The Meaning of "Participation" in Co-Design with Children and Youth: Relationships, Roles, and Interactions

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ABSTRACT
The paper examines the concept of participation in co-design practices with children and youth. Rooted in *Participatory Design* and *Participatory Action Research* frameworks, the paper draws from multi-disciplinary literature to survey existing definitions of the relationships, roles, and types of human interactions in participatory co-design. The paper advocates for the active role of children and youth in the co-design process and presents models of youth participation. The paper highlights the importance of understanding and clearly communicating various degrees of participation, with the ultimate goal of empowering youth and involving them in brainstorming, planning, decision-making, and interpretation stages of the design process. We introduce the concept of *conscious co-design* and the need to reflect on the design process at a meta level in *Participatory Design* and *Participatory Action Research*.

KEYWORDS
Participatory Design, participatory Action Research, Co-design, Children and Youth, Literature Review.

INTRODUCTION
What do we mean when we speak of youth participation in co-design? What does that space, where adults and young people work together to create something new, look like? This paper tries to address these questions by investigating conceptual models of interaction in co-design with children and youth. Rather than focus on methods and techniques, this paper looks at the relationships, roles, and nature of human interactions.

The paper was inspired by the authors' own self-reflective journeys into co-design with youth, on a research project investigating how to design youth data literacy activities *for* youth, *with* youth. Similar to other researchers and practitioners who work with children and youth, the authors tried to tackle the issue of the asymmetrical distribution of power in participatory research with children, particularly in relation to adult-initiated research. (Morrow, & Richards, 1996; Kellett, 2005; Bernikis et al., 2019). We acknowledge that it can be difficult to disentangle methods and interaction because some methods do invite greater interaction. However, the nature of interaction can shape the results of the co-design process and thus, deserve a closer look. Furthermore, co-design with children and youth is often intergenerational, suggesting an inherent inequity in power distribution. While we cannot always plan for specific forms of interaction, given the somewhat messy and organic nature of this research, we can at least be conscious of what those interactions look like.

To be transparent about "youth participation", we need a structural understanding of the partnership itself and a deeper understanding of what happens when designers (usually adults) work alongside less experienced members of the community (often youth) to create a product, a process, a pedagogy, or a program. To increase such understanding, this paper reviews the literature on participatory research with children and youth—arising from the fields of *Participatory Design* and *Participatory Action Research*—focusing on the literature that investigates and categorizes the nature of interaction within these participatory spaces. The entire body of literature on participatory research with children and youth is not analyzed in this paper. We focus on a selection of works that have attempted to create models of interaction, where the outcome is a product created *with* children and youth, *for* children and youth. The lens of our investigation is, nevertheless, wide, to include multiple spheres of co-design with youth—from technology to library services.

Our goals are twofold: First, to identify themes, constructs, and frameworks that characterize the interactions, roles, and relationships of design partners within the context of co-design, and second, to reflect upon their applicability to our own research project exploring how teens co-design after-school programs as sites of critical data practice. The structure of this paper is as follows: We begin with a description of our methods for conducting the literature review. We then situate our study within the broader context of the sociology of childhood and two dominant participatory approaches to co-design—*Participatory Design (PD)* and *Participatory Action Research (PAR)*. We examine

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specific models of interaction in participatory work with young people to arise within each approach and then conclude with a discussion about *conscious co-design* and the need to reflect on the design process at a meta level in PD and PAR.

METHODS

In developing this paper, we conducted a literature review and content analysis. The literature review on PD and PAR began in support of the authors' research study, *Data Literacy with, for, and by Youth,* with the initial goal of building a collection of resources related to the co-design of informal STEM learning alongside teens. Sources were acquired through searching (including citation mining) using key terms such as participatory design, participatory action research, participatory practices in libraries, and co-design, and by reviewing publications by leading scholars and practitioners in our areas of interest, narrowing the scope to focus on children and youth. The literature review unfolded over the course of six months, each step narrowing the scope and focus. In the first phase, we sought articles describing specific techniques of PD and PAR with youth, drawing from the scholarly and professional literature in the fields of Human Computer Interaction, Library and Information Science, and community-based work with youth. We identified an initial list of 48 articles. This list, however, was not meant to be exhaustive, its purpose being to inform our own research in terms of potential techniques. We also sought articles offering a comparative analysis of techniques and this search yielded 28 articles. As we reviewed the literature, one of our discoveries was that there is a rich body of research about *how* to run participatory research with youth, but there is less said about the meaning and nature of participation with youth. In the final stage of the literature review and content analysis—the phase reflected in this paper—we narrowed the field to works that defined participation (alongside youth) through the use of broader conceptual frameworks and models, focusing our inquiry on interaction.

