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Research Notes

Participation in design research



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To unravel the complex challenges addressed by design, oftentimes it can be necessary for researchers to participate in design processes rather than make observations from outside. However, ‘participation’ has different meanings in different kinds of design research, and research outcomes will depend on the form of participation chosen. Through a Dimensional Analysis, we establish seven dimensions on how participation in design research can be classified in terms of 1) the researcher-designer role, 2) the aim of the project, 3) the main contribution, 4) the activities of the researcher, 5) if it is a single or multi-case study, 6) the scientific reporting on the project, and 7) the kind of knowledge produced. This overview aims to assist researchers in communicating how choices for a particular participatory approach contribute to knowledge production in design research.

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Participatory design (e.g. Muller & Kuhn, 1993) and participatory innovation (Buur & Matthews, 2008)¹ are well established in both design practice and research. Practitioners and researchers also solidified participatory design methodology over the last two decades (Luck, 2018; Sanders, 2002; Spinuzzi, 2005). Across these efforts, research on participatory approaches uses the term ‘participation’ in two ways; (1) participation of those *doing* design; referring to, for example, designers, co-creative innovators and users, (2) participation of those *studying* design; referring more exclusively to researchers.

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strengths. First, participation of a design researcher *doing* design leads to a rich first-hand understanding of the design process, its emergence, and its complex establishment as relevant design practice. Second, participation as a design researcher *observing* designers, users and other co-creators participating in design leads to a fine grained description of the design process and its attributes. Following a more classical perspective on research, their research would then allow for more rigor (for an extensive debate on relevance vs. rigor in design research, see Schön, 1983).

Influential design researchers in the 1970s and 1980s, e.g. Bruce Archer, John Chris Jones, Donald Schön, and Louis Bucciarelli, were practicing designers themselves; they were doing design while studying design. Their research findings were thorough reflections and systematic analyses of their own practices and experiences. Their findings were also strongly connected to their epistemological view on designerly ways of knowledge creation (e.g. problem solving, reflective practice, and social processes). The close connection between design research and participation brought a richness that helped to get a better understanding of the unique nature of design, as different from the sciences and the humanities (Cross et al., 1981). Consequently, the design research profession developed its own epistemology, methodology and phenomenology (Editorial Design Studies, 1984). An illustrative example of how participation was understood is the work of Bucciarelli reporting on design activities in large design engineering companies:

'I learn to write up my observations at the end of the day or early the next morning. I rely on memory and, in addition to meeting notes, a few words and a name jotted down on site. I find I can recall a sequence of observations, the rhythm of a conversation, without much prompting. There is an editing process going on here, no doubt. However, I have tested my replays against the recall of participants, asking them in effect: 'Is this what was said?' 'Did John agree to do that?' I found that my representations were familiar. If participants offer a different interpretation, that again gets recorded' (Bucciarelli, 1984: p186).

Bucciarelli aims to present his data as observations, but phrases such as '*recalling a sequence*' and '*the rhythm of a conversation*' hint that his own presence and activities contributed to his data.

The participation of researchers in the design process became less popular in the 1980s and 1990s, but regained some prevalence in the early 2000s, because of the growing popularity of Design Thinking (Dorst, 2011; Stewart, 2011) and research through design projects (Koskinen et al., 2011; Stappers & Giaccardi, 2017) which expanded the *habitat* of the designer (Ball & Christensen, 2018). Designers became involved in (innovation) projects that operated in complex and new domains such as health, mobility and sustainability (see e.g. Cooper,

2019; Martin & Martin, 2009). Liddament (1999) explained that much design work in these complex domains is resistant to epistemological reduction. Consequently, design researchers began to change their research strategies and started to actively advise, participate, co-create and investigate these complex projects where different disciplines and schools of thought come together. By doing so, they rediscovered the problem of isolated research questions in design research based on real-life projects with many interrelated factors developing over time. As the main question, and even the main interest in participation in design research often unfolds throughout the design process, it is difficult to define this interest upfront and in isolation (see also Goldschmidt & Matthews, 2022). In addition, the participation of the researcher brings a richness necessary to understand and unravel the complex challenges that design research is tackling (for examples, see, amongst others Agid, 2018 and Hendriks et al., 2018, both in the 2018 *Design Studies* special issue on Participatory Design). As a result, participation in design research has become deeply embedded in society and in societal challenges. Thus, while researchers who study the ‘*design profession*’ or ‘*the design team*’ can argue that an outsider perspective is possible, researchers who study the design process in wider collaborations or in society at large are themselves part of the phenomena that they study. For this latter group of researchers, the object of design has become so broad that the design researcher’s own perspective must become part of the studied design processes, to clarify how ‘design’ is understood in a specific complex situation.

