meaningful to them, and it's not sort of a shallow participation in learning that's just happening for the sake of, let's say, Facebook.

Chris Hoadley: I would add that, I think, there's an inevitable pushback as well. It's not just that these kinds of more democratized, emancipatory, critical tactics in both education and in design are fringe and therefore not noticed. It's also that they inherently threaten certain power structures. So, if you look at the history of writing and literacy, there's certainly many societies over time where this

technology was sort of kept under wraps, and learning to read was criminalized for dispossessed people whom the powers that be intended to keep that way.

You know, we can certainly already see that. I think of the example of the teenager (Ahmed Mohamed, a child of Muslim faith) who cobbled together a maker-style projects of an alarm clock and then was jailed at his school for something that seemed to be threatening the dominant order of things. In much the same way, I think although inquiry teaching and inquiry learning are the kinds of things that have gained traction and explicit support of people in certain quarters (whether in the Next Generation Science Standards, or through explicit endorsement of educational bodies), it's still pretty rare in practice in schools. So, there are an awful lot of folks that, despite these progressive curricular standards, think people should "take what they're given" and that could apply to a third grader studying in a stultifying classroom, or it could apply to a call center employee using an Orwellian computer system, or it could apply to a consumer going to Best Buy and purchasing a shiny new device. I think the more we have conversations about what is our own determinacy in this, the more principled that those decisions will be.

Carl DiSalvo: I'm increasingly interested in that last example that you gave about the consumer who goes to Best Buy and trying to figure out . . . Right now, so many designers are interested in the so-called Internet of Things, and how do we have all these devices that are going to talk to one another. One of the questions that keeps coming up is really thinking about precisely this space and thinking about how do we use learning strategies to let someone understand what it means when they buy this device that's going to come into their house. Likely, maybe it's going to connect to another device, or maybe it's going to send information back someplace else, and not that that's necessarily a bad thing. There are times when we may want that. There are times when we may be willing to make that choice.

But I think those are actually the kinds . . . I mean to me that is a great example of where design, and learning, and participatory design and learning can come together to say, "How do we develop capacities to understand this increasingly complicated world so that when we make our choices, they're *informed* choices?" So, if we're choosing to install a network device that's going to send data about our homes back someplace else, we have an awareness of that choice. We understand what that's about. Then similarly, that we develop in people the capacity to say, "How can you think about *not* doing that?" What if I want to have an automated thermostat, but I don't want it to send the data back someplace else? I think this is where you get into this interesting mix of hacker culture, and maker culture, participatory design, and learning. How do I come to have, again, the literacies and the capacities to make those choices and act on those choices in an informed way? That to me is like a really good challenge. It's a challenge that designers aren't implicated in and partially responsible for, but will only be able to act in an effective way if we take seriously the idea of learning.

Chris Hoadley: Yeah. It makes me wonder. At one point in time, the British government had sort of been repurposing, as I understand it, what sort of used to be Shop and Home Economics curriculum through what they call the Technology and Design curriculum. There were some researchers there who were beginning to use the phrase “capability” as a term of art to mean essentially the agency with things in your environment, this agency for making use of things. You know, it’s an interesting thought experiment to think about what does it mean to teach even the youngest kids to see the world as something that can be remade, to see themselves as being able to use lots of techniques to do that. Think about how our society either fosters or defeats that. In the technology space, there are countries like the United States where intellectual property reigns supreme. The laws around, for instance, digital rights management and copyright are used to sort of lock things up in a way that people don’t have the right to mess around with them. In a place like China, intellectual property rights are not really a barrier to messing around with stuff. But what is a barrier is the politics of the government and its old censorship of what people can and cannot do. There are a lot of different potential ecosystems we can imagine which people do or don’t have a lot of design capability at their fingertips. And we can also think about cases in which that ability really is too dangerous to unleash. One thing that springs to mind is lethal self-defense designs that people came up with in post-apartheid in South Africa, from flamethrowers to tire spikes, sort of spy-novel stuff that was intended to harm. What happens when everybody has lots of design capability? It could go badly.