The search was conducted in the following databases: ACM Digital Library, the archives of *American Libraries Magazine*, Library and Information Source, H.W. Wilson's Library and Information Science Full Text, Scopus, and Google Scholar. In addition, we found the search strategy of citation mining to be particularly valuable. For example, we utilized Scopus to find newer resources that cite commonly referenced, but older, literature reviews and analyses related to PD. We also scanned conference proceedings such as those of the ASIST annual meetings, the Participatory Design Conference (PDC), and the Interaction Design and Children (IDC). As well, we reviewed the gray literature from institutions known for informal STEM learning, such as libraries and non-profits reaching young people in after-school/out-of-school environments. For this paper, we do not include analyses of specific techniques and "how to do it" guidelines, although that literature is certainly of value. This is because we are specifically interested in using the literature to paint a picture of the relationships, roles, and interactions in co-design.

CHILDREN AND YOUTH IN THE DESIGN PROCESS

Children and Youth as Agents of Change

Multiple discourse threads weave their way throughout the research and practice in co-design with children and youth, including conversations about critical pedagogy, the movement toward democratic and inclusive design, and the empowerment of young people as agents of change. We discuss these throughout the paper in specific relation to PD and PAR. However, the actual starting point for this exploration into participation are considerations about children's rights and the ways that childhood is framed in society.

The Youth Participatory Action Research community draws from the child rights movement and the sociology of childhood, recognizing young people's fundamental right to participate in making decisions about the matters that affect their lives (Shamrova & Cummings, 2017). Nevertheless, in the literature about children as design partners in technology development, little acknowledgement has been given to underlying ideologies of childhood and how they influence researchers' understanding about what young people are capable of doing and their right to do it. Childhood is not just a time of life: it is also an idea. The child rights movement, exemplified by the United Nations Convention on the Rights of the Child (UN, 1989), positions children as social actors with the inherent right to be informed, to be creative, to participate and have opinions on matters concerning their own well-being. The United Nations General Comment 25, released in March 2021, applies these rights to young people's engagements with the digital environment, including its design (UN, 2021).

In the realm of research, the "new sociology of childhood" reflects a similar stance on childhood, suggesting that young people should be seen as the subject of research and active participants, rather than the objects of study, as if they were laboratory rats "at the mercy of external stimuli" (James & Prout, 1997, p. 13). Adopting this stance on childhood means that research should be conducted *with* children, rather than *on* children. Young people should be viewed as agents of change, and not just assets for research.

Participatory Approaches with Children and Youth in the Co-design Process

In this section, we set out some definitions for two approaches to participatory research that have been used with children and youth in the co-design process: *Participatory Design (PD)* and *Participatory Action Research (PAR)*. PD is often applied to the design of technology while PAR is more often associated with social processes. (With technology increasingly embedded into everyday life, one wonders if a more unified approach is needed). Co-design is often characterized as a subset of PD and is closely associated with Cooperative Inquiry (CI), where children and youth work alongside adults as equal partners in the design of new technology (Druin, 1999, 2002; Guha et al., 2013). However, co-design has been applied to contexts beyond technology design, as, for example, a method associated with emancipatory approaches to teaching and learning.

Understanding that there are important distinctions, ideological and otherwise, between the various methodological practices of participatory research, we look instead for the common threads that bind them together. In this way, we can explore the patterns of interaction in co-design across different contexts. One such thread is the concept of "participation" as a tool for the empowerment of people. Another is the desire to create something and make it *actionable* (whether it be a new technology, space, curriculum, or a community project).

Bustamante Duarte et al. (2018), explored the benefits of combining various participatory approaches in their work to develop tools and strategies to empower young migrants during resettlement. When used in tandem in the same project, each approach filled in the gaps left by the other, creating a richer environment for discovery. On the other hand, the authors realized that the meaning of participation can be interpreted in different ways, depending on the research tradition from which it arises, leading them to argue that "it is crucial to discuss and reflect on the degree of participation in a study" (3.8)

Participatory Design

Participatory design is a methodology that gives the end user an active role in the design process. PD's primary guiding principle is the promotion of collaborative relationships between users and designers, with the user invited to contribute to the final product as a member of the design team (Yip et al., 2017, p. 5742). PD is associated with a movement originally rooted in the Scandinavian approach to systems design in the workplace, which emphasized workers' involvement in designing improvements to their quality of working life. This approach was based on the premise that workers should have a voice in determining their work experience (Halskov & Hansen, 2015; Nesset & Large, 2004).

