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Successful Participatory Design with Children

Abstract

In this study I presented findings made from previous research regarding participatory design and children. Human computer interaction field has long led the discussion around participatory design method; hence it has been implied into different participating groups such like children. Technology gives possibilities for user, and it has invaded almost everyone's daily lives. Children are a minor user group and for adults working in the professional titles, motivation to empower children to participate in the design process of creating new technologies needs to be highlighted.

Many principles, methods and approaches to participatory design exist and children can be part of the design process through multiple roles. Yet, it needs to be taken into consideration that not all techniques of participatory design that fit for adult participants fit the need of children. In this literature review scientific articles are gathered to find out good practises and methods that help empower children as participants.

Keywords
Participatory design, Children, Ethics

Contents

1.   Introduction

Participatory design has been around roughly since the year 1970; first found in Scandinavia. First projects differed by emphasis but highlighted the cooperation between local unions, focusing on what it meant to have computers at workplace (Bødker & Kyng, 2018). Participatory design also known as PD is a broad term, which in the field of Human Computer Interaction (HCI) specifies it as involving the end users as information givers in the design of technology (Read et al., 2014). While the history goes back in decades, PD methods are still quite new in the field of information technology and are constantly becoming more and more valuable for designers. Participatory design originally was all about the possibilities and alternatives equally as much as it was about figuring out a specific solution to a problem (Bødker & Kyng, 2018).

Technology has invaded to the daily lives of everyone, and user groups from young children to older adults are using technology almost daily in one form or another. One can login with a phone to shop in a local grocery store online to fill in a shopping list and one might use technology without even realising it while entering a building with a key card. The possibilities are simply limitless, technology is integrated to our lives seamlessly. Children being one of the minority user groups that is actively influenced by the technology solutions it uses, use it almost daily e.g., in schools, thus it should be highlighted to give this group a voice to influence to the development process of these solutions. How to harness the imagination and ideas from this minor user group and form a working solution for them is a skill testing issue discussed in the research field of HCI, though it still welcomes more detailed and practical solutions by researchers.

1.1 Motivation

Children are a user group of their own, and this should be considered when designing products for them. Children have their own dislikes, likes, needs and curiosities which diverse from their parents or teachers. This may seem obvious but designers who are producing the new technologies for children can sometimes forget children not being just "short adults". (Druin, 2002) This is often highlighted in the literature which is discussing the way children can be empowered through the design of technology. Different design theories suitable for the specific needs of children are adapted and adopted by the designer of children`s technologies. (Nesset & Large, 2004) And which user group would be the best to help guide and particularly improve the designs to better fit the needs of children, than children themselves? When children are participating in the participatory design process, children are sighted as the experts in childhood. (Fails et al.,2013) Hence at the same time participatory is not entirely a new concept to the field of human computer interaction, there is still room for more research on this area regarding children and participatory design. It has become clear that children's dislikes, likes, needs, and wants regarding technology become more and more sophisticated, and thereby children need to be involved in the design process in a significant way.

1.2 Research Problem and Research Question

Aim of this literature review is to solve the research problem: "How to do participatory design successfully with children?" To aid solving this problem I am going to answer the research question: "What needs to be considered when children are participants in participatory design process?".

1.3 Research method

This study is produced as a literature review, meaning that no new research is being made but the review is being constructed with important and supporting scientific material including scientific articles and documents that help to answer the research question which help solve the research problem.

The literature used in this literature review was gathered from literature databases. The search started from Google Scholar and continued to further databases such as: Scopus, ACM – Association for Computing Machinery and IEEE Xplore. While the collected literature gathered, the searches developed to more detail. State-of-the-art literature was identified which led to snowballing technique, identifying important and supporting references among the current literature helped to find relevant material.

Search phrases used was: "Participatory design AND children", "participant AND children AND design" and "HCI AND children AND participatory design". Found research was examined in means of what research methods were used and what approach was implemented to make sure the data gathered was filling the standard of quality. Themes of the literature were examined in the light of the research problem to identify better which research question the literature is capable to support and add meaning to. The abstract section was read first to find out if the scientific paper is fitted to the topic of this literature review.

