

Exclusions in social inclusion projects: Struggles in involving children in digital technology development

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1. Introduction

The children of today were born into a world where smart phones, tablets, and the Internet are ordinary things. They learned to use digital technology as toddlers and their adult lives will be full with digital technology. However, some children are better equipped for a future merged with digital technology than others (OECD 2012, Livingstone & Helsper 2007). This disparity is referred to as the digital divide or a polarization between those who have access to and ability to develop their skills related to digital technology, and those who do not. This is a serious concern of ours: it is pivotal to provide the children of today with equal opportunities to access, use, and gain benefit from digital technology (Agarwal et al. 2009, OECD 2012, Riggings & Dewan 2005, Srivastava & Shainesh 2015). The young generation needs to understand and be able to make informed decisions on how to utilize digital technologies in everyday life, underscored in the literature on computer, technology, and digital literacy (Davies 2011, Eshet-Alkalai 2004, Ezziane 2007).

It is not merely the use of digital technology, however, that is important for children. Children's participation in digital technology development has intrigued researchers within the Human-Computer Interaction community for decades (Druin 2002). In recent years, it has become apparent that we need to provide children not only with in-depth knowledge of digital technology use but also *development* skills, i.e., to concretely design, make, and build digital technology (Blikstein 2013, Cornwall & Gaventa 2000, Heeley & Damodaran 2009, Mariën & Prodnik 2014). Researchers in the field of Information Systems (IS) have addressed a wide range of related topics. Among others, the following themes have been discussed: children's digital technology use; the digital divide; the importance of computing environments in schools; digital, technological, and computer literacies: computational thinking and computer self-efficacy (Davies 2011, Eshet-Alkalai 2004, Ezziane 2007, Teo et al. 2002, Thatcher & Perrewé 2002, Vodanovich et al. 2010, Walden et al. 2013, Wei et al. 2011). However, children's digital technology development skills have remained quite neglected so far. As regards the development skills, moreover, it is not only the computational aspects that are significant but also the design of and innovation in and with digital technology (Bekker et al. 2015, Blikstein et al. 2013, Smith et al. 2015). Overall, digital technology education should empower children to make and shape digital technology to suit their purposes and interests (Blikstein 2013, Cornwall & Gaventa 2000, Heeley & Damodaran 2009, Mariën & Prodnik 2014). IS research should take children, along with their digital technology skills and competencies, into the focus of its study, as children will form the future IS workforce (Clayton et al. 2012, Iivari et al. 2016).

Accordingly, we have organized a number of participatory projects together with children, aiming to teach them digital technology design and development skills. We view our projects as examples of social inclusion projects¹. For the purposes of this

¹ Our projects align with the goals of social inclusion (see section 2.2), even if we acknowledge that there is variation in the degree of such alignment. 'Social' is used for emphasizing the collaborative nature of

study, social inclusion is defined as “the extent that individuals, families, and communities are able to fully participate in society and control their own destinies” (Warschauer 2002). In this study, we reflect on the experiences and insights gained during the projects, focusing particularly on exclusions. IS research has already addressed social inclusion from various perspectives, such as gender, age, race, ethnicity, sexual orientation, and disability (Kvasny & Richardson 2006, Trauth & Howcroft 2006, Trauth & Niederman 2006, von Hellens et al. 2012), but still needs to fully explore children’s digital technology education from the perspective of inclusion/exclusion. Research on social inclusion has already acknowledged that inclusion and exclusion are complex topics with a wide range of physical, digital, human, and social resources involved (Warschauer 2002). Inclusion/exclusion concerns both individuals and social structures and needs to be grasped from a multiplicity of perspectives: social, organizational, political, economic and cultural (Butler & McAvoy 2008, Labonte 2004, Livingstone & Helsper 2007, Mariën & Prodnik 2014, Taket et al. 2009, Trauth & Howcroft 2006, Warschauer 2002). People’s empowerment and agency are also significant concerns here, affecting both inclusion and exclusion, as social inclusion needs to be done *by* people rather than *to* them (Andrade & Doolin 2016, Taket et al. 2009). Equally important is to acknowledge the (socio-economic) rules and (political) powers that are creating excluded groups and conditions (Labonte 2004) as there are always excluded groups and conditions in society – inclusion can even be seen to involve or rely on exclusion (Edwards et al. 2001, Labonte 2004, Wilding 2009).

Our research question is: *what kind of groups or conditions² may become excluded in social inclusion projects and what seems to be creating such exclusion?* We address this question by identifying excluded groups and conditions in our projects and by analysing the various rules and powers that seem to be creating them. We utilize nexus analysis (Scollon and Scollon 2004) as our theoretical lens, which maintains that broad social issues are ultimately grounded in the micro-actions of social interaction that need to be studied close. At the same time, the very mundane micro-actions form a nexus through which the largest cycles of social organization and activity circulate (Scollon and Scollon 2004). Nexus analysis is particularly suitable for studying complex phenomena from different perspectives and it has already been used in IS research (e.g., Halkola et al. 2015, Iivari et al. 2014, Iivari et al. 2015). We consider nexus analysis as aligning very well with our view of social inclusion.

The structure of the paper is the following. Section two introduces the central concepts and related research of this study. Section three discusses nexus analysis as our theoretical and methodological lens. Section four describes the research design including the cases involved in this study as well as the procedures of data collection and analysis. Section five outlines our empirical insight. Section six discusses their implications. Section seven concludes the paper.

2. Related research

any inclusion endeavour as well as the inevitable, strong interlinking of inclusion with societal level issues – this applies to our projects as well as to social inclusion programs more broadly.

² Condition is used here to refer to a “particular mode of being of a person or thing; existing state; situation with respect to circumstances” (<http://www.dictionary.com/browse/condition>), “state of something with regard to its appearance, quality, or working order” (<https://en.oxforddictionaries.com/definition/condition>) that enables investigating not only identifiable ‘groups’ of people but also more vague ‘conditions’ of people that seem to be connected with people’s exclusion.

This section introduces relevant research on digital technology education, the context of this study, and the social inclusion and exclusion.

2.1. Digital technology education

Digital education is a field that has been advocated under various names in authoritative reports on both national and international level (OECD 2015, European Union 2015). It has been declared that children and young people need to be taught new skills for the twenty-first century. Notions of the net generation and digital natives have been proposed as appropriate to describe how children are being raised in a world in which digital technologies are ubiquitous (Prensky 2001, Tapscott 2009). While some influential critical voices maintain that researchers have not yet empirically proven the positive effects of digitalization, schools are encouraged to adopt new pedagogies for promoting digital literacy (Hargittai 2010).

Education has in part adapted to these changes, and the digitalization of our society has blurred the boundaries of learning spaces, introduced new media practices in the classroom, and transformed the professional roles of educators (Buckingham 2007, Jones & Hafner 2012, Oblinger & Oblinger 2005). However, despite financial and pedagogic input as well as abundant research in the field, no great changes seem to have taken place in schools yet on a wider scale (OECD 2015, European Union 2015). Opportunities for children to take an active role in shaping their own technology-rich environment have been scarce, despite the participatory and learner-centered approaches used in digital education curricula (Kuure et al. 2016). For teachers and student teachers, it seems to be difficult to change practices and get pupils to envision future technologies collaboratively (Kuure et al. 2016). As Ross (2017: 214) states, “Working with the not-yetness of digital education means engaging with complexity, uncertainty and risk, not as factors to be minimized or resolved, but as necessary dimensions of technologies and practices which are unknown and in flux.”

It has been argued that age and access to technology are particularly relevant when it comes to preparing children for the twenty-first century as they encounter various digital technologies and begin to learn appropriate media practices from an early age (Couse & Chen 2010, European Union 2015). However, recent studies have emphasized that configurations of socioeconomic status, gender, and cultural environment are more important than age when it comes to learning digital technology skills (Hargittai 2010). Researchers are also moving past an emphasis on the digital gap or divide to exploring the complex array of issues related to social inclusion and exclusion that emerge from the opportunity, or lack of opportunity, to access, adapt, and create knowledge using digital technologies (Warschauer 2002). The question is no longer how people use technology, but how people learn to handle technology-rich situations in which they need to accomplish diverse activities (Buckingham 2007, Livingstone 2015). More research is needed to address questions of democracy and social justice that are embedded in educational technology, which is seen as socially constructed and negotiated (Selwyn 2010).

IS research has remained relatively silent on the topic of digital technology education for children. However, we see that the discipline should become more engaged with the topic, as it has been shown that childhood plays an important role in influencing an individual’s career choices. The topic of women in IS profession has already directed attention to children in this respect (Clayton et al. 2012).

2.2. Scrutinizing social inclusion/exclusion

Discourses on social exclusion originate from Europe, particularly French social policy. There, the focus has been on those excluded by the state and their inclusion in society, while the concept of digital divide has received more prominence in the US (Edwards et al. 2001, Trauth & Howcroft 2006, Taket et al. 2009, Warschauer 2002). Recently, the concept of social exclusion has been extended to multidimensionality that regards exclusion not as a state of affairs but as a process operating within the context of social and political systems (Phipps 2000).

IS research has already addressed social inclusion from various perspectives (e.g., Kvasny & Richardson 2006, Trauth & Howcroft 2006, Trauth & Niederman 2006, von Hellens et al. 2012). Social inclusion/exclusion research has for long centered on the role of digital technology. Digital technology has been seen either to increase exclusion or to ease it (Trauth & Howcroft 2006). Studies have examined individuals, households, neighbourhoods, cities, and countries and their access to and use of digital technology or the lack thereof (Trauth & Howcroft 2006). Studies have further shown how digital technology education as well as career and work practices are gendered (Booth et al. 2010, Clayton et al. 2012, Joshi & Schmidt 2006, MacKenzie & Wajcman 1985, Tapia 2006, Trauth & Howcroft 2006, Trauth & Niederman 2006, von Hellens et al. 2012). IS literature has also acknowledged that race, ethnicity, socio-economic status, and disability may shape engagement with digital technology and associated education and careers (e.g., Adam & Kreps 2006, Kvasny 2006, Trauth & Niederman 2006). However, while other disciplines have explored inclusion/exclusion as regards children and digital technologies, IS researchers have yet to expand their focus to the younger generations. So far, IS literature on the topic is very limited (some examples are Fielden & Goldson 2005, Iivari et al. 2015, Iivari et al. 2016, Kinnula et al. 2017).

It is important to acknowledge that the digital divide does not merely concern access to digital technology but also its meaningful use (Livingstone & Helsper 2007, Mariën & Prodnik 2014, Warschauer 2002), i.e., being able to make use of digital technology in meaningful social practices, which requires a wide range of physical, digital, human, and social resources (Warschauer 2002). We extend this view by emphasizing that it is not only the access or the ability to use digital technology in meaningful ways, but people's skills and competencies to make and shape digital technology to suit their purposes and interests (Blikstein 2013, Cornwall & Gaventa 2000, Hargittai 2002, Hargittai 2010, Heeley & Damodaran 2009, Mariën & Prodnik 2014). Today, there are highly skilled and autonomous individuals and groups that are empowered in this sense (e.g., hackers, makers, open source developers), but there remains a large number of low- or unskilled individuals and groups that are not empowered. Instead, they may in fact be experiencing an increased sense of disempowerment (Mariën & Prodnik 2014).

