Cooperation, Combat, or Competence Building – What Do We Mean When We Are 'Empowering Children' in and through Digital Technology Design?

Completed Research Paper

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Abstract

This paper contributes by offering a refined understanding of what empowerment means in today's digital technology design context. Research on children and digital technology design often calls for children's empowerment, while little attention has been paid to discussing what empowerment of children really means. Information Systems research offers useful points of departure for scrutinizing the concept. We maintain that also Information Systems researchers and practitioners should see empowering of children in digital technology design as one of their tasks, while we also show that this empowerment can be achieved in a variety of ways. Our results bear relevance to the concept of empowerment in more general, not only regarding children.

Keywords: empowerment, children, youth, adolescents, design, learning, games, new literacies

Introduction

Countries try to find ways for how to prepare for the ongoing digital transformation of society. Different kinds of initiatives exist to support this goal through educational efforts targeting children and young people. For example, in Finland (NCBE 2014) and Singapore (MOE 2014), transversal competences such as thinking, learning, and interaction skills, and (digital) multiliteracies are provided the students in basic education. There are also arguments that digital technology design skills support the skills and mindset needed in the 21st century (Bekker et al. 2015; Pucci and Mulder 2015). Learning of programming has already been added as part of curricula for basic education in countries such as Finland, Estonia, and UK. Recently, calls for offering more in-depth technology knowledge for children have gained prominence (e.g. Blikstein 2013; Cornwall and Gaventa 2000; Heeley and Damodaran 2009; Iversen et al. 2016; Mariën and Prodnik 2014). In addition to that, 'making' and digital fabrication skills have been suggested to support user innovation and user entrepreneurship (Buxmann and Hinz 2013; Thiesse et al. 2015), therefore adding them as part of curricula is also considered useful (see e.g. Iivari et al. 2016). Indeed, for example in Iceland, innovation education is already integrated in the basic education curriculum (INCG 2013) and making has

been tried out, combined with school work, all around the world (see e.g. FabLearn Labs: https://tltl.stanford.edu/project/fablearn-labs).

Information Systems (IS) research, however, has hardly addressed the topic of children and their digital technology skills and competencies, even if it should be obvious that such skills and competencies of children are a significant concern of ours – children of today will form the future IS workforce (see Clayton et al. 2012; Iivari et al. 2016). In IS research, this has mostly been acknowledged in gender studies where it has been argued that childhood plays a significant role already when considering people's career choices (see Clayton et al. 2012). Traditionally, IS research has concentrated on digital technology development, use, and impacts within organizations and workplaces, thus it is quite understandable that children have not been in focus of the research. However, nowadays, when digital technology has become thoroughly woven into the fabric of our everyday life, also IS researchers need to broaden the spectrum of their studies from organizations and work into our everyday life (see e.g. Yoo 2010). With this trajectory, children, among other stakeholder groups, become relevant actors to be studied in relation to digital technology.

We argue, moreover, that obtaining digital technology related skills and competencies as part of basic education is not enough, but in addition to that, agency and empowerment of people to *use* those skills are also significant (e.g. Andrade and Doolin 2016; Phipps 2000; Warschauer 2002). Therefore, we consider empowerment of children in and through digital technology design as a significant topic. Empowerment as a concept has been addressed within numerous disciplines and it has been acknowledged long ago that a multitude of meanings can be attached to it (e.g. Clement 1996; Hardy and Leiba-O'Sullivan 1998). IS research has also been interested in the concept for decades. Particularly, worker empowerment has been a theme in IS research for long: already decades ago systems design projects in Scandinavia saw worker empowerment as their main goal (Beck 2002; Bjerknes and Bratteteig 1995; Bødker et al. 1988; Ehn 1993; Greenbaum and Kyng 1991). Currently, the concept of worker or employee empowerment pictures still strongly in IS studies (e.g. Deng et al. 2016; Zafar et al. 2014). Moreover, empowerment has been addressed, e.g., in healthcare context in which patient empowerment is an enduring topic (e.g. Ghosh et al. 2014; Kordzadeh et al. 2014; Smailhodzic and Attema 2016) and in relation to marginalized groups or communities whose empowerment through digital technology is currently a widely studied topic (e.g. Leong et al. 2016; Li et al. 2012; Oreglia and Srinivasan 2016). Even if some IS researchers acknowledge that various disciplines are involved in defining the concept of empowerment and various kinds of meanings can be attached to it (e.g. Howcroft and Wilson 2003; Mohajeri and Leidner 2017), there is a tendency in IS research to use the concept without acknowledging the conceptual complexity associated with it. Many researchers define the concept but remain silent about the various meanings and traditions related to it.

As empowerment of children has not been addressed in IS research, we turn to Child-Computer Interaction (CCI) research community for inspiration and help, as that research community has emerged to cater especially for the needs of children in technology design. In the CCI community, empowerment of children has been called for in numerous studies (e.g. Fails et al. 2010; Hourcade 2008; Iivari et al. 2015; Smith et al. 2015). However, in this community it has been left quite open what is meant by 'empowerment' and the concept itself is taken as self-evident and not in need of explicit definition. Even if the Scandinavian tradition in systems design with the goal of worker empowerment has inspired large part of CCI research (Druin 2002; Hourcade 2008; Iivari et al. 2015; Iversen and Brodersen 2008; Iversen and Smith 2012) and recent calls for foregrounding the motivations, values, and ethics when working with children have emerged in the CCI community (Iivari et al. 2015; Iversen and Smith 2012; Read and Markopoulos 2013; Yarosh et al. 2011), there currently is a lack of awareness and critique of the various forms that empowerment of children may take in digital technology design. We maintain that a careful scrutinizing of the concept is needed also for the CCI community. Open discussion and reflection upon which forms of empowerment are actually targeted at and prioritized are needed if we want to develop the field further.

Therefore, we ask as our research questions, *what does the concept of 'empowerment of children' mean in digital technology design, and, what relevance does this bear for IS research?* We approach this by studying with empowerment perspective three of our previous digital technology design projects conducted in Finnish schools with 12-15-year-old children and their teachers. We rely on Nexus Analysis as our research strategy that allows combining both qualitative and participatory research approaches in a study of a complex topic from multiple perspectives during a long timespan (Scollon and Scollon 2004). Hence, this study does not represent a typical behavioral study, but it includes a strong activist element, i.e., while aiming for better understanding of the nexus of practice, we potentially influence the future of the same

practice through participative approach. The context for these projects was improving children's literacy skills through participatory game design and playing of text-rich adventure games. Literacy skills refer to the ability to read and write, which are essential skills in information exchange. Formally, literacy can be defined as "understanding, using, reflecting on and engaging with written texts, in order to achieve one's goals, develop one's knowledge and potential, and participate in society" (OECD 2011). We take a wider view in this study, and when discussing 'literacy' we mean the concept of 'new literacies', i.e., literacies that are enhanced with technology and have at the same time more participatory, collaborative, and distributed nature than conventional literacies (see e.g. Lankshear and Knobel 2007; Mills 2010). Even though in this paper with 'children', we generally refer to under 18-year-olds, in the CCI community the studies mostly focus on youngish children, very typically 10-11-year-olds.