No empirical findings are made in this study, the material used in this literature review is gathered from previous research made in the research area. The current research is used to solidify the ground for further research and to sum up some of the conclusions and findings made in previous research.

1.4 Structure of the thesis

Introduction is the first section; the aim of the first section is to clearly establish the purpose and focus of this literature review. Second section is the main body of this literature review and presents previous research, which is divided into categorized subsections. The third section, discussion, includes summary of the results that help to answer the research question, implications for research and practice, and limitations. Conclusion is the last section; its main purpose is to summarize the findings and make recommendations for future work.

2.   Previous research

This section is presenting the findings and knowledge shared from previous research. In the first section the actual definition of participatory design is tackled by giving a platform of knowledge to comprehend what it is, and what this design approach is capable of. The second section here is continuing with a more detailed approach by focusing on children. Hence, in a way this section is supporting my aim to find an answer to the research question: "What needs to be considered when children are participants in participatory design process". The third and last section is focused on the ethical aspects needed to be considered when children are participants in participatory design.

2.1 Definition of Participatory Design

Participatory design, among other design methods used in the field of HCI (human-computer-interaction), has managed to gather quite the amount of previous research and the volume of the gathered data is rather good. Participatory design, also known as PD, dates back to the year of 1970`s, having its roots in the Scandinavian workplace where the first projects conducted happened in the workplaces where the first computers were deployed (Bødker & Kyng, 2018). In the beginning, participatory design highlighted the workers control over their lives and work (Nesset & Large, 2004). The tradition of Scandinavian participatory design has its roots in the critical research tradition and the Scandinavian trade union projects, emerged from negative critique workers had about the impact of new technologies. Hence giving workers real influence on their working condition it combined the values of work life quality and designing for skilled workers. (Iversen & Smith, 2012)

In its fundamental meaning participatory design is an overreaching methodology which involves end-users in the design process of a technology (Walsh et.al., 2013). In means, there is a shift between extrinsic roles to intrinsic roles in participatory design (Nesset & Large, 2004). Meaning that e.g., an observer can shift to as peer co-designer. How to facilitate direct collaboration between designers and users in codesign processes to engage with everyday issues regarding use, through technology is the focus of most present-day participatory design. However, in the times when participatory design was first introduced to the field, it was concerning alternatives and future possibilities equally as much as it was about specific solutions to specific issues (Bødker & Kyng, 2018).

Categorized as user-cantered design, participatory design is focusing on finding the tacit knowledge from the user and combining it with the professional's abstract, more analytical knowledge. Tacit knowledge is the undiscovered knowledge that the user might have while using technology, describing, and formalizing the tacit knowledge typically is difficult and thus it is easy to be ignored by the theory of cognition (Spinuzzi, 2005). An example of tacit knowledge could be the skill to know how to draw, it is knowledge which can be known without being able to articulate it. On the flip side of the knowledge is the explicit knowledge which can be found as concrete and easy to learn knowledge that is also easy to teach to someone else (Spinuzzi,2005). Manuals can be seen as an example of the explicit knowledge.

Being the heart of participatory design, participants are being involved in the design process with a set of participatory design practices and theories. The core characteristics of participatory design, despite the different strands of it, is to make it possible to

participate in the design process as a user, improve their quality of life during leisure or work, and grant the users a voice in decision-making. (Schepers et al.,2018) Spinuzzi (2005) identifies three stages that are presented in most of the work made regarding participatory design, these being: first investigation of work process of discovery and prototyping. First of these three, first investigation of work, discusses the familiarizing process to the ways designers and participants are going to work together. The investigation includes both the technology being used and the work procedures and workflows, teamwork, and routines. Thus, in a way all aspects of the work are explored before moving on to the second stage. Second stage is the process of discovery, here the users and designers use multiple techniques to comprehend and prioritize work organizations and imagine the future workplace. Usually involving multiple users, this stage is clarifying the goals and values of the users to come up with a desired outcome of the design project. Last stage is prototyping, where users and designers are iteratively moulding the technological artifacts to suit the envisioned workplace that was made in Stage 2. (Spinuzzi, 2005) Since cooperative prototyping includes growing user participation and by promoting cooperative communication support mutual learning, prototyping is an integral part of participatory design methodology (Nesset & Large, 2004).