In the 1990s, PD emerged as a larger field of research, expanding from the original workplace context to a broader application in the area of technology based on the following premise: Just as workers should have a role in shaping their working life, technology users deserve to be active participants in technology development and advancement (Halskov & Hansen, 2015, p. 88; Yip et al., 2017, p. 5742). This principle includes not only adults but also children as technology users, with PD playing a role in the field of Child-Computer Interaction (Tsvyatkova & Storni, 2019).

Beyond technology, PD has also been adopted in other domains—such as healthcare, civic engagement, and cultural heritage—coinciding with a shift in focus from the quality of a specific end product to an improved quality of life more generally. Perhaps because PD occurs across these multiple contexts and has an increasingly broader aim, no single methodological approach to "participation" has emerged as a best practice in the field (Halskov & Hansen, 2015; Sanders et al., 2010).

Including children in the design process does not inevitably lead to equality. Druin points to four roles that young people can take on in PD of technology—*users*, *testers*, *informants*, and *design partners* (Druin, 1999, 2002). It is only when children and youth are recognized as partners that true co-design can occur. Yip et al. (2019) argue that PD is broader than co-design and "includes any activity with end users (for example, user-testing, informing opinions)" (p. 1243). In contrast, Tsvyatkova and Storni (2019) view "co-design with children" as the umbrella category that includes PD as well as user-centered design and learner-centered design. This lack of consensus around the term "co-design" is perhaps not surprising, given Halskov and Hansen's (2015) finding that the very idea of "participation" seems to vary within the PD community. This amorphous conception of participation seems aligned with the divergence in perspectives on co-design and its relationship to PD and PAR.

Participatory Action Research

Participatory Action Research (PAR) is an epistemological approach to inquiry in which the beneficiaries of research are directly involved in planning and conducting the research. PAR challenges traditional precepts about expertise and validity by treating research as a collective process in which historically marginalized community members are considered an essential part of the research team (Anderson, 2020; Caraballo et al., 2017; Cammarota & Fine, 2008; Khanlou & Peter, 2005).

The roots of PAR lie in *Action Research* (AR), an approach to inquiry first articulated by Lewin in 1946 as a response to Taylor's "scientific management" of industrial processes, to show that human productivity and

development could be achieved through democratic practices, rather than autocratic coercion. Lewin's great concern was helping minorities overcome exploitation and colonialism through their inclusion in self-study and research to affect solutions (Lewin, 1946). AR rejects positivism and instead operates on the premise that individuals' social perceptions guide their behavior; therefore, the focus is on understanding the meaning behind people's practices in order to successfully influence their actions (Frauenberger et al., 2015; Khanlou & Peter, 2005; Fabian & Huber, 2019). Although forged in the context of industrial management, Lewin's *Action Research* has expanded, to include broad applications in the areas of community-development, social planning, and, in the world of education, to the improvement of teaching practices and curriculum design. Contemporary action research is not so much a research technique but rather, "a family of practices of living inquiry that aims, in a great variety of ways to link practice and ideas in the service of human flourishing" (Reason & Bradbury, 2008, p. 1).

Participatory Action Research positions the people or community under study as experts of their own lifeworld and agents of change in their own lives, not the objects of research. The mark of critical pedagogy on PAR cannot be ignored. Emphasizing the participant's development of a "critical consciousness" though participatory action research, critical pedagogy serves as a springboard for gaining the self-awareness and agency needed to advocate for one's own liberation. (Freire, 2000; Caraballo et al., 2017; Zeller-Berkman, 2007). Building on Freire's critical pedagogy, PAR features a design-like process of collective inquiry and application, its goal being real-world structural transformation for oppressed populations (Freire, 2000). To this end, directly impacted members of the community or workplace control the entirety of the research process, including determining the research's topic of focus (Khanlou & Peter, 2005).

In practice, there is no one unified approach to the methodologies that constitute PAR. Indeed, some practices of PAR have a distinct "design" flavor to them, as with the cyclical design process followed in QuAKTIV, a community-based project to create natural spaces for children, with children (Fabian & Huber, 2019, p. 159), while others do not. Nevertheless, Shamrova and Cummings (2017) identified a set of what they call "mutually agreed upon components" of PAR across the literature, based on a review of 45 papers: "participation, engagement, empowerment, mutual learning, capacity building and fulfillment of both research and action agendas" (p. 401).

Relationship between participatory design, participatory action research, and co-design

As described above, a review of the literature about PD and PAR brings to light an overall lack of agreement and clarity around the concepts of participation and collaboration. As well, across both approaches there is an absence of a strict set of methodologies and practices that are commonly regarded as the most effective and most ethical within each approach. At the same time, many methods are shared.