The structure of the paper is as follows: in the next section, we introduce literature on empowerment in digital technology design in general as well as focusing specifically on children, intertwined with their educational context and combining new literacies and games. After that we describe the research design and the empirical results. Finally, we discuss implications of the results and conclude the paper.

Empowering and Children

Next, we will discuss previous literature addressing empowerment, first, as currently positioned in IS research and then within the CCI community, complementing it with the point of view of new literacies and games, the design context of our study.

Empowering Workers

We can say that empowering the skilled worker is one of the cornerstones of earlier Scandinavian tradition in IS research and it has also characterized more recent research and practice. In the early Scandinavian tradition, the goals of the management in systems development were contrasted with the goals of the workers, and the goals of the workers were advocated. The tradition focused on workplace democracy and union involvement in the development of computer systems. Worker participation in systems design was seen as an end in itself; as a necessity for empowering the skilled workers to participate in decision-making in their workplace and thus for achieving workplace democracy (Beck 2002; Bjerknes and Bratteteig 1995; Bødker et al. 1988; Ehn 1993; Greenbaum and Kyng 1991).

The more recent participatory design tradition is still argued to be based on the ideal of empowerment of the skilled worker through participative activities in systems design, even though in recent decades, political issues have decreased in importance and the focus has shifted from workplace democracy to a participatory and cooperative design process. Overall, it has been argued that the focus has shifted from political to ethical aspects, and from structured institutions (trade unions) to situated local action, while, however, the ethical responsibilities of the system designer have remained (Beck 2002; Bjerknes and Bratteteig 1995; Bødker et al. 1988; Ehn 1993; Greenbaum and Kyng 1991). On the other hand, debates regarding the place of power, politics and democracy in participatory design continue (see e.g., the Scandinavian Journal of Information Systems 6(1), 14(1), 15). One can even argue that there is a revitalized interest in empowerment and democracy, interpreted now as concerning varied kinds of publics and innovation more broadly in society (see e.g. Björgvinsson et al. 2010; Le Dantec and DiSalvo 2013; Simonsen and Robertson 2013).

Regarding the concept of empowerment, it has been interpreted in many different ways and a variety of views can be identified from different disciplines. A mainstream management view postulates empowerment as a tool for motivating the employees to strive for management goals by giving them some power (Hardy and Leiba-O'Sullivan 1998; Howcroft and Wilson 2003; O'Connor 1995), while critical tradition emphasizes that empowerment can never happen through those having power giving some of it to the power-weak; on the contrary, empowerment involves the oppressed combating the oppressors and achieving power to affect decision outcomes (Hardy and Leiba-O'Sullivan 1998; Howcroft and Wilson 2003; O'Connor 1995). Hence, user participation in systems design in any case aims at empowering users, while it depends on the arrangements whether empowerment takes place in the sense of mainstream or critical tradition. Within mainstream management view, empowerment of users can be achieved through management or systems designers inviting some users to take part in making design decisions, while the critical tradition opposes this as insufficient and maintains that users need to seize this position by themselves, without the consent or initiative of management to begin with.

Within a similar line of thought, empowerment of users has been categorized in the literature as democratic or functional. Democratic empowerment of users argues for giving users power to participate in decision-making in issues concerning their life, while functional empowerment aims at improving their performance in the pursuit of management goals, allowing users more power to do their job more effectively and efficiently, including the use of better technological tools, while staying within the goals and objectives defined by the management and the organization (Clement 1996; Spinuzzi 2002). Empowerment of the power-weak, in general, may be interpreted in four different ways: as gaining access to the decision-making arena, as gaining needed resources and ability to utilize those, as gaining a will to resist the ones in power or as impossible in the sense of freedom of power effects, while local struggles may provide positive experiences (Hardy and Leiba-O'Sullivan 1998). The fourth interpretation of empowerment relies on theorists such as Foucault, who maintains that empowerment in the sense of gaining freedom from power is impossible as we are all intimately intertwined within the complex relations of power that we cannot escape from (Hardy and Leiba-O'Sullivan 1998). Equipped with these conceptual tools, we next examine literature discussing empowerment of children within CCI research community.

Empowering Children

Offering children of different ages, from very young to senior high schoolers, technology design skills and taking them to participate in digital technology design has been seen in the CCI community as one way to empower them. The ideals of Scandinavian tradition in IS have strongly affected researchers working with children. Values related to empowerment of children have been argued to drive many CCI researchers: when studying the core values of the community, Yarosh et al. (2011) found that many researchers saw children's participation in design as a tool for 'giving children a voice in the design' and 'empowering children as co-developers' (Yarosh et al. 2011). They (Yarosh et al. 2011) point out that CCI researchers consider their work as empowering children, i.e., when taking children into technology design, researchers also open up the potentials and opportunities that technologies can offer to them. In the CCI community, there is a variety in the views on what kind of roles children should have in design, many seeing children as useful evaluators and testers (Yarosh et al. 2011), while others put them in the role of informants (Large et al. 2007; Scaife et al. 1997), or active and influential design partners cooperating with adult designers on an equal basis (Druin 2002; Kinnula et al. 2017; Large et al. 2007); all however valuing children's participation and considering children to be essential experts on what their life is like and thus thinking that their participation is necessary. Especially influential has been Druin's design partner model, which relies on the Scandinavian tradition, aiming at empowering children to become equal members in a design team with adult designers (Druin 2002).

Lately these ideals have been rekindled in the CCI community by researchers inspired by Scandinavian tradition. Hourcade (2008) calls for following the original Scandinavian values, and Iversen and Brodersen (2008) highlight the essential importance of children's participation in technology design process: children are the "authentic stakeholders" and they need to be able to take part in design in meaningful communities, i.e., if a technology is designed for learning, school is a meaningful community for that. Iversen and Smith (2012) further argue that the current interest in CCI community to address the "needs, interests, and abilities of children" does not fully match the original Scandinavian values of "democracy, quality, and emancipation." They argue that applying Scandinavian values in the design process gives children a possibility to engage in decision-making and thus to be meaningful and responsible participants in the process. Iivari et al. (2015) and Iivari and Kinnula (2016a), on the same line, scrutinize also children's decision-making power in the design process and call for more careful examination of children's "genuine" participation in technology design. Iversen and Smith (2012), Iivari et al. (2015) and Iivari and Kinnula (2016a) call researchers to look beyond the actual design results and to consider what else is meaningful in the process.

Furthermore, Yarosh et al. (2011) show that CCI researchers value children's learning, achieved, e.g., through play and games. The social, intellectual, and creative growth of children have pictured strongly in CCI studies (Yarosh et al. 2011). In the context of CCI, this form of empowerment, i.e., thinking that through education and development of competence children get power to affect issues in their life, can be connected back to 1994 when Soloway et al. (1994), related to Learner-Centered Design, discussed how understanding technology is one form of literacy and how, by taking children into technology design process, we support their learning of technology literacy and through that their development to better human beings.