A different kind of an approach to discussing participatory design is being made in the scientific paper of Sanders et al. (2010): "A Framework for Organizing the Tools and Techniques of Participatory Design" where they are focusing on organizing the multiple different tools, methods, and techniques used in participatory design process. Motivating that as the emerging design practice of participatory design has developed from its first years, there has been little research made regarding which techniques and tools are best to use, to what purpose and when. Sanders et al. (2010) propose a framework for organizing all the different tools and techniques to make the non-designer engage in specific participatory design activities. Three dimensions exist in it, context, form, and purpose. Highlighting that it is in the best interest of designer to understand the context and purpose of tools and techniques and to mould them accordingly (Sanders et al. ,2010).

On top of the dimensions, different variables need to be considered with care when planning the participatory design. These variables can be categorized as group size and composition, face-to-face or on-line, and venue. The first variable discusses the decision that need to be made regarding the participants, are they going to be included as a group or individual, both have their own qualities that can affect the outcome of the project. Face-to-face and on-line describe the amount of time and money needed when conducting the project face-to-face but at the same time it is in the growing interest in practice to conduct more project on-line. As on-line sessions can have limitations to in to what extent they can be used, they are usually more easily reachable all over the world and as new communication technology emerge the amount can grow. Venue is in short, the location where the participatory design happens and it can be almost everywhere, thus usual environment is the participants` own environment. Each venue has its disadvantages and advantages, so precise consideration is needed. (Sanders et al. ,2010)

2.2 Children as participants in participatory design

Druin (2002) presents in the scientistic article:" The Role of Children in the Design of New Technology" different roles a child can take when involved in the design process of creating new technology. The paper goes on to state that no specific role discussed is suitable for all development and research needs but understanding the roles can be very valuable for the design process. (Druin, 2002) And the role of children has been in the

focus of philosophical debate and the scope to which children can participate in significant design activities (Read et al.,2014). In Druin`s work (2002) it is stated that four main roles which children can take in the design process are user, tester, informant, and design partner (Druin, 2002). There is a shift between extrinsic roles to intrinsic roles in participatory design, meaning that e.g., an observer can shift to peer co-designer (Nesset & Large, 2004). Thus, design partner role is the closest one to participatory design. As design partners children are taken as equal stakeholders throughout the whole process of designing new technologies. The role of design partner comes with its challenges and strengths (Druin, 2002).

Unique challenge in this case is that neither the adults nor children are in charge, partners need to negotiate decisions, due to this non-natural role of children not following adults say, the process can take a bit more time than other roles. Difficulties are spotted also in the lack of professionals and researchers who want to work with children as partners. Difficulty lies in the contextual design, benefits versus the drawbacks of the use of untrained participants or professional designers. (Druin,2002) The reluctance of involving children in PD as active participants lies in the professional design community which can have difficulties accepting the notion that children are capable to contribute to the process as true design partners. (Nesset & Large, 2004)

From the children's point of view, the challenge is time management, usually parents need to make time to transportation to the outside school participation and if the partnership continues over year, the children's after school time can be violated (Druin, 2002). Hence, at the same time as the workplace is substituted with the school or home of a child participating, here the enthusiasm and creativity of children flourish with the flexible structure (Nesset & large, 2004).

On top of the challenges and issues spotted, also strengths are identified. Druin (2002) goes on to identify a one-of-a-kind strength from the design partnering experience, it is found from the little time waiting to figure out which decision to pursue. Weekly discussions and feedbacks enable flexible developing activities for designers. For children participating the experience can build confidence socially and academically. Children can also see themselves growing to be more than just a user, feeling that they can make a difference, and learn to work with others and evolve their collaboration and communication skills. (Druin, 2002) And the benefits of mutual learning have long been highlighted by educational techniques (Nesset & Large, 2004).