Despite this overall murkiness and fragmentation, commonalities do emerge across PD and PAR—most notably in the realm of foundational principles and aims that transcend domains of knowledge and medium of expression. Both approaches are committed to the youth point of view and have as a goal the enactment of an outcome or product. They each upend the traditional paradigm in which an outside "expert" takes the lead. Instead, these approaches honor the validity of the lived experiences of those who are most affected but usually least represented within the dominant power structures that govern standard design, development, and research processes. Thus PD and PAR endeavor to give the end user or directly impacted community a voice in determining their own experiences and futures. Most of the components of PAR identified by Shamrova and Cummings (2017) encapsulate not just shared elements within the PAR community but also shared ideals across PAR and PD - namely participation, engagement, and empowerment (p. 401). The sections below examine models of interaction and participation to arise from the PD and PAR contexts.

MODELS OF INTERACTION IN CO-DESIGN WITH YOUNG PEOPLE

The Ladder of Participation

Including users in the design of technology is, if not ubiquitous, certainly a common and acceptable practice. A growing body of research includes children and youth in the process, generally alongside adults. However, what is meant by "participation" can be opaque.

A good starting point for any discussion around co-design with children and youth is Hart's *Ladder of Participation* (1992), a typology for thinking about young people's participation in projects, and critically, avoiding exploitation (See Figure 1 below). Developed to support the U.N Convention on the Rights of the Child (1989), the *Ladder* is meant to be used as a tool to operationalize children's rights as citizens. It is not meant to be a simple measuring stick nor is there an expectation that every participatory project with young people lives at the highest rungs on the ladder. Inclusion of young people in any initiative can fall within two zones – participatory and non-participatory. In other words, just having young people associated with a project does not mean that they are partners. Worse, using young people in tokenistic, decorative, or manipulative ways may even be harmful, should inclusion lead to their cynicism and disengagement. Involving young people in PD, therefore, has added responsibilities for the adults who initiate the project. As Hart notes, young people's "understanding of democratic participation and the confidence to

participate can only be acquired gradually through practice; it cannot be taught as an abstraction" (p. 5). A young person's inclusion in a participatory project should, therefore, be a first step toward greater engagement with the world, and not a lesson in stepping away.

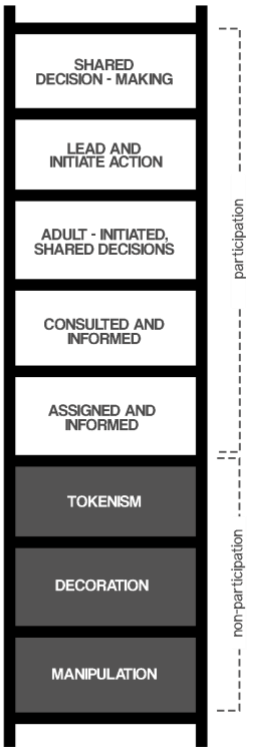

Figure 1. Ladder of Participation. Adapted from Hart, 1992, UNICEF

Participatory Design of Technology with Children

Wright et al's *Stage Model of Participation* (2010, as cited in Bustamante Duarte et al., 2018) is similar to the *Ladder of Participation* in its aim to define participatory research and comes from the PD community in the field of Human Computer Interaction. (See Figure 2). Of the nine levels, the first two levels are labelled "Not Participation", indicating that the presence of people on a design project does not indicate participation. At level eight, decision-making shifts from researchers to co-researchers and the researchers shift into the role of consultant. Level nine is perhaps beyond the realm of participation, as non-researchers assume full responsibility. While helpful, this model does not seem to allow for the equal distribution of power and decision-making amongst all members of a design team. It simply shifts from one group (researchers/designers) to the other (users/people in the community). Furthermore, it isn't specific to work with children and youth.

In another exploration into the meaning of "participation" in PD, Halskov and Hansen (2015) conducted a "critical survey of the role of users, emphasizing the way in which users are involved in various phases of the design process" in the HCI participatory design context (p. 81). One hundred and two papers presented at the Participatory Design Conferences (PDC) from 2002 to 2012 were reviewed. Although few papers were specific to design with children (which the authors attribute to the success of the Interaction Design and Children (IDC) conference), their paper nevertheless offers a good foundation for understanding what is meant by "participation" in PD and how the field conceives of the roles and relationships within. In general, researchers had fluid definitions of "participation", which differed from paper to paper (p. 87).