Carl DiSalvo: It’s a great question. I struggle with this now. I think the obvious one is the person who 3D-printed the parts for a pistol, if I remember correctly. There are a series of these YouTube videos in which people have done that are drone hacks. One was able to fire a handgun, and another one was able to fire a sort of homemade flame-thrower. You look at this and you say on the one hand, “Yeah, this is ingenious.” Someone has figured out actually some fairly complicated engineering things here. They’re abstracting a model of technology that exists and is a sort of top-down model. Then they’re appropriating it within their own context. There are lots of ways we could look at this and really sort of laud it. At the same time, we think, “My God! They made a flying robot that shoots bullets,” and that’s terrifying!

So, I think it gets to the question about how do we begin to have limits on some of these discussions? For me, this is a question where I think it becomes really important. In some ways, although I’ve been very interested in informal environments, and informal design activities to ask, “What are the roles of institutions coming back in a highly participatory culture?” Because at the end of the day, I do think I don’t want us to evolve sort of into this neo liberal nightmare where everyone is on their own and everything has been privatized, and there’s no accountability. With both design and learning, it does come back to a question about rethinking what these institutions are, what are the regulatory bodies, what

are ways of talking about ethics in a massively participatory culture in which I can go online and learn to do just about anything I want to do this afternoon, a lot of which may be very stupid.

Involving People in the Design of Their Learning Environments

Jason Yip: Can I ask a question? So, one way to think about all of this is there's a lot right now of what you just said. This is really great to see both of you have started to really merge together the notion of design and learning together with interesting temples of drones and Best Buy. One of the things that I was really interested in, while listening to both of you talk, was also: how do these philosophies help each other, particularly where does participatory come in? Where does the learning sciences need help, and consequently how does participatory design also learn from learning sciences? So, we're in a conversation that I think is really fascinating with regard to the intersections right now. So, how do these actual intersections begin to start supporting each other?

Chris Hoadley: So, one example I can think of is there's been tremendous progress in the learning sciences understanding at multiple layers of abstraction, what are the conditions that support learning? So, ranging from cognitive, all the way down to neurological, up through sociological and cultural. There's a lot of good research out there about the kinds of mechanisms that exist. When it comes to design though, I think the field of learning sciences has historically had a little bit more of a traditionalist, non-participatory model of design. Design has a long history within the learning sciences as a first-class citizen of inquiry, as a conscience to hold up against social science research findings, to try to make things both true in a psychological sense, but also applicable in a design-oriented sense. That yet has not been applied well to scaling up. So, a lot of the learning sciences' best findings still have had relatively small impact on the world, because the learning sciences hasn't done as much of a good job of understanding how these things grow and scale. A big part of that is understanding how to involve people in the design and redesign of learning environments.

One area where I think it's very exciting to see this happening now in the learning sciences is the design-based implementation research community, which is beginning to look at ways in which research can be conceived of as a form of mutual capacity building at scale, where scale becomes something that you bake into your research questions from day one. It's an area in which there are a lot of heterogeneous participants, different kinds of stakeholders with different backgrounds. And the sort of impedance mismatch between those participants being able to get everybody on the same page, having everybody have a seat at the table and be able to participate fully in what essentially becomes a co-design process is one of those things that I think certain subfields within

learning have tackled. The instructional systems design folks, for instance, have looked at this to some extent. But I think participatory design is a field that has a little more maturity in some of the techniques and processes that can be used to help ensure a productive meeting of the minds across very disparate kinds of backgrounds or agendas. I do hope that those learnings, the wisdom that exists around how to engage heterogeneous stakeholders towards common goals, that may be ill-defined or under rapid evolution. I think that's an area where PD is ahead of the curve of learning sciences.

Carl DiSalvo: At the same time, I would say what PD has done well is to take really large concepts from the learning sciences and try to work with them in small ways. Early and maybe ongoing discussions of situatedness and thinking about situated learning, as well as sort of situated design and understanding the importance of this notion of situatedness is actually a concept where the two fields had kind of drawn from each other in productive ways and informed each other. There's an opportunity to more directly try to stage collaborative research efforts that can bring together people who really have a commitment to the learning sciences and really have a commitment to participatory design and the rich tradition in both of those, then to really from the outset try to push each other's fields in ways to understand the distinguishing factors, those bits of research.