Read et al. are acknowledging that as participatory design has been researched, little work has been done regarding the fundamentals of participation, in more precisely how children choose to participate and how children's ideas are included and represented (Read et al.,2014) Adding to this, Schepers et al. (2018) mention that in many cases participants cannot see any concrete outcomes of the design process, and outreach could only be valued by the academic community rather than the participants. It has been stated that there should and could be benefits for participants through participatory design. (Schepers et al., 2018) In their work Read et al. (2014) highlight the concerns about the ethics of participatory design and children among the context of information needed to consent. In their quantitative study including 84 children they evaluate the TRAck Method. TRAck method is short for tracking, representing, and acknowledging, presented as a process to meet the need to make children understand participation in participatory design. Central aspect of this is to guide children to understand how their design ideas are used in the process. (Read et al.,2014)

Children are facing issues sometimes verbalizing their thoughts, especially things which deal with abstract actions and concepts (Nesset & Large, 2004). Read et al. (2014) describe the TRAck Method as being a supporting representation and tracking of ideas in the participatory design session. The presented case study showed that the research team was able to document how every idea had been considered and made it possible to represent ideas from four different groups to a single design brief, with the use of TRAck. Thus, TRAck supports a more ethical and inclusive approach to participatory design with children. TRAck allowed children gain more information so that their consent could be more significant by promoting presentative and inclusive participation. (Read et al., 2014)

While Nesset & Large (2004) state that the principles of participatory design best suit the design project which includes children (Nesset & Large, 2004). Iversen et al. (2017) promote a new role for children to take while participants in participatory design, the role of protagonist in their paper: "Child as Protagonist: Expanding the Role of Children in Participatory Design", the change due to the new role is illustrated with a case study. Concept of design protagonist suggested, extends the concern to empower children to critically reflect on technology, develop it and act upon it. The role has both practical and epistemological consequences. In terms of practice the process of PD is redesigned and underline the need to create ownership and legitimacy in the process. Epistemologically, emphasis is on the skills, insight and stance that children develop as participants, and it is underlined to frame these as objectives of the participatory work. (Iversen et al.,2017)

Walsh et al. (2013) present a framework in their qualitative research by implementing the framework FACIT PD, which stand for Framework for Analysis and Creation of Intergenerational Techniques for Participatory Design, into three study cases. The framework aims at guiding designers to choose the right design technique or develop a new one regardless the stage of design cycle, philosophical approach to design method or the technology being developed. It is found that by using the framework new directions for design and for the development of new technology are provided. Stating that techniques should be interactive, fun, provide an alternative communication method for children, applicable for wider audiences and lastly, enable adults an opportunity to learn and listen from children. Older techniques should not be eliminated; however, researchers and developers should consider modifications and a framework for future development of design techniques for children. (Walsh et al.,2013)

Continuing with the importance of fun, Schepers et al. (2018) reflect on a case study "Making Things!" by exploring fun as a user gain in their qualitative article: "Fun as a User Gain in Participatory Design Processes involving Children: a Case Study". The research is focusing on the children`s user gains in the participatory design process as it is overall unexplored. Findings propose that fun in itself can be seen as a user gain in a rather direct way, by highlighting the fun that children had when overcoming challenges, interacting with each other and experimenting. Sense of self-esteem was developed when children overcame challenges and felt proud of their own persistence and skills. And as the children where daring to step out of the comfort zone and interacting with each other fun was experience through these performances. Yet as a user gain in participatory design, fun is not always straightforward, as conditions of flow are closely connected to the experienced fun, it is seen that when participatory design activities demand effort which matched to their capabilities children expressed to experience fun. (Schepers et al.,2018)

2.3 Children and Ethics

In the year 1989 a "Convention on the Rights of the Child" was published by the U.N. General Assembly and in it, it is stated that everyone under the age 18 are to be considered as children. Children should have the right to knowledge and the right to express his or her own views freely regarding all of the matters affecting the child. On top of this children shall have the right to freedom of expression. This being the right to freely impart and receive, and seek ideas and information of all kinds, no matter the frontier, either in print or in writing, orally, through art or any other media which the child chooses. (UNG Assembly, 1989) The right stated here from the Assembly (1989) greatly support the ideas behind participatory design idea of empowering children.