Despite the popularity of design researchers participating in design and innovation projects, most design researchers mainly observe and report how others design. In those cases, the design researchers often use some variation of grounded theory (Glaser & Strauss, 1967) while acting as a ‘fly on the wall’. In order to develop theories and methodology for design, they interview participants and/or observe participants of a design process in (real-life) action (e.g. the Delft Protocol Studies described by Akin & Lin, 1995). In this context, the participation of the researchers themselves is limited to interpreting the actions of others through interviewing and observing. This fly on the wall participation served design research in addressing what design, designing and design thinking actually entails, and how to teach people who are learning how to design (Tovey, 1989, pp.2). In the 1980s and 1990s, these interests made design researchers move towards a more systematic and generalised understanding of the design process. The need for better theories of design led to research questions such as ‘*what makes someone a design professional?*’, ‘*how do designers think?*’ and ‘*how do designers collaborate?*’. Gradually, more robust research methods were required for studying more precise parts of the design process that could be studied in isolation so that stronger and clearer claims could be made about the nature of design (Cash, 2018, 2020). Illustrative examples

here are protocol studies (see [Purcell & Gero, 1998](#) for an overview), and experiments (see [Jansson & Smith, 1991](#) on Design Fixation). Furthermore, a growing number of design researchers were not practicing (or educated) designers themselves. They had their academic training in neighbouring (often more mature) research fields such as psychology, engineering or business and management. While these developments resulted in the further accumulation of knowledge about design theories, design cognition and design creativity, the rigor of the research methods in design research reduced the level of researcher participation.

Several frameworks have been developed for *practitioners* to clarify the variety of perspectives of participation in design projects (e.g. [Frauenberger et al., 2015](#); [Sanders et al., 2010](#)). However, in this research note, we would like to contribute to a debate about the methodological issues that arise when design *researchers* are doing design (i.e. are actively engaging in the design process itself), in relation to the knowledge that their research produces. (In the literature on action research, this distinction between doing and studying has already been identified as central in participatory research, e.g., [Herr & Anderson, 2005](#)). This debate comprises multiple facets. Even within our small group of authors, we have very different experiences with participation in our projects. Sometimes a participant is a design educator who ‘designs’ with students in a kind of master–apprentice relationship, and reports on that process. Sometimes a participant is involved in the design process by overseeing and directing design projects in a university/industry collaboration. Sometimes participation simply means involving oneself in society and reporting the design challenges that one experiences. And there are many more perspectives, all with their nuanced differences. All this research involves active participatory engagement in the design process, but the chosen methods and outcomes are very different. With this research note, we aim to contribute to the ‘mapping and understanding of developments in design research’ ([Cash et al., 2022](#)) by uncovering different types of *participation in design research*, and their *consequences for knowledge production*.

1 Dimensional analysis

We use Dimensional Analysis ([Kools et al., 1996](#)) to unfold the various dimensions of participation in design research. The method builds on a grounded-theory epistemology for addressing “problems of understanding and credibility” in empirical data ([Schatzman, 1991](#), p. 308) along different ‘dimensions’. It was developed to create a more articulate process for the analytic operations involved in discovering theories (referring to the process of data interpretation that often remains insufficiently explained in grounded-theory). Dimensional Analysis starts from the premise that there are many ways of structuring empirical material, and it is only through repeated experimenting with alternative structures that one achieves an understanding deep

enough to propose a grounded theory. The key process of Dimensional Analysis is to (re)construct the multiple perspectives of a complex phenomenon (Kools et al., 1996). We executed the following steps to do this:

Step 1 Determine an initial dimension.

We started the process by sketching a dimension of ‘researcher role’ between the extremes of ‘fly on the wall’ and ‘main participant’. Would we be able to place all cases we know along such a simple distinction? (see Figure 1).

Step 2 Select cases for the initial dimension.

As empirical data points we selected a wide variety of cases from different design researchers using participation, to question the many ways one might understand ‘participation’ in design research. To this purpose the first author also invited other researchers to bring in cases, to enlarge the variety of cases.

Step 3 Designate new dimensions based on deep discussions about the sample cases.

Not surprisingly, the first dimension in itself was too simple to capture the complexity in the cases, which led to additional dimensions we would explore. For us the method became a way of sharing case experiences and to establish a shared vocabulary while we ordered and named cases along multiple, alternating dimensions. This process allowed for both the specificity of an