As inclusion should not be seen mere non-exclusion, and, inclusion actually relies on exclusion (Edwards et al. 2001, Labonte 2004, Wilding 2009), this study regards social inclusion and exclusion as complex concepts that go hand in hand (Andrade & Doolin 2016, Butler & McAvoy 2008). In a capitalist society, inclusion necessarily involves exclusion; the inclusion of some causes the exclusion of others in a labour market (Mariën & Prodnik 2014). As Edwards et al. (2001: 427) state, "There can be no sense of difference in a condition of homogeneity in the same way that it makes no sense to talk of equality without inequality, normal behavior without a sense of deviance, or being educated without a sense of what it is to be uneducated". Hence, the concepts of deviancy and Otherness play a significant role when addressing

inclusion/exclusion (Edwards et al. 2001). When considering people's daily realities, researchers need to acknowledge that when an individual becomes included in one community, they become excluded from many others: inclusion leads to exclusion along some criteria. In studies of inclusion/exclusion, it is important to make visible the communities of exclusion that result from inclusion (Wilding 2009).

We can also question the desirability of inclusion. Inclusion as a concept is consensual and the idea behind it is warm and inviting (Edwards et al. 2001). However, we can question whether there needs to be room for diversity and for not being included. Although in social inclusion there is an idea of "a centre towards which everyone must be given opportunities to gravitate" (Edwards et al. 2001: 424), sometimes exclusion may be chosen and even desirable as people may want the freedom of not being included or of staying excluded (Edwards et al. 2001, Mariën & Prodnik 2014). Willful social exclusion can be regarded as an important moment of conflict, an empowered act of resistance to the socio-economic system (Labonte 2004). Hence, people may voluntarily and intentionally choose to exclude themselves. Then again, there are always social, economic, political, and technical conditions that shape people's choices and there actually is no free informed choice (Mariën & Prodnik 2014). From this perspective, exclusion would not be seen as a voluntary or intentional choice. Overall, there is too much emphasis on human agency in the literature, whereas attention should be paid to macro-level contexts and structural inequalities – one should be careful of not individualizing problems social in nature (Mariën & Prodnik 2014).

The literature has identified weak and strong versions of social inclusion (Trauth & Howcroft 2006). The weak version places emphasis on inviting those excluded to join the society, whereas the strong version involves adopting a critical stance and combating those involved in excluding the excluded, challenging the power of the excluders. The weak version does not maintain that there is something inherently wrong with society (Trauth & Howcroft 2006). The strong version, however, reveals a contradiction: inclusion projects seek to include individuals and groups in a set of structures and relationships that are responsible for excluding them in the first place (Labonte 2004). Inclusion may actually put people into powerless positions rather than challenge the hierarchies that created their exclusion (Labonte 2004). For this reason, exclusion needs to be looked at not only from an individual or community perspective but from a societal perspective (Taket et al. 2009). One may focus on individuals, their resources, characteristics and limitations when examining exclusion, but it is also very important to look at the social structures that prohibit inclusion (Butler & McAvoy 2008). The strong version of social inclusion primarily focuses on excluding social structures (Labonte 2004). Its concern is the socio-economic rules and political powers that create excluded groups and conditions, and the social groups who benefit from this (Labonte 2004).

Our view on social inclusion/exclusion, however, places emphasis also on human agency and empowerment in line with the capability approach, which highlights people's agency to control their destinies and to fully participate in society, through digital technology development or otherwise (Andrade & Doolin 2016, Warschauer 2002). The capability approach is not concerned with the resources individuals can access. Rather, it is interested in how people can put those resources into meaningful use (Andrade & Doolin 2016). Education plays a significant role in this. Indeed, it has been argued that education is the only enduring and successful means by which the cycle of disadvantage can be broken (Butler & McAvoy 2008). The teachers' role has been established as particularly crucial in reducing inequalities between pupils with varying digital literacy levels caused by their socio-economically diverse backgrounds.

However, educating people is not enough, but people's agency and empowerment need to be emphasized (Andrade & Doolin 2016, Phipps 2000, Warschauer 2002). For empowerment to emerge, there must be resources as well as the ability and desire to mobilize them and access to the decision-making arena (cf. Hardy & Leiba-O'Sullivan 1998). Moreover, empowerment should not merely entail the powerful giving some power to the power-weak, but the power-weak combating the ones in power to obtain empowerment (Hardy & Leiba-O'Sullivan 1998, Howcroft & Wilson 2003, O'Connor 1995). Hence, agency and empowerment in connection to inclusion emphasize that social inclusion is something done *by* people, not something done *to* them (Andrade & Doolin 2016, Taket et al. 2009).

Overall, we conclude that social inclusion/exclusion are complex concepts and they need to be studied as multidimensional, relational, dynamic processes (Andrade & Doolin 2016, Phipps 2000, Taket et al. 2009). There are numerous social, organizational, political, economic, and cultural aspects involved, both at the individual level and at the level of social structures (Trauth & Howcroft 2006, Labonte 2004, Livingstone & Helsper 2007, Mariën & Prodnik 2014, Taket et al. 2009, Warschauer, 2002). One has to pay attention to a wide range of physical, digital, human, and social resources to understand the agency and empowerment of the people involved as well as the desirability and voluntariness of inclusion and exclusion (Andrade & Doolin 2016, Edwards et al. 2001, Labonte 2004, Mariën & Prodnik 2014, Phipps 2000, Taket et al. 2009, Warschauer 2002). All of these considerations increase the complexity of social inclusion interventions as well as empirical analyses of inclusion/exclusion.

3. Nexus analysis as a theoretical and methodological lens

Nexus analysis (Scollon and Scollon 2004) is used in this article to make sense of social inclusion/exclusion in our empirical cases. Nexus analysis draws on various sources in its perspective on mediated social action: Vygotsky's (1978) cultural-historical activity theory, Goffman's (1981) theory on social interaction, Bourdieu's (1977) practice theory as well as the thinking of Nishida (1958). In nexus analysis, the basic unit of analysis is **social action** in real time and space, seen as linked into a network of other actions, situations, and events. In this paper, the social action under scrutiny is involving children in digital technology development. Nexus analysis is essentially interested in **discourses in place**, i.e., discourses circulating in certain time and place, some getting more salience than others, some with slower and long-term traces, some anticipating the future (Scollon and Scollon 2004:14). It is also interested in how "the broad discourses of our social life are engaged (or not) in the moment-by-moment social actions of social actors in real time activity" (Scollon 2001: 160). This study focuses on the ways in which the involved researchers, teachers, children, and other actors construct the endeavor in their talk (e.g., the way how children may construct technology design in school context as somewhat boring homework) as well as on the broader societal discourses constructing the topic (e.g., how national curricula shape teachers' work).

It is important to bear in mind that participants in social action all have their own historical bodies that they bring into the situation, contributing to the emergence of different interaction orders in the group. **Interaction order** (Goffman, 1981) refers to the relationships between the social actors: the researcher may ask why they interact in certain ways in different groupings and how this affects the social action under scrutiny. For example, through inspiration and/or prohibition, researchers, teachers, and peers influence and shape the ways in which children engage in the endeavor and how

they view it. Extending our considerations beyond isolated interactions, moreover, we must examine the histories of these actors as well as any relevant and available resources, trends, and news in the surrounding society or at the global level. Children's activities, for example, are shaped by their life experiences and familiarity with certain media and digital technology, i.e. by their **historical bodies** (Scollon and Scollon, 2004: 13, originally from Nishida, 1958). In the same way, the historical bodies of their teachers, their digital technology experiences and competencies, shape the routes of actions taken in our projects.

Overall, nexus analysis requires extending research from the actual here-and-now situation to wider cycles of discourse on a long-term basis (Iivari et al. 2014). Nexus analysis directs us to view social action as an intersection of historical body, interaction order, and discourses in place. These concepts, even though useful to analytically distinguish from each other, are all intertwined, each revealing a particular aspect of the same phenomenon. The social action in question is scrutinized from the perspectives of discourses, histories, and interactions of the social actors involved and how they all shape the action in question (Scollon and Scollon 2004). As nexus analysis wishes to acknowledge and tie together both micro-actions and broader social issues and discourses circulating around in society, it is particularly suitable for studying complex social phenomena that are bound together by the histories of actors and institutions across varying timeframes.

4. Research design

Our interdisciplinary research group has organized a number of digital technology development projects with children (see Iivari et al. 2015, Iivari & Kinnula 2016a, Iivari & Kinnula 2016b, Kinnula et al. 2015, Kuure et al. 2010, Kuure et al. 2016, Molin-Juustila et al. 2015). Five of the six presented studies have been conducted in the context of Finnish schools. Finnish children start their nine-year-long compulsory basic education at the age of seven. Finnish schools are public schools, which follow a national core curriculum that local educational authorities and schools follow in defining their own curricula (NCCBE 2016). The curriculum contains objectives and core contents for different subjects. One of the seven general objectives is that children should learn skills related to digital technology as part of transversal competencies. Such skills are presented in the curriculum as central skills for all citizens (NCCBE 2016), targeting the digital divide. It is the strategy of the Finnish National Agency for Education (Learning and Competence 2025) to promote the use of digital technology in education to renew learning culture. This objective entails the desire to give the pupils the opportunity of taking an active role in their education by fostering their creativity. The principle of differentiation with respect to the needs of all learners also arises from the curriculum. Learning and the role of technology are recognized as natural parts of everyday life, not just at school but in the diverse learning sites of leisure time, such as games and other virtual environments arising from people's interests. In Finland, teachers are required to have a Master's Degree, including pedagogic studies. Teacher education is among the most popular career paths among university applicants in Finland. The quality of education in Finland is one of the best in the world, according to the Programme for International Student Assessment (PISA) of OECD. Teachers have pedagogic independence: they need to follow the school-specific curriculum but they have the freedom to do this as they see fit. This background explains why Finnish schools are fruitful environments for innovation interventions and projects.

The empirical, qualitative, participatory studies described in the current work have all been conducted within our research group, independent of each other, with varying purposes and motives. The empirical material of the studies has been gathered through different methods. Five of the six presented studies include a collaborative digital technology development project with children: the first four studies as well as the last one. They all involve a team of junior and senior researchers, the junior researchers executing the work in the final phase of their Master's level studies under the guidance of senior researchers. One of the studies is an interview study of school principals in the area, enabling us to examine broader issues involved with social inclusion/exclusion in relation to our projects. Figure 1 introduces the studies according to topic, setting, sample, data collected, and articles already published on them.