Ethical questions, which are not always discussed in standard ethics reviews, arise when working with children during participatory design. In a qualitative article from Read et al. (2013): "CHECk: A Tool to Inform and Encourage Ethical Practice in Participatory Design with Children" a tool to explore the best way to describe the activities of design process so that children can better consent to participate and critically evaluate the reasons for including children in design, is presented. (Read et al., 2013) Similarly the qualitative article from Bratteteig & Wagner (2016): "Unpacking the Notion of Participation in Participatory Design" mentions that one of the biggest ethical challenges in participatory design, is the differences in the status and power between adults and children. (Bratteteig & Wagner, 2016) The interaction between adult and children and possible supporting factors to equitable interaction are also presented in the qualitative article from Yip et al. (2017): "Examining adult-child interactions in intergenerational participatory design" (Yip et al.,2017).

From these studies, certain ethical considerations can be gathered to highlight the need of ethics while working with children. Read et al. (2013) present a case study issuing the importance of hand washing routine, basing the study in Uganda, Africa they implemented the two checklists CHECk1 and CHECk2. Questions from the value checklist CHECk1 challenge the designer to think the appropriateness of children being involved and the appropriateness of the technical solution. For children to better consent the series of questions in CHECk2 are aiming at deeply understanding the design activity to better frame the overall work for children. (Read et al.,2013) The checklists used in the study of Read et al. (2013) can be seen from the Figure 1. In conclusion the whole process of questioning the motivations and values behind the design work helped to determine the two checklists to first with CHECk1 to push the designer to extreme honesty and secondly in CHECk2 to make the research being made understandable for children. (Read et al.,2013)

Yip et al. (2017) argue that an analysis of both designer (adult) and the domain expert (child) is required to better understand the design partnerships. Children being the experts at being children the power balance between adults and children needs to be worked out to make it more balanced so that children can make the most out of participating. Practical implementation to make the participating more equitable are presented to be e.g., wearing casual clothing, sitting together on the ground with children, and eating snacks with the children. (Yip et al.,2017)

CHECk1:
1.
What are we aiming to design and build?
2.
Why (this product)?
3.
What platform / technologies are we planning to use?
4.
Why (this platform / technology)?
5.
Which children will we design with?
6.
Why (with these children)?

CHECk2:
1.
Why are we doing this project?
2.
What do we tell (the children)?
3.
Who is funding the project?
4.
What do we tell (the children)?
5.
What might happen in the long term?
6.
What do we tell (the children)?
7.
What might we publish?
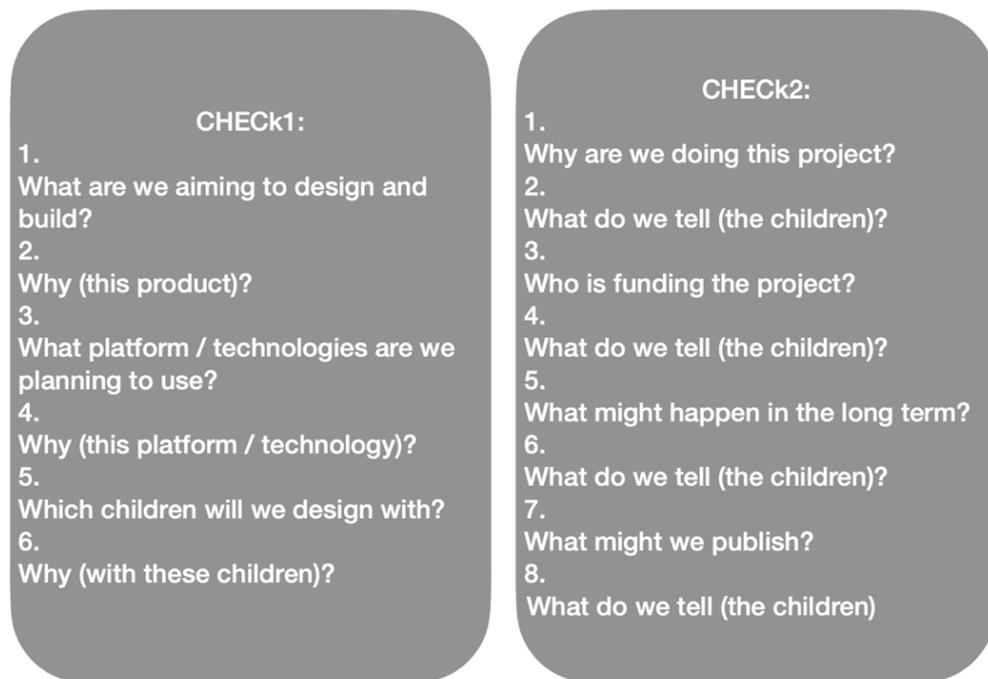8.
What do we tell (the children)