So, I'll give you an example. One of the things that many people are interested in with participatory design right now is how people develop attachments to issues. This ends up being discussion about trying to understand the ways in which people come to have sort of affective engagement with design things, and then crafting design things specifically so that people have those kinds of attachments. So, it becomes a way to get at issues, whether those issues are environmental issues, or social issues. A lot of that comes down to discussions of craft and aesthetics that I think designers are particularly attuned to, but not particularly good at communicating about.

Rather than putting the question of aesthetics aside because it seems difficult, particularly with regard to "science", let's take these questions aesthetic seriously and really probe and say, "How do these notions of aesthetics in a participatory environment end up affecting the kind of learning that happens or doesn't happen?" I think we really need those sorts of directed questions that are asking, "What is the expert knowledge of the PD researcher? What do they really know when they're out doing their observations, or they're out doing their workshop? What is it that they know so well that is hard for them to convey that?" and similarly, with the learning sciences, and try to put us together on projects where we communicate that with each other. That becomes a fundamental part of the project, as well as with the communities we're working on, to figure out how these things about design participation and learning mesh in really rich ways.

Influence of Public Interest and Funding on Participatory Design and Learning

Chris Hoadley: I applaud that goal, and I think that it would be exceptionally fruitful. One thing that I see as a barrier is that in the United States, design is often not taken as seriously as it is in other places. When I think about, for instance, in Europe, the degree to which there's government support for design research in the traditional sense, not in the learning sciences design-based research sense.

There's a sense in which designing in education has always been present, but it's always been to some extent a second-class citizen compared to social science research. So, "I'll sneak design in on the back of social science research through learning sciences research techniques like design-based research methods." But there is knowledge to be contributed on the design side as well. On your comment about "What is the expert knowledge of an expert participatory designer?" it has two parts, one of which is what do they know about how you convene a workshop, or bring people together, or facilitate a particular kind of knowledge exchange.

But there's also the question of what does that participatory designer know about just design in their discipline? That knowledge squares with the ways in which design as an activity is a byproduct of being a learning scientist and your learning research. I think the phrase "curriculum designer" may be falling out of favor. But I've recently been seeing a phrase "learning experience designer" analogous to the user experience designer starting to gain some traction. I think that's a word that's come to the educational publishing industry from the dot-com world. Nonetheless, it shows that bubbling under the surface, there is this interest in understanding what it means to really be able to make good stuff even if you're not into the social science research endeavor. I do think that in terms of production of knowledge, if the learning sciences and the PD communities got together truly, it would be nice if the knowledge contributions could be in all three of those areas. How do people learn? How do we design things in collaboration with people? And how do we design better things?

Carl DiSalvo: Yes, I agree. Some of the most exciting work right now that's happening is work that's actually happening in the UK around the role of design, the public understanding of science, and public engagement of science and technology. That work happens in part because the funding there, my understanding is that there's a requirement for scientists to engage in public understanding and engagement programs, and designers are able to engage in research from a design perspective. So, folks in places like Goldsmiths are able to write grants as designers, not having to pretend to be social scientists or something else, and actually say, "Yes. I have a particular way of doing research, and I will be able to conduct research on this topic." Design research is, seemingly more so, considered

legitimate research. To have research taken on the grounds of being design is something that is missing in the States. I think we're going to need to figure out other ways to do that work. I don't think that organizations like the National Endowment for the Arts are going to step in and provide that kind of support. So, I think as design researchers in the States, we have to continue to be creative in how we get work funded. I think that we see exciting work in other places, in part because the infrastructure and material resources are provided to support it in ways that it's not here.