As to the context of our study, combining literacy and game design, there is literature pointing to the importance of literacy skills in empowering people. It is argued that narrative is an integral part of being human, a major way for individuals and societies to build understanding about themselves (Flanagan 1992). Literacy helps in the development of narrative thought and in improvement of the ability to participate actively in our society and contemporary culture (Lacasa et al. 2008). Squire (2008) highlights that reading leads to a richer intellectual life and even serves as a basis for democracy. It has also been indicated that avid readers learn better academic skills and, in that way, can improve their socio-economic status (Apperley and Walsh 2012; Gee 2012; Jensen et al. 2012; Korotayev et al. 2011); that is, they get jobs with higher pay and higher social recognition. Finally, literacy skills are also essential for participation in technology design process (Galliers et al. 2012). Therefore, improving literacy skills can be seen as empowering people in many ways as well as improving their quality of life.

Alongside the so-called old or traditional literacies such as reading books, there is an increasing amount of conversation in research about new/emergent/digital literacies such as multimedia literacy, television literacy and game/gaming literacy. Games are argued to have a particularly high educational value on the field of literacy (Apperley and Walsh 2012). Studies have pointed out that playing games and doing related activities, such as writing and reading about games, are much closer to traditional school-based literacy practices as commonly considered. Even direct comparisons between playing games and developing of traditional academic literacy can be drawn and gaming is seen as a legitimate literacy practice (Squire 2008). Combining the built-in motivation and reading in games has been found to give significant learning gains especially for poor readers (Mitchell and Savill-Smith 2004). Games incorporate various learning principles, helping in learning of, for example, knowledge, attitudes (Cavallari et al. 1992), problem solving, decision making, resource allocation, creativity (Ju and Wagner 1997), reading, seeing (Sandford and Williamson 2005), physics and language arts (Randel et al. 1992). Games are seen to contribute to personal empowerment, creativity, socialization, and improved learning outcomes in general (Biagi and Loi 2012). Some studies can be found specifically related to the topic of designing games together with children, even connecting games and empowerment of children (Jain and Yammiyavar 2015) or games and technology literacy (Weintrop and Wilensky 2013).

All in all, the existing literature on empowerment of children indicates that the original Scandinavian value of giving users more decision-making power in issues related to their lives is still alive – also in studies on children and technology design, while there still are big differences in what this empowerment of users or children actually entails and aims at. Acknowledging and making visible what kind of empowerment of children researchers aim for makes it possible to examine and discuss what may be interesting and specific to children's empowerment in and through digital technology design, compared to addressing empowerment in more general. Moreover, the existing literature also informs us that children's learning and competence development are significant aspects in empowering children.

Research Design

Connected with our empirical work with children, our interest in digital technology design with children, children's empowerment, games, and new literacy skills are intertwined. An essential value for us as researchers and foundation for our studies is that we want to enable and qualify children as citizens capable of showing interest and acting in designing digital technology that affects their lives. Through digital technology design interventions in the school context, we aim to build educational arenas where children are eligible participants in transforming their technology-rich future while, at the same time, exploring the technology potential. Literacy skills, on the other hand, are essential when empowering people in general. In the world of new literacies, we cannot ignore different media and digital games, which are an inseparable part of people's lives nowadays. From the point of view of new literacies, when playing or designing games many literacy skills are needed and they develop during these processes.

Our work with children has for long relied on the research strategy of nexus analysis (see e.g. Halkola et al. 2014; Iivari et al. 2015; Iivari et al. 2014; Kuure et al. 2010). Nexus analysis focuses on the study of social action that is seen as a cross-section of three aspects: historical body of the participants (Nishida 1958), interaction order among them (Goffman 1983), and discourses in place circulating around (Scollon and Scollon 2004). In the research process of nexus analysis, the researcher first enters the community being researched, *engaging* with the nexus of practice, and then uses different methods and data (e.g. discourse analysis) for *navigating* for answers (Scollon and Scollon 2004). Through participating, the researcher

contributes to the *change* in the nexus of practice (Scollon and Scollon 2004). Nexus analysis offers us suitable means to study children's participation in digital technology design; it allows combining both qualitative and participatory research approaches in a study of a complex topic from multiple perspectives during a longer timespan (Scollon and Scollon 2004). Nexus analysis has guided our work with a number of projects, schools, teachers and pupils in an endeavor to understand and support children's participation in digital technology design. In our studies, all three cycles of nexus analysis have been evident. We have become visible and legitimate actors in the communities we have studied (including teachers, schools, pupils and other stakeholders) during a longer time span (for our papers related to engaging phase, see e.g. Luoma et al. 2016). We have collected various kinds of data and carried out different kinds of analyses on it (see e.g. Iivari and Kinnula 2016a; Iivari and Kinnula 2016b; Iivari et al. 2015). Our work has also included changing the practices in the community: we have collaboratively with teachers and pupils carried out technology design projects; i.e., we have invited the involved teachers and children into the arena of technology design, as discussed in the current paper. These interventions have enabled us to gain rich insights into the study topic: children's participation and engagement with design and technology.

Three of our projects are included in this paper. They were conducted in collaboration with a national LUKUINTO ("Joy of Reading") program (2012-2015), funded by the Ministry of Education and Culture in Finland, to find ways to encourage children to develop their literacy skills as lately literacy skills of today's boys, and also youth more widely, have raised concerns in Finland (Sulkunen et al. 2010). Senior researchers with background in IS and CCI (later on called 'researchers') cooperated with the program. The initial research focus of this collaboration, i.e., to understand the potential of new technology, digital games in particular, in increasing the reading eagerness and literacy skills of children was seen as fruitful to combine with our long-lasting research interest to enable children to participate in technology design.

In the projects, Masters' level students in IS acted as designers (later on called 'designers'). These students have a BSc background in software engineering or information systems and human-computer interaction. They are in the final phase of their studies and some of them have a substantial amount of work experience in companies already. For them, the project was a compulsory part of their studies yet the actual project they joined in was voluntarily selected to fit with their own interests and competencies. In these projects, simulating real-life professional projects as much as possible, 3-5 students worked independently as professionals. The steering group of these projects (1-2 representatives from the LUKUINTO program, 2-3 researchers, and in most cases one school teacher) simulates a real-life project board as well, acting as a customer, providing managerial level support for the project, and making the major decisions. The steering group was active in giving advice and guidance on how to work with children, including the practical design work with children. Next, the three projects examined in this study are described in more detail.

Project A

The aim of the project was to develop an adventure game to inspire and motivate reading of a specific target group: male junior high school ice hockey juniors (12-15 years). This target group was selected based on our pre-study that indicated this group to be a very challenging target group as regards reading interest. They do not have time or interest to read practically at all (Kinnula et al. 2014) and we wanted to see if we can develop solutions that make them somehow interested in reading. We collaborated with 9th graders (14-15 years) in two schools. The project aims were set by the researchers, having an interest in digital technology design with children as well as in the potential of games in improving children's literacy skills. The researchers contacted potential teachers, who agreed to join the project and indicated suitable classes for the work. Three Master's students acted as designers in the project (300 hours each) spanning over 4 months (September 2013 – January 2014).