Figure 1 Checklists to consider critically the reason for including children in design projects and how to explain the design activities to get better consent from children to participate (Read et al,2013, pp. 189-191).

3.   Discussion

This section is presenting the important findings made from previous research to answer my research question:" What needs to be considered when children are participants in participatory design process?" in hopes to solve the research problem:" How to do participatory design successfully with children?". After the findings are presented, the section goes forward on discussing the implication for research and practice, and the limitations. The implications present future work which still needs more research in the field on HCI regarding children and participatory design.

3.1   Summary of the results

Reference	Goal	Method	Theoritical Backround	Main Findings	Implication to Practice	Suggestions to Future Research
Druin (2002)	Suggest a framework for understanding the roles of children in the technology design process	Qualitative	Previous research & authors own experience	Children can contribute to the technology design process in many valuable ways.	It can make a difference in what we do in designing new technologies for children.	None
Iversen et al. (2017)	Suggest the role of protagonist for children to deepen the understanding of how to empower them through design	Qualitative	Case Study	Protagonist roles objective is to support the development of skills regarding designing and technology reflection, this support informed decision making among children.	Greating ownership & legitimacy into PD process to make children develope their own skills while being protagonists	None
Nesset & Large (2004)	Review literatue from several theories, usability issues regarding design and children	Literature review	Literature from HCI field	Designers are finding that children have a valuable and complementary role to play in the design process	Children must be involved in the design process	None
Walsh et al. (2013)	Describe FACIT PD framework	Qualitative	Literature from HCI field	The framework provides a means to describe existing techniques & to differentiate techniques and methods	Need to consider a framework for future development&modification of design techniques for children	Developing rechniques for underserved population of children
Schepers et al. (2018)	Explore fun as a user gain	Qualitative	Case Study	Children gain fun from different experiences	More value need to be put into the user gains of children participating	Child as a process designer
Read et al. (2014)	TRAck Method described to help children understand how their design ideas are used	Qualitative	Case Study	TRAck supports a more inclusive and a more ethical approach to PD with children	Researches in IDC should consider how each stage of a PD process can be reported.	Apply TRAck with more unequal groups and to further study the effects on the design process.
Read et al. (2013)	Present a tool: CHECk, to help children make better consent to participate	Qualitative	Case Study	CHECk1 pushes to extreme honesty which is crusial to be honest with children. CHECk2 challenge to make research understood among children	Two checklist to use while doing design work with children	None

Table 1 State of the art references which discuss children in participatory design

State of the art references which discussed children and participatory design are presented in Table 1, the table summarizes the selected references goals, main findings, and implications to practice. On top of this the research method, theoretical background and suggestions to future research are presented to make it possible to identify possible gaps among the current research. This section of the paper is presenting the results, which were drawn from previous research.

When designing the participatory design method, it is in the best interest of the designer to think about the whole experience which the participants are going to go through when participating in it (Sanders et al.,2010). And when children are taking the role of a participant in the participatory design process, unique aspects are brought to discussion. We as adults need to understand why we make a decision on a method while working with children, this is critical, as it can make a difference to what is done when designing new technologies (Druin, 2002). Multiple different methods are being used in the field of

HCI, and children can take multiple different roles when taking part in the design process in one way or another.