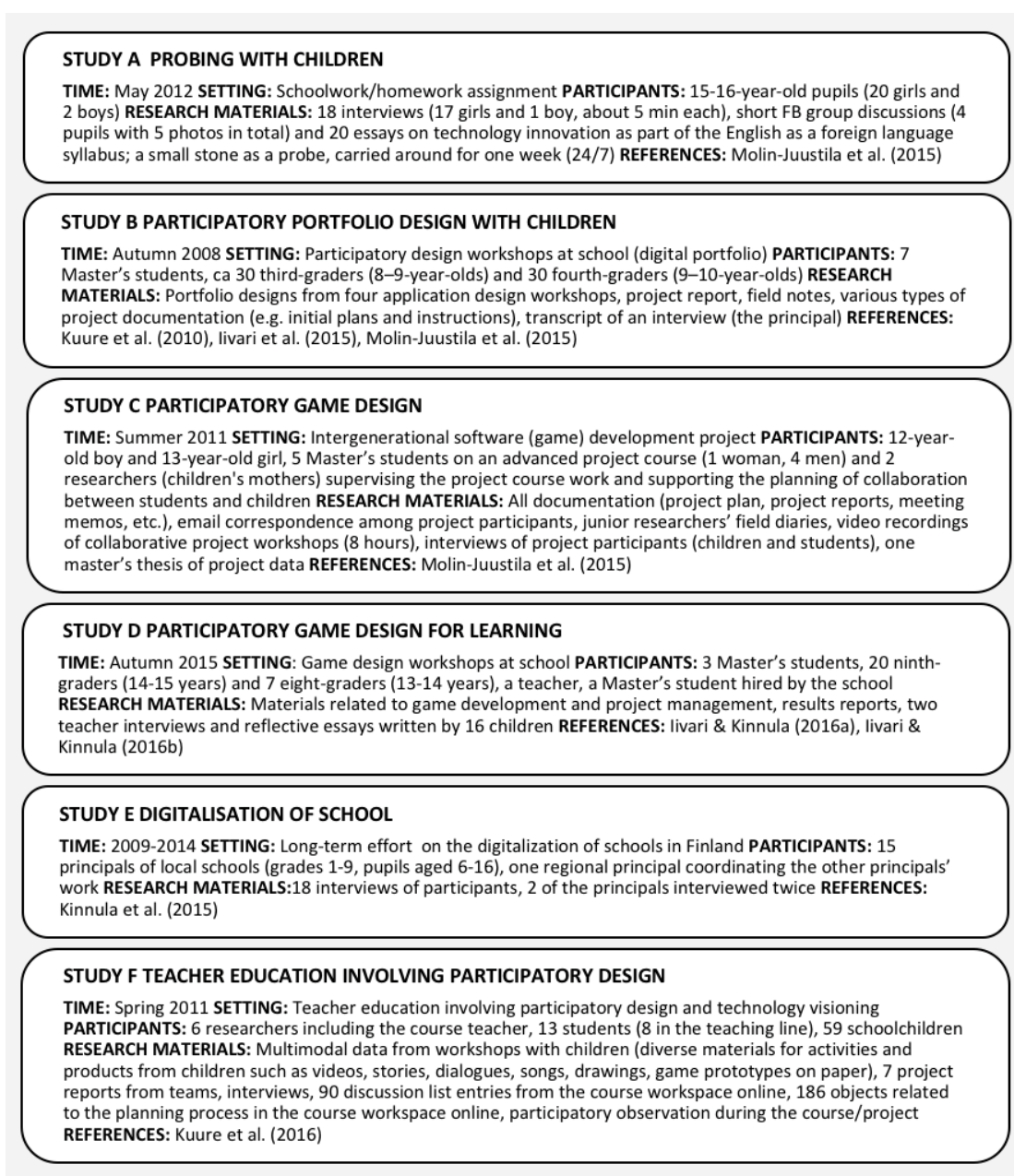


Figure 1. Introducing the studies

When we selected the studies for this paper to illustrate the phenomenon of inclusion/exclusion in digital technology development with children, nexus analysis was drawn on to become aware of the nature of inclusions and exclusions in the studies at hand (Figure 2). It appeared that despite our attempts to apply the best practices suggested in the literature for including children and for embracing their contribution, there were still excluded groups and conditions in our projects. Our wish was to understand the rules and powers at work.

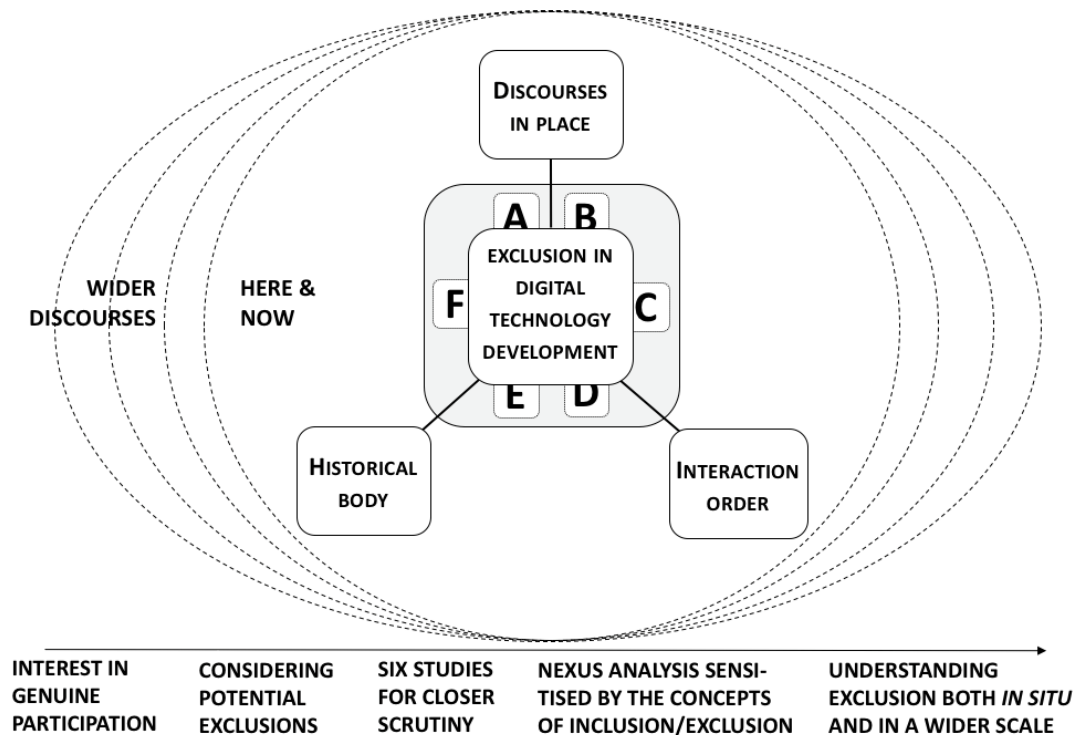


Figure 2. Using nexus analysis for examining exclusion in digital technology development (A–F refer to the six studies under scrutiny)

Six individual studies were selected to exemplify certain types of exclusion, based on our previous analyses of the cases (see the references in Figure 1). In the second phase, specific studies were assigned for each author to conduct in-depth analysis of the data. We identified the exact moments in which exclusion becomes evident in a particular study, using nexus analytic concepts as sensitizing devices (Scollon, 2001, Scollon and Scollon, 2004). We analysed the discourses circulating around by examining how the participants spoke about the projects and about children's inclusion in them. As for interaction order, we identified the signs of social interaction or relationships between people and the different actors present or implied that seemingly influenced the child participants' exclusion. As for historical bodies, our analysis focused on traces of participants' background knowledge and experiences (or lack of them) related to digital technology, media, or project work that seemed to be contributing to exclusion. A lengthy table was created, reporting insights and data excerpts from each study (resulting eventually in Table 1). In the third phase, we paid specific attention to whether inclusion/exclusion was done to the children or by them (cf. Andrade & Doolin 2016, Taket et al. 2009) as well as to how digital divide and

gender³ pictured in the exclusion examples. In every phase of analysis, we collaboratively discussed the findings and refined our shared understanding of the exclusions. Finally, we drafted the study narratives that communicate the most significant findings from each study, showing the moments of exclusion in situ and the aspects of social action that instigate exclusion, i.e., the rules and powers at work. To give an illustrative account of the studies, we settled each a specific role: every study presents something different from the point of view of exclusion as well as from the viewpoints of discourses in place, interaction order, and historical body shaping exclusion.

5. Exclusion in social inclusion projects

In this section, we identify excluded groups or conditions in our projects. Afterwards, with the help of nexus analysis, we discuss the rules and powers that seem to be creating these groups and conditions. Table 1 summarizes the findings derived from our empirical studies.

5.1. Findings case by case

Study A: Probing with children

Study A exemplifies how researchers' backgrounds, connections, and histories coupled with their choices regarding the school subjects, methods, and examples used may contribute to children's exclusion.

The study was about idea generation for new digital technologies following the probe method (see e.g., Gaver et al. 1999). A researcher working as an English teacher selected a class to work with during their English lessons. Thus, the existing contacts of the research team strongly guided the selection process. In addition, the selected method used in the study suggested specific practices to be followed by default. The selection of the method reflected researchers' preferences, although with the good intentions to enter the life world of the children and thus making their participation as engaging as possible. In this particular case, the probe package created included several tasks, of which with two tasks we will scrutinize children's exclusion: the stone task and the Facebook (FB) group task. In line with the probe method, for the stone task, the children were asked to carry a stone with them for a week and imagine what benefits the stone would offer to them if it were "a smart stone". Afterwards, the children were asked to write an essay in English about their visions for "a smart stone for social interaction." The same week, the children were asked to post pictures and comments on specific daily topics given by the research group to a closed FB group. The children were left to accomplish these tasks on their own as is usual with the probe method, although the stone essay was written in a classroom situation. The stone acted as an abstract probing material, which, together with the instructions to write the essay in English, resulted in roughly one-page handwritten stories from the children, some including drawings as well.

The language (English as a foreign language) used, the method, and the instructions given restricted children's capacity to express themselves. A girl and a boy explain to us:

³ Unfortunately, our data was quite limited to study the gender aspect. Our findings concern only children; hence, the influence of the gender of the adult participants could not be studied with this data

'In a way, it was kind of easy to invent new ideas related to the technology, like new ideas for technology, but then, when you wanted them to be connected with this "social interaction" it became more difficult.'

'Yes, if there were only the stone without any [...] you might have even thrown the stone at ...'

Evidently, the given instructions were restricting children's ideas for the smart stone. When giving the instructions, we asked them to imagine technology *'or/and social interaction.'* It seems that there would have been more ideas related to technology only. In the essays several ideas most likely were dropped out due to these instructions. Children might have also been afraid not to follow the instructions as this was their school task as well.

Second, the children had to write their essays in a foreign language and those who were not proficient in English were not able to express themselves as clearly and in-depth in comparison to the students with higher English proficiency (see Figure 3).