One of the classes taking part in the study was a specific sports class of junior ice hockey players, the other one was a regular class, which had also ice hockey juniors as pupils. Initial game concepts were presented to 24 pupils of the sports class (an adventure game concept, a gamified application with changeable texts, and a quiz-based concept). The pupils evaluated different types of the game concepts in a workshop, discussed them, and finally rated them by giving points to the concepts and voting for which game type they would prefer. At the end of the workshop, the designers discussed with the children the concept of new literacies and what it means in practice, also related to gaming. The designers then developed the game and it was later tested by two groups of four boys from the two schools (the pupils were mainly ice hockey players). Right after the user tests, experiences from playing the game were explored with an adjective card

selection method and interviews. The project work was integrated into normal schoolwork of the children.

In this project, children acted as informants in the game development and as testers in usability testing and associated interviews. The resulting classic text-rich adventure game, "Hockey Zombies – Escape from the Arena", was advertised widely. It also formed the basis for the following project (Project B). Data of Project A consist of multimodal data from the concept evaluation workshop, videos of usability testing sessions and associated interviews, adjective selections, game development related data, project management data, and results reports.

Project B

In this project, the children developed new content for the adventure game engine developed in Project A. An editor was also developed for the game with the aim to make it easier for children to create games by themselves. The overall aim of the project was still to inspire and motivate reading of the participating children. The aim was set by the researchers interested in digital technology design with children as well as in the potential of digital games in improving children's literacy skills. The research interest was now on participatory game design as a way to inspire reading (while designing content for the game) and as a natural way to educate children as regards technology potential and design. Therefore, an additional aim to get children involved in the game development as much as possible was added to this project. The researchers contacted a teacher who already had volunteered to join this type of projects. She indicated a suitable class to work with. Five Master's students (300 hours each) acted as designers in the project spanning over 4 months (January – May 2014).

Project participants were one class of 7th graders (13-14 years). They took part in design workshops on game content ideation, content design, and game and game editor evaluations. The game editor was developed by adult designers, while it was evaluated by the children in two phases: in the first phase 6 children (3 boys, 3 girls) tested the editor in usability testing sessions, and the designers improved the editor based on the test results. In the second phase, all the children evaluated the finished editor in a separate workshop, creating new games with the editor. In addition, in the last workshop children evaluated some other games, first based on their own thoughts on game usability and then by using well-known game usability evaluation heuristics. They also tested some novel technologies, unrelated to game design. The project work was integrated into the children's normal schoolwork.

Children acted as partners to the adult game designers in this study as well as evaluators. Data of the project include multimodal data from the workshops with children, game and editor development related data, project management data, results reports, questionnaires from the children and interviews of the children and the teacher.

Project C

In this project, the children developed a quiz game using a different kind of game engine. The aim of the project was to involve children as much as possible in game development while also teaching them what it means to collaborate in this kind of project. The aims were set by a teacher who acted as a customer for the project. The teacher chose the theme of the game so that it served children's learning related to the historical phenomenon of immigration and made collaboration between different school subjects possible (history, English language, Finnish as native language). Four Master's students (260 hours each) acted as designers in the project spanning over 4 months (September 2015 – January 2016).

Altogether, 58 8th graders (13-14 years), and 37 7th graders (12-13 years) from different classes took part in the study. All 7th and 8th graders took part in game design work. They created the base story for the game and the designers then implemented it. In addition, the children created mini-games to complement the main story line. Ten 8th graders also programmed parts of the game. Six 7th graders tested the final game, three 8th graders arranging the tests. The project work was integrated in the normal schoolwork. The game is currently in use at the school history and English subject classes for 7th and 8th graders.

Children acted as partners for the adult game designers in this study as well as testers of the new game, and as participatory designers when arranging the tests. Data of the project includes game development related data, interviews of 8th graders arranging the testing of the game, project management data, results reports, and two teacher interviews.

Data Analysis Process

For this study, our focus shifted to understanding the nature of empowerment that may be offered for children participating in our projects. The literature already indicates that empowerment is a complex concept with a multitude of meanings attached to it. In the case of children and design, we considered empowerment to be a significant goal driving of our work, while we also saw a lot of variety as regards it in our projects. Specific data analysis on empowerment of children in our projects was carried out. We have analyzed some of the data previously with a focus on children's meaningful participation in design projects (Iivari and Kinnula 2016a) and that acts as a background for this study. The authors of the paper collected together and examined the data from all the three projects.

In the data analysis, our focus was on locating evidence on empowerment of children in the various senses discussed in the literature. Previous analysis had already examined whether children had any real influence and responsibility in the projects; whether children had been defining the goals of the projects; whether children were allowed any decision-making power in the projects; whether children were able to contribute and to be heard; and whether the projects created any occasions for development of competence, among other issues (see Chawla and Heft 2002; Iivari and Kinnula 2016a). For the analysis involved in this paper, we identified two categories of evidence of empowerment: reports on participants' experiences and reports on our own arrangements and conditions created for arousing empowerment. For the first aspect, we particularly focused on the participants' interview and questionnaire data, but included also other material when relevant. For the latter aspect, we particularly analysed the project management documentation. During the analysis process, we ended up in focusing on goal setting and decision-making (as regards the project and the game under development) and on children's contribution to those. In addition, we identified different roles the children had adopted in the projects as well as different kinds of practices we had used for involving children in each project (see Table 1 for the result of this analysis). Moreover, we also identified evidence on children's experiences of the project as well as evidence of the competence development of children, including their literacy skills as well as technology and design literacy skills. Finally, we mapped our data together and identified evidence on the different forms of empowerment achieved (or not achieved) in the projects. This was also abstracted to a table form for comparison (Table 2). First the analysis was carried out on each project separately, after which the data was combined to form an overall understanding. During this phase, the data was extensively discussed among the authors to ensure that the analysts agreed with the interpretations.

Empirical Results

In Table 1 we summarize our empirical results regarding how the projects were organized as to involving children. Even though we can see many different solutions for children's meaningful participation in that table, it is still not conceptually clear how the solutions and practices differ from each other from the empowerment perspective.

Project A	**Project B**	**Project C**
Who set the goals for the project		
Researchers	Researchers, Teacher	Researchers, Teacher
What were the goals		
Researchers: supporting development of children's literacy skills in general; supporting children's technology and design literacy skills in particular; creating such a game for children that would make children more interested in reading	Researchers: supporting development of children's literacy skills in general; understanding and supporting children's participation in game design Teacher: children learning useful transversal skills through taking part in game design project; supporting children's participation in game design	Researchers: understanding and supporting children's participation in game design Teacher: children learning useful transversal skills through taking part in game design project; involving children as much as possible in game development while teaching what it means to collaborate in this kind of project
Who had decision-making power		
Researchers: initiated the project; planned and steered the project; gave children three choices for game concepts; let children to take part in usability test Teacher: decided who of the interested children can take part Children: voted for the most interesting concept; evaluated the game Designers: developed the game	Researchers: initiated the project; planned and steered the project Teacher: planned and steered the project; decided who of the interested children can take part Children: ideated and decided content for the game to be developed; designed the game; evaluated the game; evaluated the new game editor Designers: developed the game according to children's ideas and using content created by children; developed the game editor	Researchers: planned and steered the project Teacher: initiated the project; planned and steered the project; decided who of the interested children can take part; decided theme for the game Children: ideated and decided content for the game to be developed; designed the game; evaluated the game Designers: developed the game according to children's ideas and using content created by children
Roles of children		
Usability test person; Game evaluator; Informant; Decision-maker when voting for the most pleasing game concept	Game ideator; Game designer; Game evaluator; Usability test person; Informant; Decision-maker in game design	Game designer; Partner for the adult Designers; Game developer; Game evaluator; Usability test person; Informant; Decision-maker in game design; Participatory designer when arranging the tests
Practices used for involving children		
Teaching children what are new literacies; voting; usability testing	Teaching children game design; children fully deciding and designing the game content	Teaching children game design; children acting as partners for the adults; helping children in programming parts of the game; children arranging game usability tests

Table 1. Organizing of the projects as to involvement of children

Table 2 summarizes and illustrates our empirical results in relation to each understanding of empowerment we identified from the literature. Overall, considering empowerment of children in our projects, we can say that it depends very much on the understanding of the concept whether we can argue having achieved it or not.