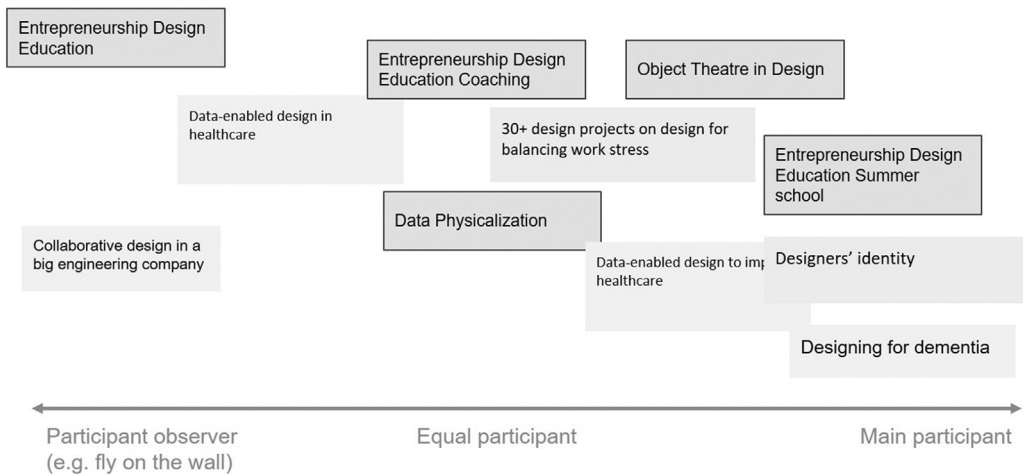


Figure 1 Excerpt from the Dimensional Analysis activity: How would we characterise the role of the researcher in various design research cases? Note: This dimension later became the primary perspective. The cases listed in the figure are described in the text below as explanatory cases for the primary perspective and additional dimensions.

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individual case as well as for comparative exercise. In line with [Schatzman's \(1991\)](#) recommendations, this procedure shares a common principle with grounded theory, later described as a process of constant comparison ([Hallberg, 2006](#)). After recounting twelve different dimensions, our analysis had reached a level of 'critical mass' ([Kools et al., 1996](#)) that was sufficient for constructing an 'explanatory matrix' of participation in design research (that we further developed in Step 4 and 5).

Step 4 Determine and capture the primary perspective that emerged through the Dimensional Analysis.

The primary perspective that emerged from the Dimensional Analysis was that 'various researcher-designer roles contribute differently to scientific knowledge production in participation in design research' (see [Table 1](#)).

Step 5 Designate the other dimensions to act as context, conditions, process or consequences.

As recommended both by [Kools et al. \(1996\)](#) and [Schatzman \(1991\)](#), we investigated how the other dimensions elicited from the analysis might be indicative of the context, conditions, process and consequences of the activity (see [Table 1](#)). In Dimensional Analysis, it is important that both ends of a given dimension have value. Other explored dimensions that are not included in this article were e.g. *the quality of the design work*, for which it became clear in discussion that higher quality is always preferred over lower quality, therefore that dimension is not suitable for a final overview.

Table 1 Overview of perspectives for participation in design research

Primary perspective	<i>The various researcher-designer roles contribute differently to scientific knowledge production in participation in design research.</i> Researcher-designer roles: <i>Is the researcher-designer an participant observer, equal participant or main participant?</i>
Context	While we do not limit the disciplinary field of design in this research note, two salient dimensions will help characterise the design research case: Designing processes, methods and tools or products, services and systems – <i>is the aim of the project to develop new processes, methods and tools or to develop 'products' (in its widest economic definition of something tradeable, including services and systems)?</i> Advancing Design Practice, Advancing Design Education or Advancing Design Research – <i>do the project participants see the main contribution to practice, education or research?</i>
Condition	Directing, Facilitating or Designing – <i>do the researchers frame their participation as that of a director, facilitator, and/or designer?</i> Single Researcher, Single Case vs Many Researchers, Many Cases - <i>How many researcher participants are involved in how many cases?</i>
Process	Method of reporting – <i>In particular, how does the researcher report on their own actions and experiences?</i>
Consequence	Type of knowledge generated – <i>How will the outcome of the research be relevant?</i>

In the following, we will unfold each of the dimensions with project cases to be able to make observations about the consequences for knowledge production. For the primary perspective and all the additional dimensions, we present cases on the extreme ends of the spectrum (and sometimes in the middle of the spectrum). One might find their own cases to be positioned all over the spectrum, with more nuances.

2 Primary perspective: researcher-designer roles

The main perspective characterises the kind of involvement of the researcher in the design project. This is labeled from the participant observer, via equal participant to main participant (Figure 2).

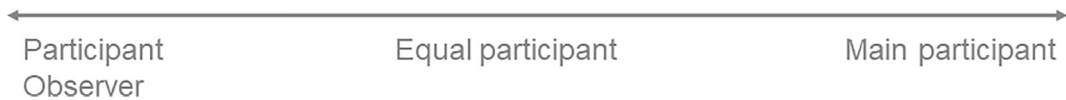


Figure 2 The primary perspective describes if the designer/researcher role is that of a participant observer, equal participant or main participant

The participant observer perspective is widely used and accepted in design research. As described in the introduction, the researcher in this perspective is mostly ‘a fly on the wall’ and is limited to *interpreting the actions of others*. Knowledge is generated by making sense of what others do. However, other researchers participate in different ways, which is the focus of this research note.

An example of an equal participant is the work of [van Oorschot \(2018\)](#). Van Oorschot explores how entrepreneurship education can be understood as a design activity in social interaction between people, using Quality of Conversation ([Buur & Larsen, 2010](#)) as a research lens. The research setting is a number of coaching sessions where van Oorschot and other educators interact with students. In collaboration, educators and students develop the business ideas and plans for the startup of the students. Although the main actors in this setting are the students, and they design the business plan, van Oorschot uses three sources of data for his analyses. First, the reflective reports of the students, reflecting what happened from their perspective in the coaching session. Second, the reflections of van Oorschot himself, combined with the reflections of the other teachers. Third, the transcripts of what was said by all participants (including van Oorschot) during the coaching sessions. By combining these three sources of data, the participation of the researcher becomes an explicit part of the analysis - as important as the actions of the students in the dataset.