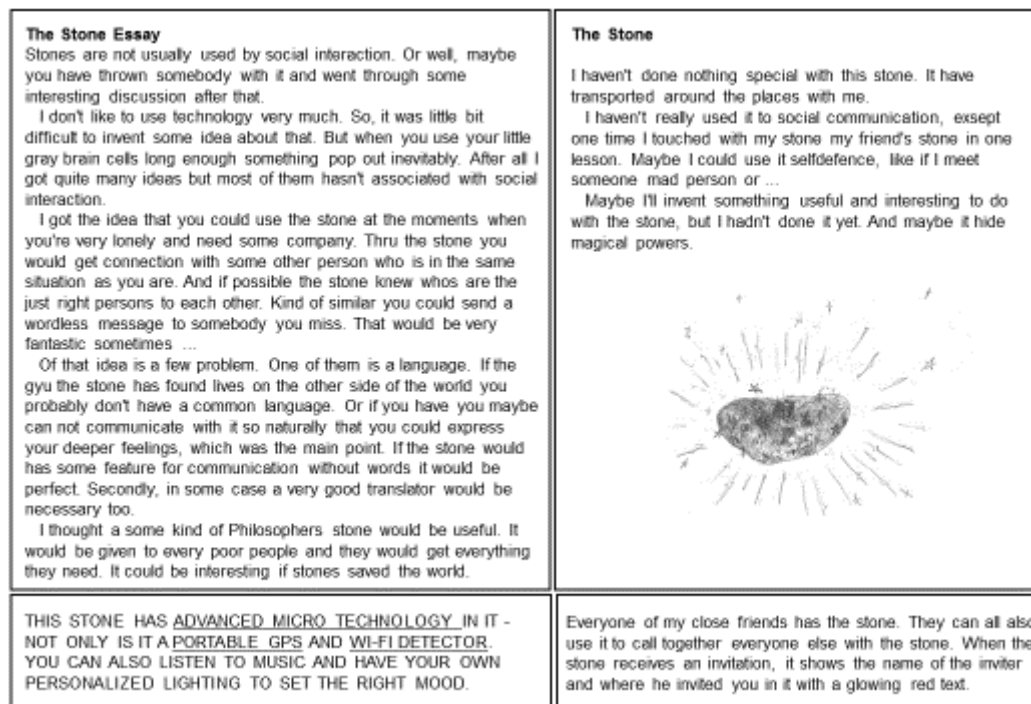


Figure 3. Four excerpts from the children's essays

The children were interviewed in English after the essays were written, further highlighting the differences among the children's language skills. Some of the interviews had to be conducted in Finnish due to the interviewee's low English proficiency. Similar to the essays, the length and versatility of children's expressions varied significantly and this must have been an excluding factor for several ideas.

Moreover, several children were unable to participate in the FB task. Again, there were exclusions created by the method choices and instructions. First, the daily topics were considered *'too difficult'*, *'boring'*, or *'irrelevant'*. Second, the timeframe (one week for the whole task, one day for each topic) was considered too short: *'I went to another city because I had a camp there so I couldn't take the pictures there and*

then I just didn't have time.' Furthermore, the English language was creating exclusions. When the children were asked about the reasons for not joining the FB group, at least some of them believed that their language skills restricted their participation as this was the only 'public' task where children's contributions became visible to their peers: *'the time could be longer in this FB task and, you know, my English is so bad.'* In addition, there were technical problems specifically in this task that excluded some of the children from participating: *'first my camera didn't work and I couldn't take the pictures'* and, *'our broadband went down and then our Internet didn't work and it was [a] little complicated to join the group.'* The following excerpt from one interview nicely sums up the limitations related to the FB group task:

'I don't really take photos . . . or use my camera or anything like that and I think that was, like—I have some weeks when I don't really use the computer at all so it was, I think it was one of those weeks when I didn't really . . . I didn't even go to FB like just a couple of times and then I thought the topics were kind of hard . . . and I thought the topics were kind of boring . . . I think, if the topics would have been more interesting and like more inspiring it would have like made people want to take pictures of the places . . . I think the pace was too quick like if you have to upload one picture every day you don't necessarily have time to take the pictures every day.'

The FB group task was too far from the daily habits of some of the participants, highlighting variety in their digital technology use (e.g., some did not use cameras and others did not use computers or Facebook frequently). Lack of access to resources or technical skills, in addition to finding the topics boring, resulted in some children simply having no motivation to participate. However, as the tasks were school assignments, all children had to participate regardless but found it hard: *'I'm not good at using my imagination when you're [...] told to use it and there was no limit so [...] I actually didn't use my imagination at all I looked around in the class'* The essay task included both a compulsory part (writing the essay) and a voluntary part (writing short essays about the stone during the week it was carried). Most of the children left the voluntary part undone. Thus, the subject for many of the essays was identified only when writing the final compulsory essay, which did not reflect the spirit of the probe method but at least enabled the children to finish the compulsory part of their school work. Hence, the study also highlights how the pupils engaged in various kinds of school work/homework discourses, some of the discourses positioning the pupils as obedient ones, others as less obedient (i.e., pupils not doing what they were told to do).

Study B: Participatory portfolio design

Study B affirms the impact of researchers' actions and choices. It also brings forth the significance of teachers and principals in schools as regards exclusion of some children in social inclusion projects involving child participants. The study also delves deeper into the *in situ* activities of children and shows how children's relationships, dispositions, interests, and interactions in the classroom shape their inclusion and exclusion in digital technology design.

The study was strongly guided by the multidisciplinary research team's interests on multidisciplinary cooperation and participatory design with children. The senior researchers initiated and planned the project and thus had full power of decision, while junior researchers executed the planned tasks. The researchers entered one of the

schools in a network of Smart Schools established in the City for experimenting with novel pedagogic practices utilizing digital technology:

'We decided to approach the [school] that is one of the Smart Schools of the city [...] The principal got excited [about] this [...] The project is implemented in cooperation with the [school] and is hence closely connected to the Future School effort that is one of the top projects of the educational department of the City at the moment. This effort develops schools to meet the challenges of the 21st century [...] At the school last year, the third graders were [given their] own laptops that they can use during their free time, too. Two classes have been combined as a joint class that two teachers teach, flexibly settling their tasks. [...] Now the pupils are starting with their laptops [in] fourth grade and [the] new third grade hopefully [will get] new computers too [...] The teachers felt they have done a lot, but it has not been documented much so far. For them, this research collaboration would be interesting.'

Thus, the school had already started experimenting with digital technology in teaching and learning and there was a pair of teachers that had specially equipped classes for collaboration. The principal indicated this pair of teachers and their classes to work with. The principal also indicated that the school supports children's participation in their education in various ways, e.g.:

'When this plan for the future school classroom was being done with the architect's office for the upper concourse, the pupils were here involved [...] this completed plan was taken to them for comments: what they think it looked like and what benefits it would have.'

The teachers decided that digital portfolios would be the topic of participatory design with the children. The researchers planned and organized four design workshops, two for 9–10-year-olds (Group A) and two for 10–11-year-olds (Group B). In the first workshop for both groups, the participants were asked to draw a user interface for a personal digital portfolio for their own use. The researchers analysed the results and decided to organize the second workshops as group work with specific user interface elements given as examples.

The data shows how much imitation, copying, and recycling took place in the design sessions. Adults seemed to be influential role models for the child participants:

*'[The] third graders had difficulties in internalizing the term **user interface** that had been introduced. Therefore, one of the project group members clarified the term by drawing a simple example of a giraffe on the blackboard and introduced how the animal itself could function as a user interface element . . . This is why in some designs there were fully identical copies of the giraffe example.'*

Hence, even if given as inspirational material, researchers' examples seemed also to be heavily limiting children's imagination. Teachers' guidance also directly shaped children's designs: *'All the children understood the user interface to be a web browser because of the example given; the teacher said that "there has to be an address bar in the product".'* Therefore, it seems that the adults strongly shaped the children's designs and hence acted as influential role models, at the same time delimiting what

was created. Especially a teacher in school context likely is a role model whose instructions are followed.

Furthermore, the children also heavily influenced each other as similar kinds of designs emerged among children. Some of them included provocative elements (e.g., phallic or scatological imagery): *'More like a provocative drawing (handicapped, pooing) [...] Clearly a provocative drawing which becomes evident e.g. as a penis has been drawn for a pig and a pile of poo.'* *'In the boys' products there were more provocative elements, dirty humour and links to gaming.'* These creations all included some sort of living creature (e.g. a pig, a reindeer, or a bear) and a pile of 'turd' (Figure 4). These creations mostly ignored the original assignment while they had many similarities with each other content wise as well as color wise.



Figure 4. Children's digital portfolio designs.

These creations can be interpreted to indicate that some children did not take digital portfolio design very seriously despite the fact that it was carried out in the school context as part of their schoolwork. Then again, there might have been also peer pressure at play – requiring each pupil to adhere to this genre of “digital portfolio design.” Overall, it seems that also in this case the children positioned themselves as various kinds of pupils, and not necessarily as very obedient ones.

Another issue that emerged was that some children seemed to have difficulty with collaborative work. Although many groups worked well together (e.g., *'among the groups, in general, there was an open atmosphere and work tasks were allocated to all'; 'the pupils collaborated and discussed what to do next, the group functioned well and the pupils were encouraging each other'*), there were also challenges in involving some pupils: *'The groups mainly consisted of few diligent pupils, but in every group there also was one or several pupils who did not have enough ability to concentrate or willingness for group work'; 'one child refused to take part in the work in any way*

during the first hour'; another participant *'was very inefficient and did not accomplish anything during two hours (wanted to draw Donald Duck).'*'

Sometimes this was a gender issue: *'The only girl in the group was left out of the cooperation'*; *'in one mixed gender group the only girl was left somewhat outside the action as the loud boys took all the attention'*; and *'the work of the mixed gender groups was in some situations poor because cooperation between girls and boys did not work out. Despite persuading, the work divided between girls' and boys'.*' Hence, it seems that children's gendered relationships hindered their cooperation.

Other times, there was evidence that a group of pupils ignored one child's contribution:

'One child had good ideas and some mature vision of interface design but almost without exception the other group members disagreed, so the views of this child did not end up in the design. The group followed strict democracy and there was a vote on every decision. Some extremely feasible ideas were not used exactly for this reason.'

One may even argue that this was bullying disguised in the form of democracy. Overall, the data implies that there were several children excluded from the design process, there being various reasons for this.

Study C: Participatory game design

Study C shows additional influential adult participants in digital technology design projects, indicating that parents' as well as researchers' activities can both help and hinder children's possibilities for participation. Both adults and children may lack necessary technological skills and knowledge, which may prevent full engagement from children. Adults may, for example, lack knowledge regarding good working practices with children, and how much to influence the children's work in the project. This study indicates that inclusion is something that needs to be done *for* children, as the chosen work practices in this case resulted in exclusion, possibly strengthened by the researchers' idealistic aims for the project. However, the study also reveals that inclusion needs to be done *by* children – their own motivation and interests also play a significant role.

In this game development project, junior researchers worked under the guidance of seniors, who had a strong interest in advocating children's genuine participation in digital technology design and invited their own two children, a boy and a girl, to take part in the project. As a result, the senior researchers acted in a triple role: as researchers, parents, and project steering group members. Children were expected to take part as fully as possible in the development activities and to have a real impact on the game under development.