Project A	Project B	Project C
Management / mainstream view		
Children were empowered by their teacher and designers to take part in the game design project	Children were empowered by their teacher and designers to take part in the game design project	Children were empowered by their teachers and designers to take part in the game design project
Critical view		
Children were not empowered	Children were not empowered	Children were not empowered
Democratic view		
Children were empowered a little: they gained a little decision-making power (were allowed to vote for a game concept and to indicate usability problems in usability testing session)	Children were empowered a lot: they gained a lot of decision-making power (were allowed to ideate and decide content for the game to be developed, to design the game, and to evaluate the game and the new game editor)	Children were empowered somewhat: they gained some decision-making power (were allowed to design the game, to invite other users to test the game, to program parts of the game)
Functional view		
Children were empowered: they gained a useful and inspiring tool for improving their literacy skills	Children were empowered: they gained a useful and inspiring tool for improving their literacy skills as well as a tool for game design	Children were empowered: they gained a useful and inspiring tool for improving their literacy and language skills, and understanding of history
Educational / competence view		
Children were empowered: they gained useful skills and competencies for acting as full members of their society (literacy skills, broader understanding of what constitutes literacy)	Children were empowered: they gained useful skills and competencies for acting as full members of their society (literacy skills, analytic skills, broader understanding of what constitutes literacy, game design skills, a wide understanding of game design process, understanding of evaluation)	Children were empowered: they gained useful skills and competencies for acting as full members of their society (literacy skills, analytic skills, game design skills, programming skills, participatory design skills, a wide understanding of game design process, understanding of evaluation, understanding of history)

Table 2. Different views to empowering children

The mainstream view of empowerment. When considering empowerment of children within the mainstream management literature frames of reference (Hardy and Leiba-O'Sullivan 1998; Howcroft and Wilson 2003; O'Connor 1995), we can say that indeed children were empowered: they were invited by their teachers and by us into the design process and had increased decision-making power within: they were allowed to vote for a game concept to be implemented and to test it afterwards or they were allowed to select the game concept, design it, even program parts of it, and test it later on. "*The goal was that the pupils offer information on what they would like to change in the current version of the game and to which direction they would like to develop the game.*" (Project B) *"The target group of the game are junior high schooler boys, who play ice hockey. (…) The study includes user testing, multiple choice questions and interview after them. (…) It is emphasized that errors and problems are searched from the game – if the user cannot use the game, the problem is in the game."* (Project A) *"The project group goes to present the game concepts in [a school, a class]. There are 24 pupils in the class, most of whom are ice hockey playing boys. In the presentation, there is an initialization, then the three concepts are briefly presented. Then the pupils are divided into three groups and comments on the concepts are collected from three tables. After the presentation, a questionnaire is delivered for the pupils, in which questions about reading, playing games and opinions about the concepts are asked."* (Project A) *"According to the plan the pupils were first to be*

given freedom. No more exact guidelines were given, but they were merely asked to write what was good and bad in the game and how it could be improved. This was done so that the pupils would get to be creative without the project group influencing their ideas." (Project B) It is obvious that children gained increased power in technology design.

The critical view of empowerment. Considering the empowerment of children from the perspective of critical tradition (Hardy and Leiba-O'Sullivan 1998; Howcroft and Wilson 2003; O'Connor 1995), however, leads us to conclude that children were not actually empowered at all. They did not combat the ones in power, but instead settled in their power-weak position and merely contributed to the design process within the limits set by adults. True empowerment of children would have required the children to challenge the existing power relations that allow them an oppressed position in decision-making. Project B can be considered as succeeding the best in allowing children to truly make decisions, but also here it took place within the limits set by the teacher and the design team. The adults pointed out that children are hesitant to freely express themselves: "*A challenge was to encourage the youth to write their opinions and ideas on paper. The youth think too much what they dare to write. To this probably also contributed the fact that we collected the outcomes, so it is certain that the pupils exercised some self-censorship."* In Project C, some children even would have preferred not to be empowered; not to take part in the activities at all, not to talk about making decisions, as the teacher told us: "*Some groups [of children] are very apathetic, not in the mood, [saying] could we watch a video or something. But you never know [beforehand what happens], and it does not always stay the same as the first reaction […] it can change."* For these children empowerment in technology design was not, at least on the first touch, something that they were familiar with or what they wanted, not to talk about combating the ones in power for their empowerment. They would have preferred to stay in the familiar ground of doing nothing new to them. However, in the school environment, children's agency, competence, and empowerment are in the core of education, therefore the duty of the teachers is also to urge children to push their limits and methods and tools are needed for this.

The democratic view of empowerment. Considering the notion of democratic empowerment (Clement 1996) of children, on the other hand, allows again pointing out some positive issues from these projects. They offered increased possibilities for children to affect decision-making; however, only related to game design. Project A was the most limited case as the children actually could not make any design decisions, only vote for the most pleasing solution, and they acted only as informants and evaluators of the solutions created by the adult designers (cf. Druin 2002). On the other hand, the project documentation created by the designers contained a large number of different analyses related to the evaluations done by the children and children's comments clearly influenced the design decisions. However, this was not communicated very well to the children. In Project B, instead, children were allowed to make numerous design decisions starting from ideating and selecting the game theme to be developed to actually designing and evaluating it, e.g. *"Voting on which group's outcome continues to further development, i.e. which at least are implemented from the perspective of graphics in the editor. Everyone was given a ballot into which they wrote, in addition to their name, the most interesting and the second most interesting option from the groups' implementations."* Project C was more limited as the involved teacher selected the theme for the game and children were only allowed to design and evaluate the game as well as to program small parts of it. However, interesting in this project was that the children were allowed to organize the evaluations together with the adult designers: older children invited younger children as test participants to evaluate the game: *"8th graders were part of the test group so that they could see how testing is done and they also made notes about testing."*

The notion of empowerment as an ability to affect decision-making may require gaining access to the decision-making arena, gaining needed resources and ability to utilize those as well as gaining a will to resist (Hardy and Leiba-O'Sullivan 1998). Considering this in more detail, we can say that in our projects children at least gained some access to the decision-making arena. This was not the case in Project A, but in projects B and C children were allowed to make many design decisions. In Project B, the teacher happily reports that "*[It is important that] children feel that the game was made by themselves"; "I think the pupils were an important part of this project. The project group succeeded very well in creating an atmosphere where pupils' choices and designs had an impact and all comments were important. THAT encouraged and supported the pupils in their work."* In project C, at least one of the children got a clear feeling of empowerment, as he specifically mentioned of his interest related to decision making: "*At first I had a consideration whether we are just given instructions [for what to do] or can we affect [the game design] by ourselves."* As for the resources needed, we argue that the children at least gained some new resources

in the sense of skills and knowledge that are needed for decision-making in design projects. Empirical evidence on this will be reported in the section on educational/competence view of empowerment. On the other hand, we did not see any signs emerging among children in our design projects related to the will to resist the existing power structures. Hence, empowering the children in this sense did not take place.