In comparison, the researcher can also act as the main participant. An example is the work of [ten Bhömer \(2016\)](#). Ten Bhömer is an interaction designer by

training who was interested in how he could create desirable applications with ‘close-to-the-body technology’ using an embodied and co-creation approach. Co-reflections on encounters with stakeholders formed a source of inspiration for ten Bhömer’s own ideation process, leading to new and more detailed prototypes that formed the input for a new cycle of co-reflections. Having a first-hand perspective on the collaborative design process supported an integral understanding of the function of prototypes during several parts of the design process. Ten Bhömer could remember his breakthrough insights from collaborations while making and reflecting on the prototypes. In his design work, he could reflect on his initial intentions, the outcomes, and on the gap between these two in relation to his actions and the input of others. In a thinking-aloud study or observational research this could not have been achieved since these aspects will stay fragmented, and require interpretations that may not be supportive of an integrated design outcome.

2.1 Context: processes, methods and tools vs products, services and systems

There is variation in researcher participation in terms of the object of design, or what it is that is ‘designed’. On the one hand, researchers participate in the design of processes, methods and tools that then in turn should help others to improve their design (process). On the other hand, there are researchers who directly participate in designing products, services and systems themselves (Figure 3). Methods, tools, products and services as outcome of research and the knowledge it generates is described extensively in *Research through Design* (for an overview, see [Stappers and Giaccardi \(2017\)](#), for recommendations on quality in Research through Design, see [Prochner and Godin \(2022\)](#)).



Figure 3 This context dimension asks if the designer/researcher ‘designs’ processes, methods or tools vs. products, services or systems

An example of designing methods and tools is the work of Ryöppy on Object Theatre in Design. Ryöppy staged a number of design explorations in running design projects and projects initiated by herself with design students and research colleagues. She investigated how object theatre traditions might change designers’ perspectives on the ‘things’ they are designing. In the process, she adapted object theatre exercises to design and developed new methods. For instance, ‘object interviews’ as a way of enhancing ethnographic studies ([Ryöppy et al., 2018](#)), ‘object cemetery’ to encourage shared vision forming in a team ([Ryöppy, 2020](#)), and ‘data objects’ as a method to make self-tracking explicit. The development of methods and tools requires quite extensive control of the entire design process. For this reason, the validity of

the methods hinges on the explicit discussion of the project context and limitations in their degree of generalisability.

An example of designing products and services is a project aimed at researching the degree of control service designers have over the behaviour of users (and other people) involved in new services (Snelders et al., 2014). The area of application was mental health and work-related stress. Project work consisted of student projects carried out with industry, with some of the student projects leading to larger demonstrator prototypes created by one of the industry partners in collaboration with two design agencies. Participation was focused on learning about the role of design in services, based on qualities of executed designs. For instance, one student design ('Little Devil' by Rhys Duindam) used a convincing combination of neutral feedback and negative reinforcement to counter work-related stress, thus showing how different approaches to behaviour control can coexist in a single design, and how the decision on those approaches became a designable in itself. The larger demonstrator models that were created with industry were exhibited at a design fair and in a hospital, and then permanently placed at a health institution where it was used by the institution's work staff, and also used for further research on work-related stress. The designs were analysed only as artefacts; the underlying design process, methods or tools that led to the design played little role in the conclusions.

2.2 Context: advancing design practice, advancing design education or advancing design research

The cases described above, already illustrate that participation often means that the project is in collaboration with external stakeholders. In some cases the primary interest is to advance the design practice of the stakeholders, either in practice or in education, while in other cases the interest to advance design theory comes first and the added benefit to a wider audience is secondary (Figure 4).



Figure 4 This context dimension investigates if the designer/researcher participation is advancing design practice, education or theory

The following is an example where the researchers are regarded by stakeholders as a strong collaborator to advance design practice. Price et al. (2019) describe 10 years of highly impactful design work they did with the aviation industry (through 75 MSc thesis projects and 7 PhD projects). They describe how, designing 1) integrated products, 2) services, process and interactions, and 3) systems and organization, advanced industry practices through

design. Their work resulted in a framework to better ‘describe a collaboration that has taken place or is occurring, and to generate new collaborations with industry’ (Price et al., 2019: p 319). Participation in this case meant to be deeply emerged in the context to allow for strong collaboration. The knowledge that is built up can be transferred to other practice domains. In this case, the first follow up project is the retail industry, where design practice can be advanced using what was learned in the first context.