The junior researchers, however, were not very familiar with working with children. This resulted in some unfortunate choices of working methods in the middle of the project. They chose traditional collaborative project work practices and tools (e.g., Google Drive, email, Wiki), familiar to them but not to the participating children. The children were not provided with all the necessary instructions: *'[in the instructions given to the children] there is only advice on how to start the game and what can be done in the demo.'* The participating boy, who was accustomed to trying out new technologies and also asked his mother-researcher for help, managed to do the tasks set for the children, as the field notes tell: *'The boy was testing the game and was able to*

write surprisingly clear comments on his experiences independently through email.’ He was successful even though he had written in an email, *‘I’m not that good at writing email messages.’* The participating girl, on the other hand, did not complete all tasks as she had not even noticed the emails related to those tasks first. Field notes of one junior researcher mention that *‘during summer [the girl] disappeared from the project.’* When asked about this in the interview, the girl explained, *‘I don’t use email that often so in some cases I hadn’t noticed the email’*; *‘maybe a text message [could be more efficient]’*; *‘Facebook [could have been a more efficient method for keeping contact]’*; and *‘one could post a message in Facebook saying check your email.’* She did not ask support from the adults for the project and was not offered that either.

The junior researchers’ educational background of project work practices that typically involve adult members only and emphasize individual responsibility created a conflict with children as participants. This conflict was perhaps exacerbated by the overall aim for genuine participation in the project, and the adult members got confused about the “proper” amount of support to provide when striving for genuine participation. In this case, the expectations concerning the child participants to become “full project members” led to the partial exclusion of one child participant. Aiming at children’s genuine participation, the researchers wanted to avoid interfering in the project work too much. After the project, both mother-researchers reflected on this issue when interviewing the children and asked from them whether they saw that their parents should have helped more in the project tasks. The girl’s mother-researcher had followed the “researcher rule” of not getting involved. The girl pondered that her mother *‘could have helped a little [...] in loading the game’* but she did not even ask her mother for help as she assumed that *‘maybe mother wouldn’t have known how’* to help her with a technical problem. The boy’s mother-researcher, on the other hand, interpreted the situation differently during the project and helped her son with the tools thinking that it was just a regular parenting issue; as the boy saw it, she was *‘a little bit like backing [the work in the project] if I had for some reason a very difficult issue.’* Thus, she supported him in completing the project tasks.

This study also shows that for a social inclusion project involving children to succeed, it is not enough that the participants are included and given practical possibilities to participate: the participants must also desire to include themselves. In the children’s interviews, we can perceive that they were both clearly interested in the project and identified themselves as important and influential participants in the project. When the boy was asked who, in his mind, *‘owns’* the game, he answered, *‘in principle all of us, maybe more the programmers because they did the job but in principle it was everybody’* because *‘here you could see that your own ideas are genuinely taken into account.’* The girl also used the phrase *‘the game made by us’* unprompted. She mentioned several times that the project was interesting because she *‘learned new things’* when participating. The children made roughly equal contributions to the game design: seven of the girl’s and six of the boy’s ideas for design were utilized in the final game. However, the boy might have had a stronger motivation to participate in the project as he told us that he was interested in *‘creating games and things like that in general . . . because I am interested in that profession [...] I will probably try to aim for that career.’* The girl, instead, had more general interest to participate. Herein may lie the reason why she did not make a stronger effort to tackle the technological difficulties she faced, which resulted in her unintentionally excluding herself from some project activities. We expect that neither of the children made a conscious choice here but were led by circumstances as well as their motivation or lack thereof.

In this study, stereotypical gender roles and some evidence of the digital divide seem to become manifest. The boy was interested in complex technological issues. The girl, while a competent user of technologies and avid social media user, seemed to be neither willing nor interested in tackling difficult technological problems, especially when there was no easy help available.

Study D: Participatory game design for learning

A special focus in Study D is on how teachers and schools shape pupils' inclusion and exclusion. Additionally, the study gives voice to the children themselves, presenting the motivations behind their inclusion- and exclusion-related decisions in digital technology design.

This study is different from the previous ones as it was initiated within school. One of the junior researchers from one of our previous projects was hired at a school where he informed the teachers about the possibility of working with the senior researchers. One teacher in particular got very interested and the former junior researcher together with the teacher contacted the senior researchers and they established the project in collaboration. The pupils were quite comprehensively involved in the project work that involved game design. The game topic (a national epic) was decided by the teacher, but the pupils collaboratively designed and evaluated the game.

In this case, the teacher was the driving force behind the entire project. Her motivation for the project was shaped by her personal and professional background and interests:

'I want to actively develop and experiment with different teaching methods [...] I joined in eagerly and curiously to find a new perspective to handle a classic with pupils in their final year in comprehensive school. This project enables to approach a national epic from a new angle.'

She makes it clear that teachers' commitment is significant in this type of project:

'There is this resource challenge as one inevitably has to do some extra work, one has to commit to this and be prepared for meetings and other stuff [...] This has not been recognized necessarily at the level of school. I have been involved in this mostly due to personal interest, I am interested in doing new things and due to this I have been prepared to go the extra mile.'

Here, the teacher also points out the influence of the school's planning practices, as well as restrictions caused by subject-based teaching and the curriculum, and how teachers need to be prepared to deal with these. In subject-based teaching, each teacher has a very limited timeframe for teaching a specific class: *'We do not have much room for manoeuvre, we usually have time the 45 minutes, or depending on the good will of teachers of other subjects, it might be that we sometimes have two hours.'* Planning for projects involving several subjects needs to be initiated early: *'The earlier we know that this type of project is coming, the better we can integrate several subjects into it.'* Without a very committed teacher and careful planning well in advance, the projects may easily become impossible to put into practice. Moreover, the teacher always has to ensure that the classroom time is spent on issues included in the curriculum:

'[The teacher] has the pedagogic responsibility of children learning what they are supposed to learn [...] Some headaches and special arrangements have been caused by scheduling, but things have been reasonably manageable. The challenges have concerned specifically scheduling. In the final year of the curriculum there are many different language, literature, and media related issues that should be integrated into the project. Otherwise it would not be possible to spend so many lessons on dealing with one classic.'

Thus, within the context of the traditional classroom, there are many structural issues hindering children's inclusion in digital technology design.

The teacher was heavily involved in project activities: she divided the pupils into groups, selected suitable pupils for activities, offered materials for design work, encouraged pupils to engage in the activities, and kept order in the class by steering pupils to concentrate on the task at hand:

'[A teacher] does a lot of pre-work with children so that everything happens smoothly and efficiently when [researchers] enter the school and work with children [...] We decided together with [the former junior researcher] that we hide the colouring pens in a closet as some pupils concentrated on colouring and not on what they were expected to do. Some pupils were like: 'what, can't I colour', but we were tough . . . Most of the pupils are genuinely excited about this project. There are also pupils whose commitment to work is overall weak [...] From teacher's perspective challenging are the pupils whose perseverance does not last long enough [...] I know the pupils and how to make certain pupils work and get excited.'

Hence, teachers' expertise was valuable in preventing the exclusion of some pupils, while the study also shows how teachers exercise power in the classroom and very strongly shape how children are included in the project work as well as whether some are excluded from the work. This project also engaged pupils external to the class in question by inviting pupils from a different class to participate in usability testing. The teacher was involved in helping select pupils 'suitable' for the tests: *'The teacher selects the test persons to avoid, for example, a situation where people are laughing at others' creations.'* While this resulted in the exclusion of some pupils, this exclusion was pedagogically justified according to the anti-bullying selection criterion. It was also agreed that the usability tests involved only few pupils external to the class: *'It is not necessary to have a whole class as a test group. [...] It succeeds so that I have a Finnish language lesson for ninth graders and I settle it so that from the eighth grade test persons are taken into my class.'* Usability testing as a method is so burdensome that it was considered impossible to arrange the tests for a large group of pupils – this is a widely acknowledged issue also in the literature on usability testing (e.g., Dumas & Redish 1993, Rubin 1994). This consideration inevitably excluded many pupils from taking part in the usability testing sessions and more generally in this project.

The teacher's expertise was valuable in fitting the game design activities with the curriculum. She had clear plans for what the pupils would gain from participation in this project. The teacher saw pupils' participation and engagement as a noble goal and happily reported: *'This is modern, related to which many get excited. Making games excites quite many, most of them [...] The pupils felt that this is an important project [...] [The game] will be available [on] the school's website. They saw it as important.'* The teacher also stated that

'A teacher always has the goal that a pupil gets excited about something or feels that s/he has learned something. I guess there was someone in the group, who gained a genuine spark that this type of study or work could be my thing. Even if that pupil felt school as somewhat difficult, tough, repulsive thing, s/he surely got excited about this.'

Hence, the teacher also strongly advocated for social inclusion among her pupils.

The pupils also voiced their opinions on this matter. In their feedback essays, they indicated that they enjoyed making the game, drawing, and group work related to the assignment. Additionally, they reported that the *'group work went well because all we involved in design'* and that *'all worked and we were able to finish all with care and within schedule.'* However, the pupils also indicated that not all were involved, stating *'sometimes not all contributed to the work,' 'I could have participated more,' 'sometimes I did not concentrate that well on the topic,' 'the group work was good for most, but for some the effort was bad,'* and *'sometimes there were disagreements,'*

After the project, none of the girls indicated interest in continuing to study or work in game design, citing their lack of interest in games and digital technology as a factor: *'It just doesn't feel like [my] own thing. And I don't play games during leisure time that much,' 'I would not be able to code any game with a computer and it does not interest me so that I would start learning,' 'I am not interested in [it] as information technology things are not my thing,' 'not really because I don't play video games,' 'I'm not good in ideating that kind of game things and I don't know much about games,' 'it is pretty difficult for someone who does not understand anything about current technology,'* and *'I don't care about games much so it isn't a meaningful profession for me.'* Some boys were similarly uninterested in game design following the study; however, it is noteworthy that several did report having an interest: *'It is nice to design,' 'inventing the story is fun as you can affect how it progresses,' 'I am interested a bit because I like to play games,'* and *'it seems fun and challenging.'* Hence, it seemed that only the girls uniformly excluded themselves from further digital technology design.

Study E: Digitalization of school

Study E shifts the focus from individual teachers and their choices made *in situ* to a variety of networks, arrangements, and society level issues, showing how inclusion/exclusion is created not only by individuals but by broader structural issues. The school principals were interviewed to get data on the current shift in Finnish schools towards wider digital technology use in learning. Here, selected schools and principals are analysed as significant actors creating inclusion or exclusion among children as regards digital technology.