However, when considering the venue, precise consideration needs to take place when choosing it (Sanders et al.,2010). Children can bring a lot to the table when designing e.g., new technology with participatory design, but the environment, the venue where they are working on needs to be determined in a way that it is suitable for children so that there is not anything restraining the imagination of them. The participatory design techniques should be interactive, fun, provide an alternative communication method for children and they should be applicable for wider audiences. On top of this they should enable adults an opportunity to learn and listen from children (Walsh et al.,2013).

Yet, there is a growing interest in practice to conduct participatory design on-line (Sanders et al.,2010). The venues designed for participatory design may need to be reconsidered. It is to be considered as a possibility to adopt on-line participatory design with older children to tackle e.g., the time management issues. Time management can be an issue if children are participating as design partner to the process of participatory design (Druin, 2002). There would not be need for transportation to the venue where the participatory design happens if it were to be conducted on-line. But still the issue of after school time remains (Druin, 2002). Children would still need to make time to participate on-line in the participatory design process. But the TRAck method allowed children gain more information to make more significant consent by promoting presentative and inclusive participation. (Read et al., 2014) Therefore children should be encouraged to do their own decision whether to participate or not, or into which extent they are willing to participate.

On top of the consent and rights of children participating, the gains children can have through the participation in participatory design have been researched less. However, the findings proposed by Schepers et al. (2018) show that fun in itself can be seen as a user gain in a rather direct way, by highlighting the fun that children had when overcoming challenges, interacting with each other, and experimenting (Schepers et al.,2018). And fun is gladly not the only thing that children can experience and gain when participating in the participatory design process. Children can have multiple positive effects when participating as design partners (Druin, 2002). As it was discovered by Schepers et al. (2018) a sense of self-esteem was developed when children overcame challenges and felt proud of their own persistence and skills. Similarly, as design partners expressed by Druin (2002) children can build confidence both socially and academically when being design partners. And as the children were daring to step out of the comfort zone and interacting with each other fun was experienced through these performances (Schepers et al.,2018). It is also seen in Druin`s article (2002) that as design partner children can learn to work with others and evolve as collaborators and communicators.

Findings like this which express and discuss the benefits children can have when participating motivate the need to take children as part of participatory design. Yet as a user gain in participatory design, fun is not always straightforward, as conditions of flow are closely connected to the experienced fun, it is seen that when participatory design activities demand effort which matched to their capabilities children expressed to experience fun. (Schepers et al.,2018) So in a way the conditions of the participatory flow influence the amount of fun, and this can be hard to track. However only when the demand of the participatory activity matched with the skill of the children, they were able to experience fun. These issues can be difficult to solve, but not impossible. Need for understanding what children have to offer at different ages and what this can mean for the design process need to be understood (Druin, 2002). And when understood, the

designer can overcome issues related to the skills of children. Children, in multiple valuable ways can contribute to technology design process and while the design partner role is the most suitable in the means of participatory design (Druin, 2002) it needs to be considered that it comes with it challenges. As neither the children nor adults are taking charge in their own, negotiating decisions can take more time.

On top of this there is a lack of professionals and researchers who want to work with children as partners (Druin, 2002). It may be that the idea stems in the way professionals are not accepting the notion that children are capable to contribute as true design partner (Nesset & large). TRAck Method presented by Read et al. (2014) enabled the professionals to document how every idea had been considered and made it possible to represent ideas from different groups to a single design brief. Thus, TRAck supports a more ethical and inclusive approach to participatory design with children. (Read et al,2014). Methods like this may help to change the direction of professionals and researchers who are not inspired to work with children. Also, when children are being the partner in design, the weekly discussions and feedbacks enable flexible developing activities for designers so that they can pursue a decision in little time (Druin, 2002).

Participatory design techniques and tools are best when they are used in combination (Sanders et al,2010) and as Walsh et al. (2013) found that by using the FACIT PD framework new directions for design and development of new technology are provided. Nesset & Large (2004) state that the current principles of participatory design are best fitted for the design projects involving children. The workplace is substituted with children's school or home environment; children's enthusiasms and creativity are flourishing withing a flexible structure. Also, the benefits of mutual learning have been long stressed by educational techniques. (Nesset & Large, 2004) Hence decisions when planning participatory design should involve comparing the new and old techniques and principles to find the best fit for the specific project under work.