Collaboration is not always with industry, as the work of Baha et al. (2018; 2020) illustrates. Baha coached and consulted design students to uncover how their design work reflected on their identity as a designer, and their principles for designing. The two publications report on his work with students, who themselves also co-authored these publications. In this process, Baha researched both the students and his own consultant role and the students themselves consulted Baha’s research. The knowledge created in these situations advanced the educational practices of Baha and the students he collaborated with, but are also insightful for the design education domain in general.

For both cases above, the main aim in collaboration is to strengthen the relation between researchers and collaborators, there is a focus on situated knowledge creation for both parties. Therefore the academic knowledge creation might be limited, while the work advances design practice and education immensely.

In contrast, even though a project is in collaboration with industry, the purpose of the project can be mainly to advance a better understanding of design. This was true, for example, in the work of the CRISP-GRIP subproject reported by Snelders et al. (2014) above, where industry and student projects were first and foremost driven by a research question about the degree of control designers could or should seek over the behaviour of users and providers in service design. At the end of this project there may have been a few spin-offs from this research in terms of patents and commercial services, but none of these were sought after by the researchers, and (likely by chance) all of these related to other application areas than work-related stress, the research area of the subproject.

2.3 Condition: from directing to facilitating to designing

When participating in design projects, the researcher is not necessarily the one who ‘designs’. The researcher might have a facilitating role, or a directing role, where the researcher oversees and plans design activities (often from an academic perspective) (Figure 5).



Figure 5 The condition dimension examines if the participation of the designer/researcher is in directing, facilitating or designing

An example of a project where the researcher has a directing role is the work of Snelders between 2011 and 2015 as principal investigator in the above-mentioned project on work-related stress. In all subprojects, Snelders acted as a director of research, with a responsibility for setting up design briefs for projects where he and other researchers participated in (either through student supervision or as head of a design team that would operate outside an education setting). The main researcher role for Snelders was that of deciding, guiding, and reflecting on all design subprojects (about 35 in total). Over a four year period there were learnings from previous projects that translated into proposals for new projects (and new collaborations with industry partners). Each time, a core underlying question was explored and reflected upon, about the degree of control designers could or should seek over the behaviour of users and providers in service designs for countering work related stress. His work did not entail any role of a design practitioner in terms of making or creating new solutions, although as supervisor he was involved in deciding on creative directions, and (re)framing and reflecting on creative solutions. The researcher role here can best be described as that of someone who aims to learn from his participation in the design projects he was supervising, either as educator or manager. The knowledge that Snelders can report from his participation (as in [Snelders et al., 2014](#)) is therefore mainly on a managerial level.

Mosleh's research is an example of studying design in a facilitating role ([Mosleh, 2019](#)). Mosleh was part of an ERASMUS + Knowledge Alliance on teaching innovation to corporations struggling to develop new practices. She facilitated workshops and interventions in corporations, using tangible artefacts and theatre methods. Her interventions led her to suggest a nuanced understanding of the role of artefacts, when used by facilitators to further their own or other's agendas in design workshops ([Mosleh, 2017](#)). Prominently, she achieved a deep insight into the collaboration between designers and engineers in one development department of a large manufacturing firm. On this, she reported both through ethnographic accounts and auto-ethnographic narratives. Based on the theory of complex responsive processes of relating, she also enriched the conceptual understanding of participation in the Participatory Design field ([Mosleh & Larsen, 2020](#)). The contributions rest on a facilitator's vantage point.

The research of Laurens Boer on *Provotyping* may serve to unfold characteristics of design research where the researcher takes a primary role of designer ([Boer, 2012](#)). In a project on indoor climate controls with five industrial partners, Boer designed a series of provocative prototypes (provotypes) in order to challenge the partners to think about their products in a broader light of often unexpected user practices. His provotypes were deployed with both companies and users for longer periods to elicit reactions. Because Boer was in full control of the design parameters of the provotypes, he could make significant

a student perspective. He reported daily on his experiences in a diary and later used auto-ethnographic writing to make sense of his experiences on a deep and uncompromised personal level, connected to design and entrepreneurship theory.

A clear example on the other end of the spectrum is the above mentioned work of [Price et al. \(2019\)](#). Their participation in 82 projects contained many designers and researchers. As a result, they were able to contribute to design knowledge on a higher level of abstraction. A single experience in a single project is ‘compensated’ by experiences in other projects. The deep insights as described by van Oorschot might have got lost in the reporting process, but as a consequence they were able to generalize their findings and also transfer their design insights and knowledge across many different projects, and potentially also across different domains.

2.5 Process: method of reporting

Participation of the researcher in the design project still means that the participation can be reported on in different ways. For this dimension, we present some consideration from theory on methodology, instead of providing exemplary cases from our own experience, since it provides more concrete starting points for researchers to implement the method of reporting in their research practice ([Figure 7](#)).



Figure 7 The process dimension determines if the research is reported through a case study or through auto-ethnography

The case study side of this dimension contains all the cases where participation of the researcher is considered as *necessary to interpret the data*. The researchers acknowledge that their participation has influenced the project at hand, and this is then ‘compensated’ by, for example, multiple or team-based coding of data (e.g. [MacQueen et al., 1998](#); for an illustrative example in design research see [Kleinsmann et al., 2017](#)). Participation still provides a richness but is also checked by other, non-participating researchers in the aim for a more objective and rigorous outcome.