The schools where data was gathered for this study differed from each other considerably. Two of the schools portray the differences in an exemplary way. One school suffered from poor inside air quality and was undergoing renovations to improve the situation. For this reason, neither the principal nor the teachers had resources to extensively implement digital practices in teaching (*'one can't really talk about building future schools here'*). The principal minimized his role as a pathfinder, saying *'I really am no pioneer nor [...] a bellwether.'* He presented the teachers as having more agency in developing their work practices by drawing on their own interests. He did not see the teachers as having great enthusiasm in this, however, possibly due to the problematic situation in the school: *'We don't have such developing passion here, they*

are expecting something quite ready-made, and are then quite ready to do their share all right.’ In another school, the situation was entirely different. The recently built school had been planned to provide a modern environment for education, which was supported by modern management and teaching practices, as reported by the principal: *‘in the management system we have moved from the old sort of hierarchical system to this kind of flower model with multi-professional modular teams.’* Technology use was another aspect that the principal considered vital for development in the school:

‘[Technology] is one important element here that helps us in reaching the goal of the four other petals, how physical and health education have been integrated with technology, it is sort of tool, it is a kind of support unit for other things. My view is that we kind of understand its meaning now. It is not a value in itself, but a prerequisite for learning things.’

This principal actively encouraged the teachers to try out new practices and followed through with putting those plans into practice: *‘I also require in the positive sense that we align with these plans.’*

The examples above involve a range of possibilities for inclusion/exclusion. In addition to their leadership practices, the principals in our study emphasized teachers’ autonomous role in the classroom as well as their skills, abilities, interests, and their effect. Many of the teachers were reported to consider *‘if there is too much work involved [...] one adopts a submissive stance saying that one cannot do it, doesn’t have time, energy, where to find time,’* or *‘didn’t necessarily feel the pressure to change anything,’* Some teachers were felt to be reluctant to experiment with technology (*‘there is a small group who don’t use anything’*) and the principals considered it a challenge to encourage them to do so. On the other hand, there were also teachers who were perceived as *‘development-minded innovative teachers who followed what was going on in the world.’* These teachers could be called “lead users” driving change; in other words, teachers who use technology actively and willingly share their experiences and practices: *‘s/he is very helpful and likes to train others, so s/he has extremely good skills [...] s/he is now the leader of this [ICT] team [...] has been enthusiastic and brought to meetings [...] we try to bring to meetings or show and share what we’ve been doing and what sorts of skills we have gained.’*

The backgrounds of the individual schools also shape inclusion/exclusion. Some of the schools had a long background in technology-related projects through which networks had been built:

‘There are about 50 schools from all around the world [taking part in the Microsoft Pathfinder program], which are willing to [...] ponder together what learning will be in the future and what schools will be like in the future. We have [...] online meetings regularly [...] We have our own mentor [school] [...] from England. Then we have face-to-face meetings [...], at least once was a Global Forum where all the pathfinder schools met. [...] So this is a network where you can benefit each other, mentoring.’

The principals describe taking part in different projects as giving teachers a possibility to *‘develop and bring their own ideas [into their teaching], and that increases their drive [to try out new things].’* Taking part in the projects was seen as a way to develop the collective school competence, embedded in school practices and skills and mind-sets of principals and teachers:

'Yes, yes, many, many good things [has resulted from taking part in different projects]. The truth is that projects come to projects, money comes to money, innovations come to innovations, it just is so that it is easier to build new things on top of old ones and then when you apply for funding or participation in something, the old doings surely are noted. If you haven't done anything, well, it is difficult, if you don't have it you don't have it. Yes, a huge number of good things resulted from those [projects].'

There are, however, broader issues at work shaping children's inclusion projects. In addition to exclusion from digital technology use and development, one of the principals commented that there is a discrepancy between teacher education and the recommended practices of the field: *'the [young teachers] have been asking quite critically why they don't talk, for example, about co-teaching [in teacher education] very much even though it is in the field in a sense among the hottest hot.'* This is an issue we will explore in more depth next.

Study F: Teacher education involving participatory design

Study F focuses on the role of teacher education in children's inclusion/exclusion. There is a strong tradition of what teaching entails in the classroom, what the pupils are expected to do and what the role of digital technology may be. This tradition seems to be difficult to change.

This study reports on a voluntary university-level course, where the participants were language students considering becoming teachers in the future. The main activity for these student teachers was to engage as participatory designers schoolchildren in visioning the future of language learning using new technologies. In the online learning environment for the student teachers, the activity was described as follows: *'we are trying to involve the children in envisioning their future linguistic landscapes, language/literacy and language learning practices and possible technologies through different activities, play, games, etc..'* As this participatory design stance was considered potentially a paradigmatic change for the students' viewpoints on being teachers, the students were familiarized with participatory design, new technologies, and technology visioning at the beginning of the course. They ideated concepts on how to utilize new technology in language learning, specifically focusing on teaching English as a foreign language. Later on, they planned an intensive week during which they would implement their ideas with children.

The researchers made the central decisions about the empirical context. Nevertheless, a range of actors beyond the research group contributed (e.g., teachers at the partner school). There were also larger-scale policies and background aspects that influenced decision-making: the researchers and schoolteachers had to negotiate the project to fit contextual constraints set by the school (e.g., timetables, available technologies, teaching spaces). Another aspect that guided the selection of this particular school was its membership in the Smart School network and its status as a school of the future. This suggested a general positive attitude toward technology-use and pedagogic innovation among staff. The school's willingness to temporarily put schoolwork on hold for one week while the project took place was a critical affordance.

A significant portion of schoolchildren at the partner school were excluded from the study since only grades 5 to 7 were expected to have sufficient enough English language skills for participation. This was the case despite the fact that the pedagogic

setting at the school was designed to include all pupils in collaborative activities, regardless of their age and linguistic skills. Introducing a new configuration in the school context caused some confusion among pupils who were used to working in groups of the same age. When pupils from a higher grade-level entered the room, the younger pupils suspended their contribution immediately (evidence provided in a video recorded from the session when the pupils were brainstorming future technologies for language learning). Nevertheless, the schoolteachers were open to the student teachers' pedagogic designs and eager to involve all the pupils in the activities.

From a teacher education point of view, there were decisive factors that influenced the potential participatory design actions and the progress of the study. For example, the scope of the course (5 ECTS) and the distribution of lessons had to be taken into account. This had an impact on how much time was available for specific course phases and tasks. Therefore, the children's role from a participatory design point of view remained minimal. The student teachers organized the collaborative actions involving children without reflection from the children themselves.

Building up creative assignments turned out to be a challenging task due to the student teachers' general preference for traditional schooling and pedagogies. They regarded language learning as taking place through activities focused on linguistic matter and textbooks. For example, one of the student teachers suggested using video games and mobile phones as tools to make learning more fun, but another student teacher commented: *'The ideas for the mobile applications appear interesting at first, but I am not sure how efficient these kind of learning methods are in the end. Wouldn't it be much more time saving just to open a book and read. Does language learning have to be fun and playful?'* Whenever innovative technology use or engaging activities were brought up, traditional practices were reinforced when the applicability of the idea came into question. For example, one student teacher noted: *'I think the usage of the mobile phones is a good idea, but obviously it shouldn't be used as the only means of teaching. Just something fun to do every once in a while.'* Another student commented on using games in language teaching: *'Simply having a game interesting enough, but in a foreign language, might motivate some kids to make an effort to understand what's going on. Obviously not much teaching time could be devoted to such "non-educating" pursuits.'* Overall, the student teachers had a hard time distancing themselves from the habitual language teaching practices and could not see new technologies as anything but "add-ons" or enhancements for these accustomed practices.

After the theme week, the student teachers reflected on their experiences and continued developing their concepts further. However, instead of approaching this phase from the participatory design process perspective they treated it as an individual assignment. Consequently, the children participating in this study were not involved in this reflective phase. They were thus excluded again from the reflection needed to envision the future. They were not invited to be active participants in the design process and their experiences were not considered. Despite the efforts made by the researchers, the student teachers were unable to adopt a participatory designer stance to integrate new technologies into language learning (Kuure et al. 2016).

5.2. Nexus analytic interpretation

When looking at our findings on the excluded groups or conditions, one can say that a variety of issues could be identified (see Table 1). There was plenty of evidence that some children were excluded. Some were excluded by their own choice, some unintentionally due to circumstances, and some by actions of someone else. It is more

important, however, to make sense of the issues creating exclusion than to identify that exclusion took place. Nexus analysis enabled us to identify issues that contributed to exclusion, such as the children's own language, technology, or interactional skills, knowledge, or interests; the children's relationships and interactions; the teachers' skills, knowledge, or interests; schools' and principals' interests, backgrounds, and resources; parents' skills, knowledge, and interests; researchers' interests, experiences, and method choices; teacher education; and larger political and social forces.

EXCLUSION IN SITU	ASPECTS OF SOCIAL ACTION INSTIGATING EXCLUSION
<ul style="list-style-type: none"> Teacher-researcher selects one specific class instead of another Children withdraw from activities thinking their language skills are insufficient Children are not able to participate fully due to practical arrangements (schedule, task assignment) Children participate less or less systematically due to lacking motivation Children participate less or less systematically due to their own, different accustomed practices and problems in technology use 	<p>DISCOURSES IN PLACE</p> <ul style="list-style-type: none"> Various kinds of schoolwork/homework discourses <p>INTERACTION ORDER</p> <ul style="list-style-type: none"> Use of the probe method (specific roles for participants); Time constraints; School setting (positioning participants as pupils instead of design partners) <p>HISTORICAL BODY</p> <ul style="list-style-type: none"> Teacher-researchers and researchers' background and method repertoires; Children's varying experience and skills
<ul style="list-style-type: none"> Researchers choose a (smart) school instead of another School principal selects two classes and a teacher pair instead of others as their pupils have each their personal computer Children refuse to take part Children's ideas are not taken into consideration by others Children's ideation heavily limited by others' influence 	<p>DISCOURSES IN PLACE</p> <ul style="list-style-type: none"> Children's engagement in discourses related to schoolwork, homework and digital technology design <p>INTERACTION ORDER</p> <ul style="list-style-type: none"> Researchers' interests; Teachers' active role in delineating the focus of activities and participants; Children's 'stimuli' for other children (peer pressure); Children's varying interaction skills and refusal to take part; The school setting (positioning participants as pupils instead of design partners) <p>HISTORICAL BODY</p> <ul style="list-style-type: none"> Smart school status; School profiling through digital-technology-oriented pilot classes led by a teacher pair; Children's interests and dispositions
<ul style="list-style-type: none"> Parent-researchers choose two children instead of others Children do not participate fully due to lacking skills and support 	<p>DISCOURSES IN PLACE</p> <ul style="list-style-type: none"> Varying discourses on children's genuine participation, i.e., what constitutes an equal position in a design team <p>INTERACTION ORDER</p> <ul style="list-style-type: none"> Parents in various roles (researchers, steering group members, child participants' mothers), avoiding to interfere too much; Traditional software development project practices with high individual responsibility <p>HISTORICAL BODY</p> <ul style="list-style-type: none"> Junior researchers' lacking knowledge about working with children; Knowledge and skills in supporting genuine participation among all the participants; Children's limited skills in technology use
<ul style="list-style-type: none"> Researchers select a teacher with her class to the project instead of others due to the teacher's own initiative Researchers select a small number of pupils for usability testing Teacher selects suitable children for usability testing instead of others on the basis of their interactional skills Children position game design as not their thing 	<p>DISCOURSES IN PLACE</p> <ul style="list-style-type: none"> Teacher engaging in discourse on teacher agency and resistance/neglect; Teacher engaging in discourse on pedagogic diversification; Children reinforcing the discourse on the digital divide <p>INTERACTION ORDER</p> <ul style="list-style-type: none"> Teacher's active role in starting the project and steering children's work <p>HISTORICAL BODY</p> <ul style="list-style-type: none"> Curriculum; Subject based teaching; Scheduling at school; Teacher's background, knowledge about children, interest and will; Children's interests and dispositions
<ul style="list-style-type: none"> Principals do not give enough encouragement and support to teachers in using technology in pedagogy All teachers are not keen on promoting the use of technology unless forced to do so 	<p>DISCOURSES IN PLACE</p> <ul style="list-style-type: none"> Principals engaging in discourse on teacher agency and resistance/neglect <p>INTERACTION ORDER</p> <ul style="list-style-type: none"> The complex network of actors in and between schools (e.g., principals, teachers, development teams, lead teachers) cause variety in technology use in different schools; Teachers' actions related to technology use in schools guided by their teacher education <p>HISTORICAL BODY</p> <ul style="list-style-type: none"> Background of teachers as technology users; Teacher autonomy and agency; Teacher education; Schools' background in projects and technology use
<ul style="list-style-type: none"> Teacher-researchers select the smart school to work with excluding other schools Children cannot take part if they lack a certain level of foreign language skills Course arrangements (resources & schedule) constrain participation in diverse ways Student teachers do not involve children in reflecting on their experiences 	<p>DISCOURSES IN PLACE</p> <ul style="list-style-type: none"> Student teachers' discourses constituting professional identity (tradition versus new ideas); Student teachers' discourses on appropriate education <p>INTERACTION ORDER</p> <ul style="list-style-type: none"> Potential actions constrained by the course teacher's and research group's course design; Workshop arrangements prepared by the student teachers; Tacit exclusions created by the school context with its specific rules and power relations <p>HISTORICAL BODY</p> <ul style="list-style-type: none"> Smart school status; Student teachers finding it difficult to adopt the participatory designer stance; Difficulties in taking distance from habitual language teaching practices