Halskov and Hansen (2015) found that the literature on PD approaches "participation" from three stances: First, as *implicit*. In other words, it's *not* defined, and the role of participants is taken for granted. Second, as an *expression of the user's point of view*, implying that PD is a platform where stakeholder's perspectives can be expressed and reconciled. And third, as *a space for mutual learning*, where participation represents a transfer of knowledge between members of the design team (p. 86). Notable by its absence from the PD literature is a category representing the complete control of the design process by the users for whom the product is being designed.

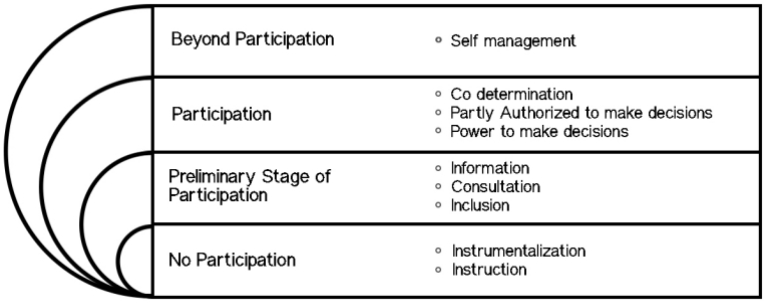

Figure 2. Stage model of participation
Adapted from Wright et al. (2010), translated into English by Bustamante Duarte et al (2018)

It seems unlikely (and certainly not what we as researchers have experienced) that the inclusion of children and youth would fit into Halskov and Hansen's (2015) implicit category of participation ("taken for granted"), given the legal standing of youth and the barriers to access that surround them. However, thinking of participation as an expression of the user point of view seems representative of much of the PD work with young people. The third category of participation—*mutual learning*—is more in line with co-design.

Several studies reviewed below illustrate various degrees of children participation in technology projects. Large et al (2006, 2007), whose Bonded Design research project developed web portals with children, gives a nod to Halskov and Hansen's *mutual learning* (2015). Large et al. argue that the co-design process is conceptually compatible with Vygotsky's notion of socially supportive climates for learning, where over time, individual expertise becomes common knowledge shared by the community. The intergenerational team consisted of adults "with special knowledge about technology design and children with special knowledge of what it means to be a child" become a community" (2007, p. 70). An equal partnership between adult and child, however, was not claimed nor were the adult-child dynamics explored further.

A study with 12 former child design partners looked at ethical issues in PD, one of which is the adult-child power structure in the context of intergenerational participatory design (McNally et al., 2016, p. 3601). The results allude to an open atmosphere of mutual respect but say little about specific interaction between child and adult nor does it set out a series of stages of participation. The children said the co-design process was like a "big group of friends" but at the same time, they recognized that adults had additional responsibilities and that they, the children, took direction from adults: "The adults just told us what [the design session] had to be about. They didn't tell us what we couldn't do or could do" (p. 3601).

Co-design with children and youth, at least in the context of technology design, seems at times to be a black box. It is not enough to say that children are design partners. What actually happens in this collaborative space? Yip et al. (2017) explored this question further, examining adult-child relationships in 36 co-design sessions. The study juxtaposed the complementary roles of children and adults in the design of children's technologies. On the child-side of the equation, children's roles moved from passive to active, user to partner (see Figure 3 below). Adult roles mirrored and complemented child roles, from observer to design partner. Presumably, a true co-design situation would exist when children and adults serve as mutually supportive design partners.

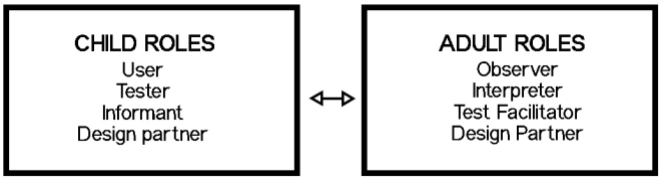

Figure 3. Complementary child-adult roles in intergenerational participatory design
Adapted from Yip et al, 2017.

Digging deeper, the study also found that design partnerships span four dimensions—*facilitation*, *relationship-building, design-by-doing*, and *elaborating together*. Each dimension travels along a spectrum of interaction, from balanced to unbalanced. For example, the *Facilitation Dimension* was unbalanced when only adults facilitate the design session. Alternatively, balance occurred when children and adults facilitate together. The *Design-By-Doing*

Dimension contrasts adults observing while children do the design work (unbalanced) with adults and children designing closely together, exchanging dialogue and ideas (balanced). The *Relationship Building Dimension* is about how socially distanced adults are from children while the *Elaborating Dimension* reflects the process of negotiating ideas. When children do all the talking and adults ask all the questions, this is an unbalanced elaboration. Alternatively, sharing ideas and negotiating design solutions is balanced (Yip et al., 2017, pp. 5746-5749). A stance on involving children and youth as equals in co-design might therefore suggest that aiming for balance is the key, rather than focusing on a set of progressive stages.