Researchers on the right tail-end of this dimension are reporting exclusively on their own experience in a social context, mostly using auto-ethnography as a method. The main strength of auto-ethnographic research is to provide insights that cannot (or only with difficulty) be obtained by observation or interviewing participants ([Ellis & Bochner, 2000](#)). [Anderson \(2006\)](#) coined ‘analytic auto-ethnography’ referring to situations where the researcher is ‘(1) a full member in the research group or setting, (2) visible as such a member in

published texts, and (3) committed to developing theoretical understandings of broader social phenomena' (Anderson, 2006, p. 373). Chang (2016) builds on Van Maanen (1988) to explain that auto-ethnographic texts are constructed of 'field texts' which are in turn (a combination of) of one of three kinds of 'tales' (as Van Maanen calls them):

- 1) **Realist tales.** A detailed description of an event. For the design researchers this means to describe the details of the event that are not captured by interviews, recordings, pictures etc. The fact that the researchers were present at the event ensures that they can capture or recall these details, which in turn might lead to new insights.
- 2) **Confessional tales.** The researchers explore how their personal biases, character flaws or bad habits impacted practices (like a design process). Researchers are in the perfect position to have a deep look inside themselves to these influences and see how and why they would also apply to others.
- 3) **Impressionist tales.** These highlight rare and memorable moments in the design process. The writer *intuitively* feels that a moment is interesting and aims to unpack *why* this was interesting. In contrast to realistic tales, the aim is to go deeper into the *why* instead of the who, what, how, when and where.

In practice, a field text often has elements of all three tales. It is through writing and rewriting that the research contribution becomes clear. It is by linking the field texts to existing literature on the topic at hand that auto ethnographic texts are then created (for a detailed description of this process, see Chang, 2016).

In auto-ethnography the aim is to uncover what was previously covered, or even covered up. For this reason, there is no preset research question or agenda based on expectations. This is the key strength, since the method allows to explore those elements that are highly influential in the design process but would not surface in a more traditional research setting where the aim is set up front.

2.6 Consequence: type of knowledge

Finally, we address if the consequence of the knowledge produced is externally or internally relevant (Figure 8).



Figure 8 The consequence dimension investigates if the research knowledge has external or internal consequences

In most cases described above, the knowledge produced by the participating researchers primarily serves an instrumental function, targeting knowledge consequences external to the researchers themselves. The knowledge addresses e.g. industry collaboration (Price et al., 2019), education and student experience (Baha et al., 2018, 2020; van Oorschot, 2018), various uses of prototypes (Boer, 2012; Kleinsmann & ten Bhömer, 2020; ten Bhömer, 2016), or method development (Ryöppy, 2020). In those cases, researcher participation was helpful in uncovering knowledge that would likely have been missed by only observing the context. These cases are also representative of how design research tends to understand the contribution of participation for knowledge production (See also Schön's (1983) work on designers' reflective practice).

In contrast, there might also be internalised (and internally mediated) consequences of participation in design research: how did participation have an impact on the researcher? This perspective has not been explored much in design research, but has a long tradition in sociology under the heading of reflexivity (e.g. Giddens, 1990) and the broader field of symbolic interactionism (e.g. Holmes, 2010). This tradition stresses how social participation can lead to a process of self-renewal (for examples in studies of leadership, see Kempster & Stewart, 2010; or in queer studies, see Adams & Holman Jones, 2011; McDonald, 2016). With respect to participation in design research, the initial insight is more likely internal, changing the perception and identity of the designer/researcher based on what was experienced throughout the project. Participatory research on an internalised identity leans on auto-ethnography, based on research introspection. Taking this methodology to design, Xue and Desmet (2019) argue for the academic value of such introspection, and argue that its underlying process is different from reflective practice (Schön, 1983), where reflections can also be self-referential, but more directly serving a function in connection to some externalised consequence in a design process (see Xue & Desmet, 2019 for a overview of different approaches of introspection).

We do not know of participatory design research where such reflexive, internalised knowledge has been put central stage, although we sense that in some famous publications introspection and self-identity work clearly must have taken place (e.g., Andreasen, 2011; Bucciarelli, 1984). In the design research cases that we discussed above, we can also confirm that our work had internalised consequences, where researchers understood themselves better as coach, educator, maker, curator, or academic, but also as a team player, someone with particular issues, or merely a friend or colleague.

We also note that for research carried out by junior (student) researchers, issues of growth and development are often highlighted, and students are often explicitly asked to reflect how their work made them a better designer or researcher and how it supported or developed their research identity and interests. In reporting on participating with others in design processes, the need for sharing

personal development issues should not be considered as something private, or - the reverse - as substantiating what [Manzini \(2016\)](#) called *big-ego design*. Internalised consequences can also be explored as a knowledge contribution, in that it helps researchers to account for the subjectivity inherent to their chosen approach more meaningfully. We feel this could be especially fruitful in fields where design processes easily connect to the identity work of participant designers and researchers (e.g. in inclusive design, transition design, design and entrepreneurship or design for health). Therefore, we would like to argue for a greater openness about knowledge production in participation in design research based on the internalised consequences of the research.