The functional view of empowerment. From the perspective of functional empowerment of children (Clement 1996), then again, we claim that children were empowered with the tools we developed: they offered the children useful and inspiring means for improving their literacy skills, as was indicated both by the teachers and the children: *"For many, the traditional Finnish language [school subject] is not that exciting, so it was great to see how they got excited of this."* (teacher in Project B) *"It's like, familiar! Totally different than if the game was about some different sport, so it was actually pretty much like that. … Yeah [the character] was like… just spot on!"* (pupil in Project A) *"Yeah, it did kind of motivate to read."* (pupil, Project A) *"Of course, if the texts are long and they have stuff you have to read carefully to really understand something. And just like the game was, you don't get forward if you don't read. That's important."* (pupil Project A) In addition, the editor developed in project B enabled children to create and modify games even in a more empowered way, as was the case with Project C as well. In Project C, the children created a useful tool for learning for other children even, as the resulting game is currently used at the school to teach other classes. In line with the functional empowerment perspective, however, the children stayed within the goals and objectives set by their 'management' and 'organization', i.e., teachers and the school: they accepted the learning goals set for them and took part in creating tools to help in accomplishing those even more effectively and efficiently. Empowerment in the democratic sense might lead to questioning and redesigning even those. Here, it would mean children questioning the need for literacy skills or design expertise, which, on the other hand, is not something we would like to encourage the children to do.

The educational/competence view of empowerment. Moreover, our literature review as well as our empirical data both point out that children can be empowered in technology design also in other senses. Children's inclusion, education, and learning are issues that equip them to act as full members of the technology-rich society, also in the future. All our projects have particularly aimed at equipping children with better literacy skills that are significant also from the empowerment perspective (Apperley and Walsh 2012; Gee 2012; Jensen et al. 2012; Korotayev et al. 2011; 2008). Moreover, we consider that the skills related to game design and technology design more generally are pivotal (in line with Iivari et al. 2016; Iversen et al. 2016). In the future, digital literacy and understanding of technology potential and design are definitely important and will allow improved possibilities to have a say and make a difference in one's life and in the society.

Development of children's literacy skills was especially aimed at in project A. In this case, children also thanked the game developed in this respect: *"Useful – it is such that you understand what you read, you learn to understand what you read and what you do there. You have to read carefully so that you understand. Reading helped it that."* (pupil) Projects B and C, moreover, offered children understanding of different phases in a game design project, and especially the game editor used in Project B showed children the complexity of game design and the huge amount of data and decisions needed when developing even a simple game. When using the game editors, children had to learn to use their analytical capacity, to be able to create structured stories. This was clearly challenging to some of the children, depending on their background, as the teacher of Project C said: *"Some [of them] can experience it as difficult – creativity and self-imposed and active way of working, it can be challenging*." On the other hand, in Project B the teacher reported that "*Pupils liked the fact that the lessons were different and they could cooperate with different people*" "*For many, the traditional mother tongue lessons are not that interesting, so it was fantastic to see how they got excited about this*." She also told that pupils had learned a lot of new things: *"[They learned] a lot about game development as well as about working with also other people than only the teacher. [They learned] group work and negotiation skills as well as about the content and meaning of multi-literacies*." The pupils themselves reported of learning about "*game design", "modification of things"* and "*programming of different kinds of things*" as well as that game design "*is difficult"* and "*takes a lot of time"*. Many pupils also said they had learned "*to use the editor"*. Programming skills have been proclaimed to be the skills for the future, even to the extent that countries like Estonia, UK, and Finland have added programming as part of their curricula. Project C offered children a possibility to program parts of the game. In addition to that, Project C offered children understanding of participatory design in practice. The children were not designing the game only for themselves but for other users, too, who the children invited

as evaluators into the technology design process for improving the solution. The teacher in Project C saw the whole project as an important learning process for the children: *"my expectations were that children gain a lot [of different types of skills and understanding when taking part] in the process [of game development, which they did]."*

All in all, we claim that our activities offered children possibilities for development of competence as regards their social, intellectual, and creative skills, which should help children to act as full society members later on in their life (Chawla and Heft 2002; Yarosh et al. 2011).

Concluding Discussion

The aim of this paper was to examine *what does the concept of 'empowerment of children' mean in digital technology design, and, what relevance does this bear for IS research?* We believe that the context of the projects examined in this study, learning the all-encompassing new literacy skills, provides an excellent context for studying children's empowerment; engaging children as participants in the on-going transformation of the school. Previous studies show that games and technology in general may play a decisive role in the improvement of literacy skills (e.g. Apperley and Walsh 2012), and games are pervasive in the modern world, and also a source for huge growth as part of creative economy. Therefore, in the three projects discussed in this paper, we have involved children in game design, a promising arena in which learning new literacy skills and empowering children in/learning of digital technology design merge and children gain also some understanding of what it means to create something new and innovative. We wanted to critically examine the projects in light of our literature review on various sources addressing empowerment of users or children and to consider in which respects children were empowered in our projects as well as in which respects empowerment of children was neglected. We also considered how our study could serve IS interests more generally. Next, we discuss the implications of our findings.

Empowering Children

In IS research, children have been a neglected group so far, although calls for research on children and IS have emerged recently. CCI community, then again, offers understanding on how to work with children in digital technology design, and empowerment of children has been one of the driving values in the community. It is, therefore, a good source for IS researchers interested in digital technology design with children and children's empowerment. However, within this research community relatively little attention has been paid to discussing what empowerment of children really means: researchers arguing and aiming for empowerment of children often seem to take the concept of 'empowerment' as self-evident and do not define what they mean by it. For us, this resembles the **mainstream tradition** of empowerment: motivating and inviting children to take part in design actions initiated by others. That is why we felt that the concept of empowerment as regards digital technology design with children needs to be opened up and updated to benefit both IS and CCI researchers.