Participatory Design in the Context of Library Services for Youth

The interactions modeled by Yip et al. (2017), developed within the context of technology design, could be easily transferred to other modes of co-design with children and youth, including library programs and services. For example, many public libraries have Teen Advisory Boards facilitated by a youth librarian, where youth design programs and policies for the library. Researchers in the area of library and information science (LIS) have argued that the techniques of PD are an essential skill set for youth librarians. Subramanian suggests that methods of cooperative inquiry, an approach commonly practiced in technology design but also associated with action research, can be applied to the co-design of youth-focused library services, with teens and librarians working collaboratively (Subramaniam, 2016). Exploring this further, Yip et al. (2019) modeled participatory librarianship, informed by the four dimensions of interaction set out in their earlier work—*facilitation*, *relationship-building, design-by-doing*, and *elaborating together*. The librarian role reflected degrees of interaction, from supportive to co-design.

Participatory Action Research with Youth

Participatory Action Research (PAR) with youth is often associated with the goal of creating a pedagogical product (a curriculum, after-school program, a learning experience or health intervention), a social innovation (a new process, a service, or restructured systems, or a physical object), and even the re-design of space (parks, libraries, etc.). Media products, developed with youth, on issues that are meaningful to youth, can also be situated within a PAR frame (Soep, 2006; Soep & Chávez, 2010).

The library can be a locale for PAR, such as a project led by the Free Library of Philadelphia, to plan and design a teen center. The project, which self-identified as participatory design *and* action research, involved multiple stakeholders, including teens, the library staff, and community partners (Steele, 2013) Another example comes from the world of academic libraries, where participatory action research informed Somerville and Brown's project (2011) to re-design space. While the study addressed a wider "campus constituency", some of the students in an architectural design class may have provided a young adult component (Somerville & Brown, 2011). We include this study, not as an example of youth-oriented research but rather, as one of the rare instances of library-focused research that clearly self-identifies as PAR, in order to provide readers with a library context.

As with the co-design of technology with children, the roles, relationships, and interactions within PAR are not always transparent. Reports on PAR often describe the techniques used but have less to say about the nature of interaction between co-participants, the roles they move in and out of, and their relationship to each other. Rather, a set of guiding principles is highlighted. For example, Somerville and Brown (2011) identify "*participatory and collaborative"* and *"emancipatory"* as central to the PAR approach, writing that "researchers are co-workers conducting research with and for the people concerned" and the process is "egalitarian rather than hierarchical, because all participants are assumed to be participating equally to the inquiry" (p. 671).

Fabian and Huber (2019, p. 161) outline "participation steps" in their project *Quaktiv*, a PAR design project with children, to create places and natural spaces that embody children's lifeworlds. Fabian and Huber's model demonstrates degrees of empowerment within the PAR project and represents participation as a set of stages reminiscent of Hart's Ladder of Participation described above (See Figure 4).

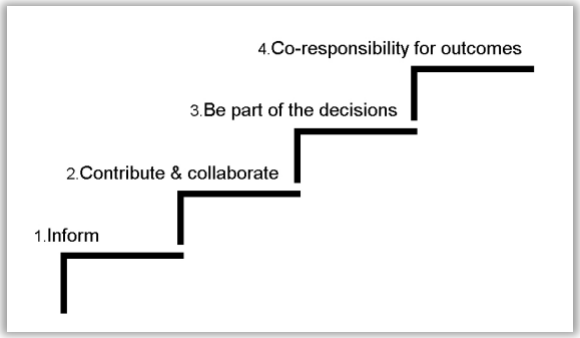

Figure 4. Participation steps in QuAKTIV. Adapted from Fabian et al, 2019, 161

Fabien and Huber (2019) note that principles of participation alone will not lead to the full and comprehensive participation of children in PAR: It is dependent on the conditions in the community (p. 165) and must be addressed in a situated manner (p. 171). This suggests that the roles, relationships, and interactions in PAR can only be understood in the moment, rather than planned for in advance (p. 171). The authors faced the conundrum of participatory research with children and youth: *For meaningful participation, who should initiate a PAR project?* "Is it more useful to wait until the community and children become active themselves…[or is it] more useful to intervene from the outside, from the world of adults and administration, in order to initiate projects that resemble PAR in the attempt to strengthen the community and children" (p. 175).