When children are taking the role of a protagonist, in the participatory work, the objective moves on from a design target to the skill development and technology reflection children make. This aims at empowering children to make considered decisions about technology in their lives. (Iversen et al, 2017) And if not protagonists, children can see themselves growing to be more than just a user of technology, they can feel that they can make a difference when participating as a design partner. On top of changing the technology, being able to change the life of a child, as new technologies emerge that enable a child to act in a position they would never dream of, give new possibilities for the future. (Druin, 2002) And even though participatory design techniques can be expensive when used with adults and are likely to even be more so when used with children, in terms of innovation and appropriateness of design the advantages are able to overweight the negative factors. (Nesset & Large, 2004)

3.2 Implications for Research and Practice

Regarding the positive impacts that children can give to the field of information system design through participating in participatory design need to be studied further. As I made my searches through the topic regarding participatory design and children, I found that little work is done with quantitative research approach. Multiple reasons to choose quantitative research design study exists, and there are several different types of quantitative research.

Quantitative research is aiming to find reliable and accurate measurements which allow a statistical analysis (Rutberg, 2018). Surveys allow to collect data directly from the person involved and are one of the most used quantitative research techniques (Queirós et al.,2017). Survey techniques from quantitative research methods could open interesting aspects on the issues how to deepen the meaning of child participants in participatory design. Surveys have many benefits, but the accuracy of answers provided from the respondents and the survey structure impact the reliability of the survey data (Queirós et al.,2017).

One should keep in mind that children can face sometimes issues verbalizing their thoughts, especially things which deal with abstract actions and concepts (Nesset & Large, 2004). The surveys should be designed in a way that children feel comfortable answering to them, without feeling bored, however in a way that the data is not missing its uniform structure.

Professionals from different fields such as for example teachers and designers should consider the different influential factors that participatory design can bring as the projects start, develop, and are ending. The ethical questioning is something to highlight, as it rose to a question as my research went on. Also forming the role for children to take while participating is of value, children should also have something to gain from participating. There is vast amount of roles children can take, processes and principles to follow and choose from, but it is important to find out what best suits the purpose to empower children and this should have the most impact in the process of designing participatory design for children.

3.3 Limitations

This literature review comes with its limitations, the literature gathered is focusing mostly on children as participants in participatory design. Children can be included into the design process with also multiple different methods and the diversity of children is not something that I was including in my review. Children with special needs should have room in the participatory design, but this review does not discuss this. Also, as the HCI (Human Computer Interaction) field has many frameworks and methods when taking different design methods into discussion I have not included them all. And as the state-of-the-art research presented in the previous research section mostly is following the qualitative research approach, I acknowledge that this might be one limitation of this study.

4. Conclusions

This study examined and gathered findings regarding children as participants in participatory design from previous research to answer the research question: "What need to be considered when children are participants in participatory design process?". Previous research showed diverse factors to answer the question. One being that the role of children in the design process needs to be considered. Children as design partner can come with multiple strengths, but challenges from it need to be considered. There is a lack of professionals and researchers who want to work with children as design partners (Druin, 2002). Hence, they need to be motivated. The role of a protagonist brings value for the children participating through the means of self-development through design (Iversen et al.,2017). Also making the children gain fun from the participatory design process (Schepers et al.,2018) has its possibilities to encourage children to participate. Adding to the factors that should be valued when working with children, is the presented TRAck method which highlights the need to make children able to give meaningful consent when participating (Read et al.,2014). Study of FACIT PD framework suggest that the techniques of PD with children need to be fun, interactive, provide alternative communication method (Walsh et al.,2013). Designers need to make sure the used techniques fit the need of children. For designers this literature review presents helpful tools that can be used when working with children, researchers can find possible gaps in research with the help of this study, such as the lack of quantitative research, and for research this thesis gives a humble contribution by gathering some of the state-of-the-art references together to form a discussion around children and participatory design.

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