Chris Hoadley: I mean, I'm also reminded of India's National Institute of Design, which is a combination of between sort of a school and a government agency with a role that is inherently participatory, not necessarily because there was a such a liberal philosophy of design at its founding, but because the problems that their design gaze is pointed at tend to be problems of great scale, and pressing problems of development in India are intractable without mass participation. So, a lot of the design questions that they consider, inherently become participatory design at some level just because their implementation hinges so much on whether you can get, for instance, an illiterate craftsman from the village to learn a new technique for using bamboo as a building material, or whether you can get everyone from multimillionaires to the disabled, impoverished, or elderly to use the same kind of National ID card. These problems of design often bump up against issues that are best tackled through a participatory approach. I believe that learning as a design problem is inherently one of those problems where the participation comes along for the ride. If you don't put it there in the beginning, you'll discover it in the end, because the problems themselves are so non-self-contained.

Jason Yip: So, we have nine months left (as of the date of this interview, April 2, 2016) in the Obama administration. I think there's time for you to walk down the streets and lobby for a funding agency.

Chris Hoadley: Well, I'll tell you, as a reflection of the times, and I should state unequivocally I'm not speaking in my role as a temporary worker in the US government, but this is the first administration that held a Maker Faire at the White House. I mean, I think that some of that may be around ideals connected to democratization of technologies. But I think at some level, it's similar to what I was saying about India's development problems. America has a challenging, drastically shifting economic landscape in which jobs like unskilled manufacturing labor are endangered. So, this question of what replaces it is a pressing question of the moment in 2016 and beyond.

No matter who's in the administration of the US government, I do believe that these problems will favor PD and hopefully society, public/private sector, nonprofit sector, everybody will be focusing on those problems in a way that will allow us to take advantage of everybody's contributions or wisdom. It's likely that

the shape of that commitment from government to make things better is going to look different from administration to administration just because everybody has to put their mark on things. So, I don't expect a Maker thing, whatever the next administration is. But I do think this idea of participatory culture will be underneath the surface of lots of things that happen in the next decade or two.

Carl DiSalvo: I agree. One of the things I found very interesting is that the person who's leading the making effort for Intel, and Intel was very wrapped into the White House Maker Faire, has a PhD in design. There's very few of us in the States who have PhDs in Design. Jay Melican has a PhD in design from Illinois Institute of Technology. He's now Intel's Maker Czar. Jay has been able to lead that maker movement from within a corporate environment that has real-world public impact. I think that there's something hopeful in that.

Chris Hoadley: And, you know, we saw in the press. I remember it felt like it had gone mainstream when *Wired* had an article, that design became a trendy corporate idea as a way to understand, for instance, the success of Apple Computer as a corporation. There is a need for, if not participation or literacy in design, there's a need for at least awareness of, or appreciation for design. What does it bring you? What is it good for? That's one of those areas where, whether you're talking about engineering literacy, maker literacy, design literacy, there's an area in which the public would probably benefit from a greater awareness. Again, things come into being not fully formed like Venus on the Half Shell, but there are processes by which people decide that which should exist and bring it into existence that have foibles just like any other human endeavor.

Carl DiSalvo: To go back to one of the things I said to start and to play off of what you just said, learning is not something that ends when you leave class, we should be constantly learning; learning how the world works (or doesn't work) and then learning to change it: "Look, the world is constructed. It's made and it can be made differently. Then you can add to that and you can learn how to do that."

You can, develop those capacities for change, and you can do that whether you're age 6 or 60. Obviously, you're going to be able to affect the world differently at age 6 or 46 or 60, but in any cases, you can learn to affect the world. That, to me, when you pair learning and participatory design together, that's when things get really interesting.

Chris Hoadley: Aha. I agree.

Jason Yip: Both of you have naturally arrived at a key question, which is, How can the learning sciences and participatory design together affect social change? Maybe through the whole design and learning environments, and people understanding that those learning environments are constructive and that people can participate, maybe that's part of that social change? I don't know. It's fascinating to think that it's not the whole participatory design in learning as the outcome,

but the actual outcome is that people start to see not just by their curriculum or better learning activities. Rather, it is a meta-outcome of people understanding that those things that we built—learning activities, learning experiences—came from somewhere. They came from either power and politics and the things that we allow in this case.

Carl DiSalvo: One thing that I hope people get from this conversation and the book is that participatory design and the learning sciences have significant things to share with each other. There have been a lot of individual people and groups that have moved between these fields, filling the in-between spaces, since the 1980s. We are not the first to bring these fields together, but there is more work to be done.

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