It is interesting to consider what participation in action research means from a youth perspective, on a youth-initiated project. Tuck et al. (2008), write about CREDD (which stands for Collective on Educational Disappointment and Desire), a co-design project led by group of youth aged 16 to 22. The collective conducted a self-study about New York City public schools, investigating how education failed them and actions that they, as young people, can take in order to change the system. This was not an intergenerational research experience shared with adults. Participation in the CREDD meant nothing less than total ownership of the research process:

> "There is transparency on all matters of the research;
>
> The research questions are co-constructed;
>
> The project design and design of research methods are collaboratively negotiated and co-constructed;
>
> Analysis is co-constructed; and
>
> The products of the research are dynamic, interactive, and are prepared and disseminated in collaboration". (p. 51)

As Cahill et al. (2008) note, PAR should, in the true, Freirian-sense, allow participants to hold up a mirror and come to terms with the roots of their oppression (p. 91). CREDD's approach fulfills this emancipatory goal of critical pedagogy, without the guidance of adult experts in research. But the reality is that many PAR (and PD) projects with children and youth are initiated by adults, guided by adults, and often rely on the domain expertise of adults, in order to create change. (In the context of informal STEM learning, this may be all the more true). At what point does the research move from guided inquiry with children, toward children as participants in research? Barnikis et al. (2019) capture this tension as they describe their own roles in participatory research:

> "Issues of power, present in all research encounters, are heightened when adults do research with children…There is a tension in adult-initiated research between the desire to reduce power imbalances by involving participants more fully in all stages of the research process, and the need to employ knowledge and theoretical understanding that may not be available to the participants…" (pp. 19-20)

In terms of power and positionality, another consideration is the multiple relationships that the researcher may have with youth participants—as educator (or librarian, as the case may be) and often (since it is difficult to recruit children and youth for research), as a family friend. Action research is inherently embedded in social context, so this is not meant as a critique of the method. Rather, as Barnikis et al. (2019) note, researchers must consider how pre-existing relationships can weave their way into the co-design process in PAR and be conscious of their social location to children and youth (p. 8). Adult members of a co-design team with children and youth need to articulate their role, as Tiffany, an adult researcher, does here in a self-study of her work with children.

> "I, an adult, established the research questions, design, and intentions. I also co-constructed the conversations with the children, but still framed, analyzed, and interpreted the data alone" (Tiffany, as quoted in Barnikis et al., 2019, p. 6).

One is left asking if the inclusion of adults in PAR co-design projects automatically distorts group dynamics, inevitably bending power away from children and youth? An approach to PAR that allows for adult expertise, while maintaining the generosity of spirit needed for deep, collaborative partnerships, comes from the work of YR (Youth Radio) Media, a national network of young journalists and artists collaborating with adults in a process called *collegial pedagogy* (Soep, 2006; Soep & Chávez, 2010). YR Media creates cultural products for youth audiences but is also a space for theorizing about community action and participatory processes for co-learning and co-design with youth.

Collegiality transmits a clear sense of a "relationship in which two or more people jointly engage in a significant task for a shared purpose, with collective responsibility", building on the notion of a "community of practice" (Lave & Wenger, 1991, p. 53). Rather than see youth as recipients of learning in the co-creation of media, the learning is something that the community creates, alongside the production of media. Adults are not to be phased out as participation progresses. Rather, youth and adults are joined in a shared purpose, which in the case of YR Media, is

to reach an audience. This positioning is similar to Halskov et al's *mutual learning* in PD (2015) and Large et al.'s notion of socially supportive climates for learning within *Bonded Design* (2007). Which is to say that when an adult shares their expertise with youth for a shared purpose, this does not necessarily equate to the downgrading of youth participation but rather, a growth experience for all.

What are the conditions for a *collegial pedagogy*? Seop and Chávez (2010) outline three factors: *Collaborative Framing*, *Youth-led Inquiry*, and *Public Accountability*. *Collaborative Framing* means that co-design/co-learning has to have a mutually agreed-upon starting point. The frame is negotiated, through trial and error. Youth put forward different approaches, try it out, and then discuss with adults (in the case of YR Media, this might be an adult producer). As youth explore ways to frame a topic, they become informed. *Youth-led Inquiry* connects personal meaning to information learned through the creative process. This does question the role of adults in transmitting complex information, as might be the case in STEM learning, but it clearly asks youth to shoulder some of the burden. The last factor is *Public Accountability*. A PAR (or PD) product is meant for *someone* – a person, a community, an institution. Too often in co-design, young people's ideas are not operationalized and shared with a real public. If reaching an audience drives participation, then a real audience is needed.