In case of children, we argue that in this mainstream sense empowerment has been well addressed in the CCI literature as well as in our work. However, CCI researchers have not been encouraging children to combat their 'oppressors' to gain more power, but the assumption has been that the different parties should try to achieve this goal in a peaceful manner instead, involving negotiation and listening to each other. An open question is whether empowerment of children in the sense of **critical tradition** is recommendable in some situations. It would be quite natural at least for teenagers who in any case struggle with their identity and growing independence. It is worth considering whether we should prepare for this and even encourage it somehow in our projects, by creating natural opportunities for children to act more forcefully. It could be combined with giving increasing responsibilities to children, thus teaching them the balance between power and responsibility. Quoting Winston Churchill: "*Where there is great power there is great responsibility, where there is less power there is less responsibility, and where there is no power there can, I think, be no responsibility*." Of course, we can also critically ask: if we benevolently give children the possibility to 'fight their oppressors', do we once again empower them in the sense of the mainstream view? And moreover, for the basis of power and responsibility, one needs to have knowledge. Therefore, it can always be argued whether the children of today have enough knowledge yet to seize even part of the design power for future digital technology development.

Democratic empowerment of users (see Clement 1996), including children, is quite evident in the CCI literature: it can be seen in the sense of increased power of decision among children, in digital technology design. However, we must again point out that usually this democratic empowerment has taken place within the objectives set by others (e.g., the organizations involved); hence, no questioning of those have been reported. In our design projects as well, teachers and schools (i.e., the managers and the organizations) have been appreciated as valuable resources rather than as something that should be strongly questioned. A relatively unexplored question concerns the different views on what is required for empowerment in the democratic sense: is it resources and ability and opportunity to utilize them, access to the decision-making arena, or is it the will to resist (see Hardy and Leiba-O'Sullivan 1998)? The last aspect has not been addressed within our projects, while some evidence of progress was found related to the former two. A more thorough analysis of these requirements and their realization in practice is needed in the future.

Functional empowerment of users (Clement 1996), or children, is also an obvious achievement of many design projects within CCI literature. Such projects have contributed to the life conditions or practices of users, including children, in significant ways. Yarosh et al. (2011) show that through digital technology development CCI researchers have created clear improvements for children's lives in several respects. Related to our projects, we consider the technologies we have created as empowering children in many significant ways as well. From this viewpoint, practitioners' efforts when creating solutions for children are very valuable. We would like to highlight the importance of these digital tools as potential material for children's creative capacity to envision digital technologies of the future (see Iivari et al. 2017). We encourage, however, the practitioners also to consider would the tools created for children's use benefit from giving children more decision-making power in the sense of democratic empowerment, when developing those tools. As children are experts of their own lives, could they also be able to make sensible decisions when equipped with resources and ability to utilize them?

A less discussed aspect that we have addressed in the current study considers the empowerment of children from the perspective of their **learning and competence development**. This is not a very far-fetched view of empowerment, as the literature has pointed out long ago that both literacy skills (e.g. Apperley and Walsh 2012; Gee 2012; Korotayev et al. 2011; Lacasa et al. 2008; OECD 2011; Squire 2008) and technology and design skills (e.g. Campbell 2004; Iversen et al. 2016; Large et al. 2007; Smith et al. 2015; Soloway et al. 1994) are essential for people, including children, and can improve their ability to participate in society and even to lead to richer intellectual life, better academic skills, better jobs, better socio-economic status, and improved quality of life. Such skills, overall, may give children increased power to shape their life and the surrounding society. We see this view of empowerment coming close to that advocated by Mohajevi and Leidner (2017) who argue that relevance of research should be interpreted as empowerment, among other interpretations. They emphasize a view on empowerment in which stakeholder engagement, power, and decision-making authority are to be aimed at for improving their life and well-being in some respect (Mohajeri and Leidner 2017). They also point out that educational value should be considered here – research may be relevant by empowering stakeholders through education that enables stakeholders to apprehend, discern, and understand, for example, competing perspectives and value systems related to the phenomenon being studied (Mohajeri and Leidner 2017). For us, this type of empowerment of children shows as very relevant. In addition, we want to highlight the empowering role of education regarding design skills of digital technologies in the future. Similarly to the new literacy skills, understanding, using, reflecting on, and engaging with digital technologies might empower children by developing their creative potential to develop their own visions of the future. However, less research attention has been devoted to this form; hence, future work is needed on this form.

Empowering People

The original values of Scandinavian IS tradition are still valid and empowerment of people is a topic that still intrigues as well as should intrigue IS researchers. The scrutiny of the concept of empowerment is valuable for IS researchers interested in empowerment in more general than only related to children. For IS researchers, overall, we maintain that it is useful to understand that empowerment denotes many different things. While it may drive our well-intentioned efforts, there are numerous approaches to it with clear differences and also with contradictions.

In recent IS research more generally, the concept of empowerment still arouses interest. It has pictured, for example, in studies on worker and team empowerment in healthcare and information systems security

Management/ mainstream view **Advocates**: Empowerment as a tool for motivating employees to strive for organizational/ management goals by giving them some power (Hardy and Leiba-O'Sullivan 1998; Howcroft and Wilson 2003; O'Connor 1995) **Neglects**: Liberation of people from oppression and false consciousness	**Pros**: easy to take into use; motivates people; invites people to take part; many existing methods and tools available (e.g. TQM, BPR, agile methods) **Cons**: empowerment happens within the boundaries set by the organization and/or management; those in power set the goals; empowerment can be only decorative or tokenistic; does not give true decision-making power to people; possibly does not encourage strong or long-lasting commitment
Critical view **Advocates**: Empowerment as the oppressed combating the oppressors and achieving power this way (Hardy and Leiba-O'Sullivan 1998; Howcroft and Wilson 2003; O'Connor 1995) **Neglects**: Organizational/ management goals; collaborative development involving all stakeholders (e.g. management and workers); practicalities in organizations (an idealistic view)	**Pros**: gives power and responsibility to people; encourages to see the oppressing conditions of the status quo; offers an opportunity to experiment with power and responsibility; encourages to make a change and take action **Cons**: contradicts strongly with existing (organizational) value systems, therefore difficult to take into use (e.g. with children, especially within school system); arouses hostility among the stakeholders; does not encourage collaborative ways of working; motivating people to take action may be challenging; various kinds of skills, competencies and dispositions (e.g. personality traits) required from people
Democratic view **Advocates**: Empowerment as people's right and ability to participate in decisions affecting their lives (Clement 1996) **Neglects**: Organizational/ management goals; practicalities in organizations (an idealistic view)	**Pros**: gives decision-making authority to all involved; empowerment strongly connects with people's own life world and interests; gives power and responsibility to people; offers an opportunity to experiment with power and responsibility **Cons**: may contradict with existing (organizational) value systems, may be therefore difficult to take into use (e.g. with children, especially within school system); may lead to consensus seeking and compromises; may be difficult to reach decisions; motivating people to take part may be challenging; various kinds of skills, competencies and dispositions required from people
Functional view **Advocates**: Empowerment as improving people's life-conditions to serve organizational/ management goals; e.g. empowering people to do their job more effectively and efficiently, including the use of better technological tools (Clement 1996; Spinuzzi 2002) **Neglects**: Liberation of people from oppression and false consciousness	**Pros**: encourages participatory development of people's life conditions (e.g. work practices and technology); easy to take into use; motivates people; invites people to take part; many existing methods and tools available (e.g. participatory design methods) **Cons**: empowerment happens within the boundaries set by the organization and/or management; those in power set the goals; empowerment can be only decorative or tokenistic; does not give true decision-making power to people; possibly does not encourage strong or long-lasting commitment
Educational / competence view **Advocates**: People are empowered through offering them important skills and competencies **Neglects**: Liberation of people from oppression and false consciousness	**Pros**: prepares people for the future, for acting as full society members; easy to take into use; may motivate people (if motivated to be educated); plenty of existing (educational) methods and material **Cons**: develops people's potential to become empowered, but does not directly allow any power for people, may end up as having no impact on people's lives; may be difficult to motivate people to participate (e.g. pupils in schools)