3 Summary: the quality of different kinds of participation for knowledge production

The seven dimensions illustrate that different participation practices in design research contribute to knowledge in different ways. Where [Table 1](#) provides an overview of the different dimensions of how researchers can *position themselves in participation*, [Table 2](#) provides an overview of how these different dimensions *may contribute to knowledge production*.

Table 2 Overview of how different dimensions of participation in design research can contribute to knowledge production

Primary perspective	<p>Researcher-designer roles: <i>For an audience to assess the quality of participatory design research, the role of the researcher in the design process under study must be explained with a clear description of how different data types were acquired.</i></p>
Context	<p>Designing processes, methods and tools or products, services and systems: <i>While the researcher may act as 'designer' both in the case of designing new products, services and systems and in the case of developing new processes, methods and tools, arguments for the quality of either are dependent on the embodiment of the knowledge.</i></p> <p>Advancing design practice or advancing design research: <i>The quality of contributions to practice is gauged on direct applicability in practice or in education whereas knowledge contributions are assessed through scientific argumentation in relation to a state-of-the-art.</i></p>
Condition	<p>Directing, facilitating or designing: <i>The task description of the participant researcher, while affording a deep personal experience, also limits the vantage point from which knowledge is generated. Quality rests on transparency about the task description and what exactly the participatory experience contributed to.</i></p> <p>Single Researcher, single case vs Many researchers, many cases: <i>Single researcher, single case projects have the potential to contribute a new, uncompromised perspective, while multiple researchers, multiple cases projects can provide a more balanced and generalisable contribution.</i></p>
Process	<p>Method of reporting: <i>Scientific knowledge contributions rely on a trustworthy interpretation of observations. While auto-ethnographic 'tales' may be contested as scientific knowledge contributions, the genuine experiences of research participation richness may not be conveyable otherwise. Quality rests on a balanced, well-argued combination of reporting context and conditions, and an integration/contestation of relevant theory.</i></p>
Consequence	<p>Type of knowledge: <i>While most participatory research contributes to general phenomena in design, the contribution can also be through introspection, with internalised consequences for oneself as an initial result.</i></p>

Figure 9 illustrates how all dimensions come together in the above described CRISP-GRIP project of Snelders in the area of service design. Snelders takes up a role of (1) an equal participant, in a project where the focus is on (2) designing products, but also some new methods and processes were created. The project has a focus on (3) advancing design theory and Snelders has a (4) directing role. In Snelders et al. (2014), he reports on (5) many cases carried out by a variety of researchers (although not as many cases and researchers as in e.g. the work of Price et al. (2019) described above). In the reporting process, Snelders mainly describes the work of others via (6) case studies that have (7) external consequences for knowledge production in the domain of service design.

Mapping a research project on all dimensions illustrates that participation can be relevant in many areas of design research. We invite researchers to map, together with fellow researchers and other stakeholders, how they understand (or could understand) participation in their specific design and research context at the start of a project. There is not one specific research approach that fits a specifically defined context, based on *if this, then that* actionability. However, having a comprehensive overview of the kind of participation and the kind of expected knowledge production of a specific project will guide researchers to make sense of their projects in relation to projects with the same, or opposing, characteristics.