Table 1. Nexus analytic interpretation of exclusion in social inclusion projects

The discourses one can identify in these cases are generally very positive in tone: they advocate children's participation in issues that affect their lives and the significance of offering digital technology skills and competencies for children. We researchers engage in those as well as the individual teachers and principals in our studies. On the other hand, one can find very similar enunciations at the societal level,

where the existing legislation and curriculum impose similar kind of understanding of the world. As for the involved children, some of them were eagerly engaged in our projects and seemed to learn a lot. However, we also found evidence of resistance in the form of children not taking part, ignoring the task assignment, and preventing even other children from taking part. We identified many cases where the participating children approached technology design as schoolwork or homework alone, positioning it as a compulsory, boring, irrelevant, or even objectionable duty to be done. We also noted how the existing discourses of appropriate education and teaching as a profession may contribute to children's exclusion in technology design.

The concept of interaction order enables us to focus on how the complex relationships among participants may create exclusion, sometimes *in situ*, sometimes from a distance. There was evidence that children among themselves prohibited the meaningful participation of some children. Child groups may also involve peer pressure to behave in a certain manner – either as obedient pupils following adults' instructions or as more rebellious ones ignoring those. Parents may also play a significant role in enabling or hindering their children's participation in digital technology design: parents may lack the needed skills or competencies or may be unaware that their help is needed. Teachers as relatively autonomous agents in the classroom are definitely important: they may experiment with new technology and its development but they may also keep it from their pupils. Teachers' skills, competencies, interests, activities in the classroom (e.g. instructing, selecting and steering children), and existing relationships (e.g., with researchers working on the topic) are significant.

While researchers should try to make a positive difference in education, this requires help from parents, teachers, schools, educational administrators, and, at times, even the government. Although good will exists and national education strategies are very well in line with our goals and agendas, actual work in schools requires resources. Some schools have strong backgrounds, existing networks, and expertise in getting funding and resources for such work, while others are badly lacking in this respect. Teacher education is another essential factor: it strongly shapes the professional identities of future teachers, and currently teacher education still seems to produce teachers with somewhat outdated understandings of learning and the role of technology within. Moreover, we recognized that researchers' own methodological choices may create exclusion through some interaction orders established: some methods are so labour intensive that participation of a large group of children is simply impossible, while some methods place too much emphasis on independent work, leaving children without sufficient support.

Considering historical bodies, another central concept in nexus analysis, enabled us to view historical and experience-related issues looming in the background, affecting inclusion and exclusion. Children's, teachers', and parents' existing skills, knowledge, interests, and resources shaped their activities and encouraged children to or dissuaded them from taking part in digital technology design. The examples and methods used also framed, shaped, or restricted children's designs. Teachers' historical bodies are strongly shaped by teacher education.

Historical body and interaction order are always intertwined, but they can also be analytically separated from each other. In our studies, for example, researchers' examples, task assignments, method repertoire, and actual design sessions with children shaped children's technology-related experiences and thus contributed to their historical bodies. Researchers' existing contacts within schools are part of their historical bodies, while the mutual interactions among researchers and teachers in the projects constitute significant interaction order related issues – excluding and including

children. This analysis shows the value of these concepts for research on inclusion/exclusion of children.

6. Discussion

In the following, the results of this study will be summarized and discussed.

6.1. Summary of the results

This paper focused on groups or conditions excluded in social inclusion projects and the rules and powers that create exclusion, in the context of developing digital technology collaboratively with children. We analysed the moments of exclusion with the lens afforded by nexus analysis, specifically utilizing the concepts of discourses in place, interaction order, and the historical body (Scollon & Scollon, 2004).

We recommend nexus analysis as a suitable theoretical lens for studying inclusion/exclusion dynamics as it effectively reveals and manages complexity: it acknowledges people's *in situ* practices and discourses in place as well as discourses circulating around on the societal level. It also guides us to study the historical and interactional dimensions of any social action. Accordingly, we acknowledge in the examination of social inclusion/exclusion both discourses and concrete actions that are complexly intertwined with interaction orders and historical bodies of the participants involved. With the help of nexus analysis, we found that exclusion in our inclusion projects is usually not the result of an individual or force actively and intentionally preventing someone from participating; instead, exclusion emerges in more subtle ways through choices made, activities taken, and interactions that occur; all of which lead to neglecting many other choices, activities, and interactions. These subtle occurrences do not necessarily prevent anything from happening; they merely make things less likely to happen. In spite of this, exclusion in social inclusion projects can also be intentional, a choice made by a participant. Figure 5 summarizes our main findings on factors that created exclusion in our social inclusion projects.

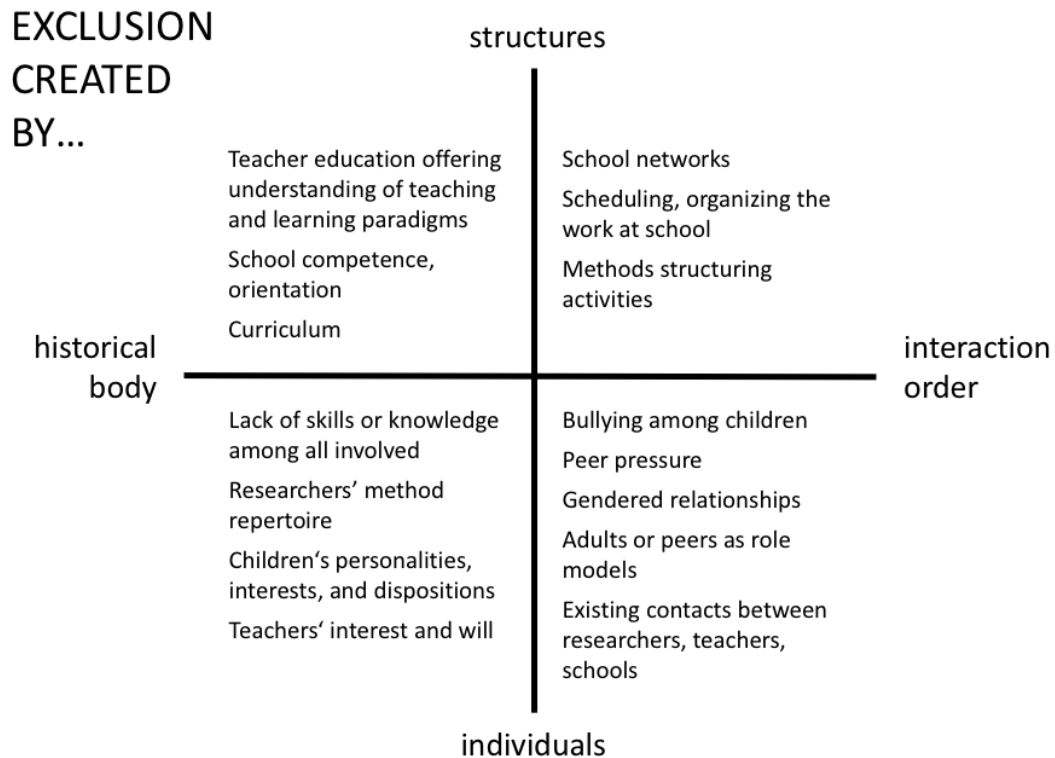


Figure 5. Factors creating exclusion

Some of the factors that create exclusion relate to individuals and the interaction order between them. Examples include when children bully each other; when they look at adults or peers as their role models, following some but ignoring others, gender⁴ as one reason for that; or when researchers use their existing contacts to find collaboration partners, excluding the remainder of schools. Individuals also carry their personal histories as backpacks, which affects their choices. This can be seen when researchers select which methodologies to use, when teachers choose what kind of special projects to offer their pupils, when children decide not to take part in group work, therefore excluding themselves from learning; or when participants lack some necessary skills or knowledge resulting in incomplete or crippled participation.

The factors can also be related to broader issues that we call structures. From interaction order point of view, these structures can be e.g., collaboration networks the schools belong to, affording possibilities for peer learning; established methods teachers or researchers use for structuring the working with children, affording or inhibiting, e.g., children to use their creative potential at its fullest; or, the daily routine scheduling issues teachers have when organizing their collaboration at school, giving or taking away opportunities for renewal. From historical body point of view, the structures can be related to teacher education and prevailing, slowly changing learning paradigms that affect the pedagogical choices teachers make daily; the schools also have their accumulated histories and competences embodied in their personnel, making it (im)possible to offer children important skills that are not necessarily listed in the curriculum.

⁴ Gender should be included into Figure 5 in a much more profound sense, but as our data did not allow such an analysis, this inclusion needs to be done by other researchers in their future work

6.2. Arguing for inclusive digital technology education

Even though the digitalization of our everyday lives has been acknowledged within the field of education, relatively little attention has been paid so far to empowering children to act as makers and shapers of digital technology. IS research in particular is limited in this respect. While IS research has addressed the existence of the digital divide and the significance of gender in both digital technology education, careers, and work practices, the work stops short here. We claim that there is a lot to be done, IS researchers and professionals included, to provide inclusive digital technology education for the current and future generations.