Table 3. Views to empowerment

contexts. In these studies, the concept seems to connect with the mainstream view of empowerment: workers are expected to align with the management goals, while they are given more power and authority in their work (e.g. Maruping and Magni 2015; Zafar et al. 2014). Then again, there are also IS studies utilizing more critical approach to empowerment, e.g., related to different kinds of vulnerable or

marginalized groups or communities (e.g. Leong et al. 2016; Li et al. 2012; Oreglia and Srinivasan 2016). However, not all of these studies rely on a stance informed by critical research tradition either. That stance would have encouraged to combat the oppressors in order to liberate the oppressed. One notable stream in IS research addressing worker empowerment relying on critical lens comes from Scandinavia, in which worker empowerment in and through systems design has been an essential goal. The more recent participatory design tradition has been criticized as neglecting the original political aspects and some of it can be interpreted as addressing the empowerment of users in more mainstream sense (see also Bjerknes and Bratteteig 1995; Ehn 1993; Greenbaum and Kyng 1991), while today, there also seems to be a revitalized interest in the critical view in the participatory design research community (see e.g. Simonsen and Robertson 2013).

Overall, we argue that many IS studies addressing the topic of empowerment do not necessarily acknowledge the variety in the views on empowerment – it is not recognized that the studies are dealing with a complex concept with many ontological, epistemological and ethical differences. We also argue that due to the digital transformation of society we need to consider carefully what form of empowerment could serve best in designing or redesigning the society. Each of the views advocates a particular perspective while downplaying others. Each perspective has strengths but surely also weaknesses. Researchers should be making conscious choices between these views and between the approaches to empowerment they end up advocating (see Table 3 for a summary of the various views to empowerment discussed in this paper). If we focus on the forms of empowerment where the goals and boundaries for people's actions have been set by others (mainstream and functional views, Table 3), does that allow genuine possibilities for creative thinking? Or, if we support empowerment form where new value systems contradict with the existing ones (critical and democratic views, Table 3), can that be a too huge burden to some people? We need to first acknowledge our own aims and then consider what form(s) of empowerment help best achieving aimed results and serves best in the context. We also want to provokingly ask, what kind of people change the world and what kind of empowerment helps them in that task?

Conclusion

In this paper, we have studied different forms of empowerment of children in our own projects. Use of these different eyeglasses for examining our own work has opened our eyes to see new possibilities for how to continue our research. We will definitely in the future look at the possibilities offered by critical view to empowerment even though we acknowledge the challenges it brings and can see potential conflicts, for example, in school context if that tradition is stressed too far. Partly criticizing our own work, we argue that it is not enough that we involve children in technology design projects or provide them skills to become mere participants of the technology-rich society we are building for them, and call this empowerment, even though we see their competence development as an important element of empowerment, as discussed above. Instead, we think that the children of today need to learn that it is possible and even wished for them to challenge the existing solutions, be they societal or technological ones. Therefore, when we talk about empowering children of today we should, first, aim to engage them with the social world and practices of design in a similar way as new literacy skills aim to engage children with the new social and communication practices involved in the modern digital society and, second, also consciously consider is that the only type of empowerment we are seeking for.

We think that as regards the ongoing digital transformation of society, the makers and shapers of the future need to have to feel empowered to resist the current norms and ways of doing things and we need to consciously consider what kind of empowerment serves this objective best. Children of today are the key players, the creative human resources of the future and therefore, there is a great potential in these children to transform the current IS economy. By empowering children now, we aim for a creative economy of the future where digital technology becomes the 'craftman's material of future'. This is why we suggest taking into consideration whether empowerment in the critical sense could or should be nurtured in children. Iceland with their curriculum for basic education is a great example of integrating some elements of this type of thinking as part of the curriculum, as their innovation education teaches children to question existing solutions and to find new ways to solve the problems (see e.g., Thorsteinsson and Denton 2003).

Furthermore, we argue that the transformation is happening right now, by all of us, not only in the future of our children. Therefore, we argue that our results bear relevance with any group of people, be they workers, patients, or consumers or more vulnerable groups such as elderly or disabled, as they all contain

the potential for a change, even though the critical form of empowerment might not be the answer to all. Overall, we invite both IS researchers and practitioners to critically reflect on which view(s) of empowerment they hold when working with people, be they young or old and what are the reasons and values behind that. Raising their awareness should be beneficial in itself but by familiarizing themselves with the various forms of empowerment, researchers and practitioners can also develop their own ways of working. There are such huge differences in the views on empowerment (cf. the mainstream and the critical view) and the discussion of those enables researchers and practitioners to make conscious choices as regards which form of empowerment they aim at. Such considerations are essential before any project starts, while we think it is also useful to monitor the project progress from this respect: whether empowerment has been the focus of the work, whether any progress as regards it can be observed and whether it is the most suitable form of empowerment that has been achieved or is being targeted. After projects, it is also valuable to reflect on the work done from this perspective, i.e., to reflect on whether relevance in the sense of empowerment was achieved and it which forms (see Mohajeri and Leidner 2017).

A limitation of this study is that there were only three projects and a limited number of participating children. With a larger number of projects different forms of empowerment might have been revealed. Different results could also have been achieved with a different mix of school subjects, e.g., sports classes would have been a very interesting context that is worth studying further. It would also be interesting to see other interpretations of empowerment of children, and particularly interesting would be to gain more understanding of how children themselves see their empowerment, as in this study we mainly concentrated on adults' views. This is justified, as the involved adults – researchers and teachers – strived for competence development and empowerment of children to act as full society members, and teachers were able to provide us elaborate, sophisticated accounts of that. They also knew 'their children' intimately, often from working many years with the same ones. However, we do acknowledge that children's own views are equally important and should be inquired in more depth in the future. Another path for future work concerns participants who "do not want to be empowered" (Correia and Yusop 2008) that also we encountered in our projects. Teenagers are a very challenging group to work with in that sense, and the teachers, as professionals for working with teenagers, have the same problem daily at school. We ask, in the same line with Iivari et al. (2015): "everyone should have the right to take part and to have a voice, but how does one deal with those that do not want to exercise that right?" From this perspective, different kinds of methods and tools could have been experimented with also in our case.

Finally, as a highly fascinating path for future work we also wish to highlight the potential of participatory game design as a practice for developing children's general competences needed in life as well as for increasing young people's literacy skills, our original goal. Learning skills through digital games and gamification has increased and although currently participatory technology design projects are rare in schools, the increasing interest of adding programming as part of school curricula entails possibilities for widening the perspective from mere programming to participatory game design.

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