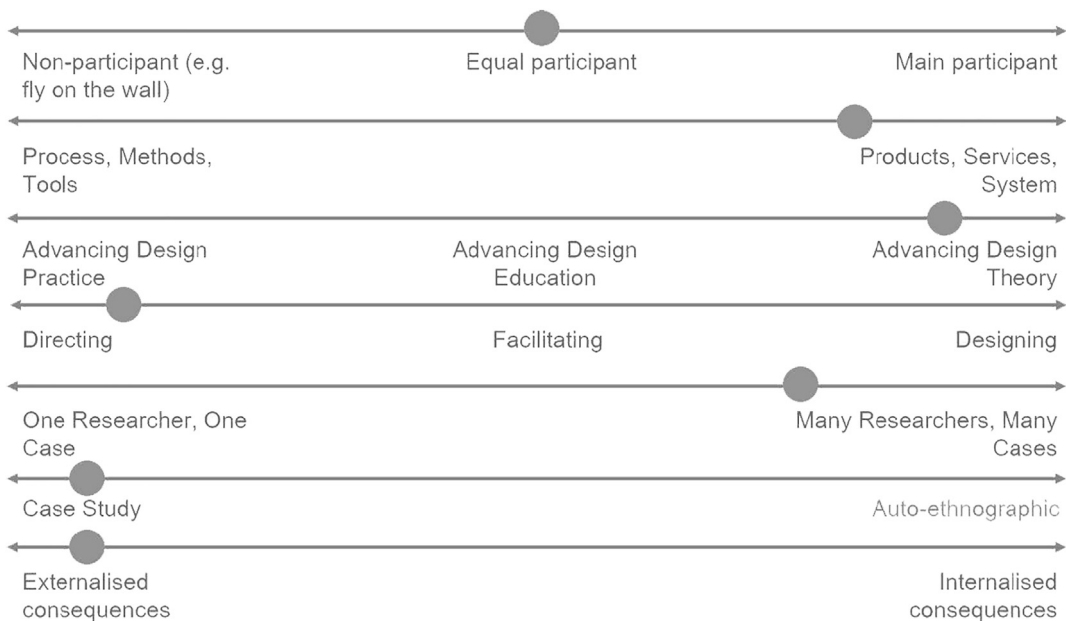


Figure 9 A mapping of the different dimensions of the work of Snelders et al. (2014)

Participation in design

4 Conclusion and discussion

In order to fully understand the roles and contributions of design in complex settings, it can be necessary to *participate* in design processes rather than only observing them from the outside. This paper aims to characterise how participation in design research can contribute to knowledge production. We think that the related, overarching methodological issues should be addressed because design is currently applied in multiple contexts and to multiple complex challenges.

Since participation is an ambiguous concept in itself with very different meanings, we applied a Dimensional Analysis to establish an overview on how participation in design research can be classified in terms of 1) the researcher-designer role, 2) the aim of the project, 3) the main contribution, 4) the activities of the researcher, 5) if it is a single or multi-case study, 6) the scientific reporting on the project, and 7) kind of knowledge produced. This overview, colored with rich case examples with a description of how different data types were acquired, could assist other design researchers in establishing and communicating their research strategies, depending on context, conditions, and a type of knowledge production that they seek.

We are already finding that this overview is helpful in setting up and carrying out participatory design research projects by our students in education. At the same time, we are aware that the proposed dimensions are influenced by our own experience, and that they are based on a selection of cases that is not exhaustive. Therefore the dimensions might be expanded and/or modified in the future, and we invite other researchers to do so and enrich our analysis. Another limitation we came to realise during our analysis is that not all aspects of researcher participation can be put on a dimensional scale with a valuable spectrum. An example would be the level of design and/or research experience. While more experience seems preferable, it cannot imply that participatory research is unsuitable for junior designers and/or researchers. Their advantage could be a fresh perspective on things, even if they have to put in the extra effort in finding meaningful ways to participate in design projects and find new knowledge.

The presented dimensions cover a broad spectrum of participation in design research. With seven dimensions, some with two extremes and some with multiple positions, there are hundreds of distinct ‘profiles’ for positioning oneself as a design researcher in participation. Still, particular combinations of dimensions might be dominant for specific types of design research projects, or specific motivations of researchers. The dimensions support in building up a better understanding of the characteristics, similarities and differences of participatory projects which is useful for researchers, reviewers, editors and other (non-academic) stakeholders to evaluate what type of knowledge a

project could generate. By providing this type of guidance we hope to avoid that these dimensions will be misused for identifying ‘right’ and ‘wrong’ types of participation.

The dimensions could also support researchers to reflect on the question: *‘Is what I am doing in this design/research project academically viable?’* We realise that not all participation in design research is suitable to be reported on academically, and it requires a critical view on one’s own work that is sometimes lacking. A freedom in methodological choices does not absolve academic design researchers from relating their choices to their (initial and subsequent) research questions, and to provide a full account of what knowledge they aim to produce and how to achieve this. Our proposed dimensions can assist in deciding and explaining how the researcher’s own participation in designing led to insights and effective knowledge production, leading to a more structurally transparent methodology. Furthermore, our overview might also help design researchers to develop their roles in collaborative projects. For example, in university/company collaborations multiple forms of participation co-occur among participants. One could use the dimensions to discuss these different forms of participation to manage roles and expectations among partners. A company might, for example, be more interested in developing a product or service while the main interest of a researcher could be to develop a new design process. Explicating and capturing collaborator roles on the dimensions could support a better understanding of how participation in design research itself is initiated and further developed. Such processes are currently underexplored in the literature, while they are highly relevant. Getting a better understanding of the establishment and distribution of roles among partners in research collaboration will help to better connect different forms of participation to more specific types of research questions. This connection will not only depend on the participatory role of the design researcher, but also on the types of participation of the other participants. The provided dimensions could guide this process of making partners in a participatory design research project more aware of their roles and relationships.

Finally, with this paper we also hope to spread our enthusiasm about doing high-quality participation in design research, and to profess an openness to a wide variety of motives for doing so. Participating in design projects can be an enjoyable part of doing research, generating unique and valuable knowledge that cannot be produced through other research methods.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Notes

1. Throughout the article, we use the term participatory design, referring to both participatory design and participatory innovation. We understand participatory design as the design (in its broadest definition) process of designers, users and other co-creators, and participatory innovation addressing the challenges of implementing such practices in organisations.

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