Our approach has been to work with schools offering K-9 education. Naturally, education can be offered outside schools and it can be targeted at even younger or older age groups. However, we see a lot of value in cooperation with K-9 schools as they can be used to reach large groups of children. Further, K-9 schools, particularly technology- and development-oriented ones, afford relatively easy access to researchers, at least in Finland. The literature has also reported that K-9 schools support genuine participation of children and inclusion, even if they are a bit inflexible partners for technology design with children (Iivari & Kinnula, 2016a). We see working with schools to adhere well with our basic values and recommend future work with schools for other researchers, although we hope that the exclusions identified in this study are kept in mind and that steps are taken to prevent similar occurrences in the future work.

When working with schools, one necessarily has to understand the context and the significant actors within. Teachers, in particular, are influential; in Finland, teachers have significant autonomy. This can act as a driver or a hindrance to inclusive education of technology design. Principals are another powerful group, although their influence tends to show on a broader level, outside the boundaries of a single classroom. Moreover, the government and society are significant: national curricula and legislation create an emphasis and set limits. Closing the digital divide and developing children's technological skills and competencies are accentuated as desirable goals at this level in Finland, but it remains open how much support and pressure individual schools and teachers get to achieve these goals. Even the teachers' understanding of teaching and learning is relevant. Teacher education plays a crucial role in bringing about a change.

Many of the issues addressed in this research are country and culture specific; hence, we call for similar studies in other countries with differing educational structures and cultures. In Finland, the situation is generally good: Finland represents a high-tech country that seeks to integrate digital technology in education. Even within this context, however, our study revealed evidence of the digital divide: some schools were much better positioned than others, even within a single city, and teachers and principals exhibited significant differences in their attitudes toward digital technology education as well. Among children, there were definite differences in digital technology usage habits and skills, which is also reported in the literature (OECD 2012, Livingstone & Helsper 2007). Thus, studies on the digital divide even within wealthy Western countries with perceived educational equality are warranted in the future.

7. Conclusion

This section concludes the paper by discussing implications for research and practice, and by outlining the limitations of the study and paths for future work.

7.1. Struggling with exclusions in social inclusion projects

Social inclusion/exclusion and the digital divide are current topics in IS research. This study contributes to this literature base by showing a variety of exclusions taking place in social inclusion projects. We suggest that also other IS researchers take a closer look at their inclusion projects and exclusions created within. We argue that nexus analysis (Scollon & Scollon 2004) provides one suitable means for a nuanced analysis of factors shaping inclusion/exclusion, enabling to acknowledge both discourses and concrete actions as well as history and interaction related issues involved – in situ as well as at the societal level.

Our approach to inclusion/exclusion is in line with the process view on inclusion/exclusion. This entails looking at multidimensional, relational, dynamic processes instead of the state of the affairs (cf. Andrade & Doolin 2016, Phipps 2000, Taket et al. 2009). Attention needs to be paid to a wide range of physical, digital, human, and social resources (Warschauer 2002) as well as to the agency and empowerment of the people involved (Andrade & Doolin 2016, Phipps 2000, Warschauer 2002, Taket et al. 2009). Based on our findings, we emphasize that social inclusion projects need to be done *by* children but also *for* children. Children's agency and empowerment are significant: children need to gain skills to make and shape technology by themselves (cf. Blikstein 2013, Cornwall & Gaventa 2000, Heeley & Damodaran 2009, Mariën & Prodnik 2014). They need to have resources, ability to mobilize them, and access to the decision-making arena – but also the will (Hardy & Leiba-O'Sullivan 1998). Various kinds of adult participants are also essential in the inclusion/exclusion of children. Adults also need to be well prepared to arrange a suitable setting for inclusion that tries to avoid exclusion. Our data indicates that some unintentional exclusions could have been avoided purely with better preparation, even if many of our findings also show that avoiding exclusion is all but simple.

Although we see a lot of value in the projects we have organized, we also see a lot of work ahead. We have tried to combat the digital divide by creating opportunities for learning (cf. Butler & McAvoy 2008) in line with the capabilities approach (cf. Andrade & Doolin 2016), but we wish to do more, i.e., not only to include children but also to combat the oppressors responsible for exclusion. Only including children in social inclusion projects represents the weak form of social inclusion, whereas the strong form would require challenging the power of the excluders (Trauth & Howcroft 2006). This is something that we have not done yet. This would entail critically looking at decision-making at the city, government, and societal levels. Another issue is that it is not enough if we combat the oppressors; instead, it should be children who combat them (Taket et al. 2009). In our projects, we have tried to offer resources and abilities to mobilize children, while access to the decision-making arena as regards digital technology development may sometimes be difficult to achieve. In fact, our data shows that the will may also be lacking. Not all children have been interested in taking part and the same may be true also in the case of the strong form of social inclusion.

In social inclusion projects, we see the dilemma of exclusion as central. Our studies, in line with others, point out that exclusion comes hand in hand with inclusion. Actually, there is no inclusion without exclusion (Edwards et al. 2001) as our studies also show. It is impossible to include all. A connected issue is that there also needs to be a possibility of not to be included (Edwards et al. 2001, Mariën & Prodnik 2014). When operating in school environment this may be difficult to achieve, as teachers have the power to decide what children do in the classroom. In the school context, there actually is no possibility for free informed choice for children as regards taking part (Iivari & Kinnula 2016a). Then again, our data also includes examples of intentional

self-exclusion of some children in our projects that may be interpreted as an important moment of conflict, an empowered act of resistance to the socio-economic system (Labonte 2004). There may be alternative communities in which the children wished rather to be included and that resulted in their self-exclusion in our projects (cf. Wilding 2009). Many times, this choice needs to be respected. However, it also needs to be acknowledged that free informed choice is only a dream (Mariën & Prodnik 2014): we are all prisoners of the existing system and discourses (Hardy & Leiba-O'Sullivan 1998). Hence, critical scrutinizing of the intentional exclusions is also needed – those excluded may have made a conscious decision but not an informed one. In such a situation, social inclusion project may be able to make a difference.

This discussion leads to acknowledging some findings related to gender and the digital divide. In some of our studies, there seemed to be a tendency of girls being less into digital technology than boys and having less experience as regards it. These findings corroborate the existing findings on gender and digital technology (Booth et al. 2010, Clayton et al. 2012, Joshi & Shmidt 2006, Tapia 2006, Trauth & Howcroft 2006, Trauth & Niederman 2006, von Hellens et al. 2012). On the other hand, our data also includes a lot of evidence of girls eagerly engaging in digital technology design. However, our findings can still be interpreted to indicate that in Finland, among other countries, there is room for more research on gender and technology. There may be some girls whose exclusion in digital technology design is not a well-informed choice.

7.2. Combatting exclusion in practice

We suggest that both researchers and practitioners consider the facet of exclusion in their social inclusion projects when planning and implementing their project as well as when analysing their results. As inclusion goes hand in hand with exclusion, we need to make conscious choices of what kind of exclusion we are prepared to accept and what kind of exclusion needs to be tackled and prevented. The framework in Figure 5 can help. In every phase of a project both structural and individual-related issues can be looked at from the viewpoints of interaction order and historical body. In the following we make some suggestions on how the framework can be used. We wish to highlight, however, that as situations and participants differ, no universal guidelines can be given.

When planning a social inclusion project, we suggest considering what kind of interaction orders exist or may emerge between the parties working in a project and how this can afford inclusion but also create exclusion, e.g., if there is existing friction between parties – among adults or children. Even openly discussing the situation may help, while more complicated arrangements may be needed to enable the participation of all needed parties. The significance of existing networks needs to be noted: exclusion emerges many times during very early phases of such projects when cooperation agreements are being made. Being aware of this situation, entailing potentially many excluding decisions, may help to widen the group of participants.

Moreover, the potential participants may also lack some needed skills or knowledge due to their historical bodies (on working methods, technology, philosophy behind the work). Arranging training may help the situation. Sometimes it is possible to foresee problems related to personal characteristics of the participants; this may be dealt with careful methodological choices already in the planning phase, e.g., by giving introverted persons individual tasks to do or extroverted persons a possibility to work in a group. On the other hand, it is useful to consider whether there are structures that somehow affect the working conditions between the participants, such as daily

unchangeable routines at a workplace, making it impossible for some parties to be included in the project even before the project has started. The existing cultural or legislation related conditions can also result in exclusion if not taken into account.

During the implementation phase of social inclusion projects, in terms of interaction order between individuals, one may observe whether this creates exclusion and whether one can somehow prevent it *in situ* with, e.g., methodological choices or just by arranging participants in different groupings. If there were some aspects in the participants' historical bodies that seem to be causing their exclusion from activities, one may again try to change this during the project with suitable training. To prevent exclusion created by interaction orders at the level of social structures, e.g., a conscious generation of sustainable networks for the participants during the project may help. The project might also even have an explicit aim to affect the structures where historical body causes exclusion, such as changing practices at school or city level, or even on national level, through politicians.

While doing the analysis, one should reflect on what kind of exclusion was created (un)intentionally during the project and how it was related to the dimensions in the framework in Figure 5 – was it somehow due to historical bodies of the participants or interaction orders between them or maybe a result of structural factors in play, and what can be learnt from it with respect to future projects.

7.3. Limitations and paths for future work

The results have limitations to be noted and to be addressed in the future work. The data in the six studies were not originally gathered for the purpose of this analysis and the analytic focus was revealed through our inductive, collaborative data analysis, as is quite common in qualitative research. The data has been collected in a single wealthy Western country. We maintain, however, that the concepts used are not culture-dependent and do not value any context over the other. Another limitation is that our own work has so far mainly addressed the weak form of social inclusion, while in the future we wish to include also the strong form into our projects. Moreover, the issues of free informed choice and possibility of not to be included need future attention as well as the influence of gender in inclusion/exclusion. Gender of the different stakeholders can, often subtly, affect exclusion both at individual and structural level, as part of the stakeholders' historical bodies and in the accustomed interaction patterns between them; however, the current data did not allow going deeper into that analysis. Additionally, we plan to carry out our projects in the future by utilizing the guidelines discussed above – as mentioned, the current projects were not planned or implemented the prevention of exclusion in mind.

To conclude, our aim has been to empower children to become capable, skilled persons who already as children see the world as their oyster. This means that they see themselves as having real possibilities to have a say and affect not only issues related to their own backyard but more broadly on what is going on in the world, what can happen in the future, and how they can be active agents in building better future. For this, they need to have capability for rebellion, to battle against the existing rules, and to create new ones, with the help of technology. At the same time, we acknowledge that we cannot escape the social and historical context that necessarily affects what we do, how, and with whom. What we can do is to try to battle it by consciously reflecting on the conditions and consequences of our choices and bringing the reasoning behind them to the daylight. This hopefully creates conditions fruitful for inclusion. We invite other

researchers to use the guidelines as well as the framework provided in this paper and to consider how to support inclusion and prevent exclusion, e.g., within school context.

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