DISCUSSION

This exploration into the meaning of participation in the context of co-design with youth sets out models that perhaps raise more questions than they answer. We highlight below some of our own reflections to arise from this inquiry:

- What happens in co-design projects where some level of disciplinary, technical, or craft knowledge is required? Young people, simply by virtue of having fewer years of life experience, may not have acquired this knowledge and need the scaffolding provided by adults with "expertise". Does this imbalance necessarily translate to a situation of adult dominance over youth participation? Soep and Chávez's model of *collegial pedagogy* (2010) and Yip et al.'s model of *complementary child-adult roles* (2017) both point to a more mutually beneficial perspective, where co-design is an experience of shared growth.
- How is youth participation influenced by the context and medium of the co-design project? For example, discussing how a physical or digital object works versus brainstorming ideas around a social construct like privacy and data might look like two very different participatory processes. The models presented here do not acknowledge this. One has the sense that giving a tool to teens and saying 'take it apart and make it better' would lead to a different level of autonomy and participation from that which might arise around abstract concepts that require some explanation.
- If we, as researchers, initiate a co-design project with youth, are the higher-levels of participation (as set out by the models in this paper) then even possible? In our own reflections on our work with young people - co-designing STEM activities for after-school learning environments—we suggest that there can be many forms of participation within a single project. In a research project, perhaps funded by external agencies, the researchers often begin by generating the research questions and protocols, without first consulting youth. However, in the "Vygotskian" sense, perhaps a project can begin with adults doing the heavy lifting in terms of conceptualizing the overall project and then they deliberately fade into the background as youth move toward greater autonomy. As long as researchers are transparent and self-aware about the co-design process, we suggest that researchers can accept a certain level of fluidity in interaction types. This does not, however, resolve the question as to who frames the initial problem.
- This latter point leads us to emphasize that co-design with youth requires a baseline level of self-consciousness, transparency, and intentionality on the part of the adults who initiate the process. The models and concepts we've presented in this paper point to particular factors that can lead to greater youth participation. But we think there is something more. We call for *conscious co-design*—the self-reflective and deliberative planning for participation in co-design, particularly on the part of adults working with vulnerable populations - so that problematic dynamics that may only benefit those already empowered are not reinforced by the very act of co-design. Notions of the "reflective practitioner" have long woven their way into professional practice (Schön, 1983) and more recently into the design of technology (Malinverni, & Pares, 2017). We simply argue that a self-reflective critical practice also applies to co-design with youth, a journey that we, the authors, have begun in our own co-design project, *Data Literacy with, for, and by Youth*. We hope to generate further discussion on the meaning of participation in information science research.

CONCLUSION

In their paper reviewing ten years of PD, Halskov and Hansen (2015) note that "it is crucial that researchers be more precise about users' roles…who drives the process between sessions, with regard to interpretation, planning, and decision-making in the design process" (p. 90). In this paper we have attempted to examine the roles, relationships, and interactions between partners in co-design in a holistic way, by reviewing the literature on co-design concepts, frameworks and models drawn from the literature in both PD and PAR. While our review of existing resources on

participatory co-design was not meant to be exhaustive, we identified a range of interaction models. The stage models (Hart, 1992; Wright et al., 2010, as cited in Bustamante Duarte et al., 2018; Fabian & Huber, 2019) show that interactions in participatory processes can be designed in alignment with a higher stage (or rung on the ladder) or, start at a lower level and evolve. Yip et al.'s model of complementary child-adult roles (2017) is interesting in that it includes adult roles and aims for balance in addition to shared growth. Soep and Chávez's collaborative framing, situated within the broader perspective of collegial pedagogy, emphasizes the mutuality of youth-adult participation (2010). Such models, and others, can serve as a *map*, guiding the way to design *for* participation. The same models can be applied as a *diagnostic tool*, helping to analyze, post-research, the nature of interaction in co-design projects with children and youth. We, the authors, find that our own awareness of the potential roles, "rituals to share power" (Cahill, 2016, p. 162), relationships, and forms of interaction is invaluable in planning our own research co-designing data literacy activities with youth, and we will continue reflecting upon these models as the project progresses.

Acts of *conscious co-design* can raise the adult researcher's self-awareness of their own role in co-design with young people. It is an ethical stance: Design work that makes claims to "co-design" should be transparent as to its stance on the role of *all* participants during the design process and importantly, evident to the adults who initiate participatory projects with youth. Transparency impacts the reliability and replicability of research, and demonstrates respect for all participants, no matter their level of involvement. More importantly, telling young people that they are helping to make a difference in the world is problematic if they have a decorative role in participatory research. We hope that this paper will not only offer methodological guidance to fellow researchers and practitioners interested in co-designing with children and youth, but will stimulate further research and discussions on the ways to empower youth by engaging them in all phases of the design process, from initiation to implementation.

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