Information Systems Research for the Next Generation: Child-Centricity in a Digital World

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Abstract

Traditionally, information systems (IS) research investigates socio-technical systems in organizations and the workplace. As IS have become an integral part of our daily lives, IS research nowadays also incorporates the private space. However, efforts to date have mostly focused on adults. Children, born into a digital world today, have been mostly left out. Yet our discipline not only has the potential to contribute to the adequate and child-friendly design of IS artifacts for children but can also help to further develop theories on children's behavior. For this to succeed, IS researchers need to adapt their approach to children. Ethical considerations should address children's vulnerability, the design of interventions should happen in close collaboration with children, research methods should be child-centered, and the specificities of children should be kept present in result analyses.

Keywords: Child-centered research, research in a digital world, research with children, children, research methods.

1. Introduction

The digital transformation impacts not only organizations and the workplace but also greatly influences people's personal lives. Traditional IS research is concerned with socio-technical systems in organizations and their impact on the workplace (Kinnula et al., 2017). As the information society has become an integral part of our everyday lives, research now increasingly involves the private space in addition to the organizational aspect (Yoo, 2010). In the private space, human-centric IS have the potential to make our lives more convenient and effective, more sustainable and economical, safer and healthier, and last but not least, more interesting and fun.

While the focus of IS on organizations and the workplace naturally directed the focus on adults, entering the private space also means entering the world of children. Children in the Global North today are all digital natives; they are exposed to technology at an early age and often become technology users before they are exposed to books. Children see how their parents use technology on a daily basis and when they use it themselves, they feel empowered by it because it responds immediately to their actions (Cooper, 2005). IS have the potential to broaden and extend learning opportunities for children (Bavelier et al., 2010). Researchers have for example shown that games and technology can greatly improve literacy skills (Apperley & Walsh, 2012). Generally, well-designed IS can help children learn more than they would be able to learn without technology (Cooper, 2005). Moreover, recent technological advances promise to make technology even more important in the lives of the young. A look at the Metaverse, which is predicted to become a trillion-dollar economy (Rijmenam, 2022), confirms this: the Metaverse is being embraced by the most tech-savvy segment of the population, children. Roblox, a game that closely approximates a true metaverse, for example, has a huge user base of children under 13; over 50% of all daily active users in quarter four 2021 were below the age of 13 (Roblox, 2022). A growing user base of young people is a phenomenon that can also be observed in related offerings. Children are thus at the forefront of establishing the next generation of the internet, both as consumers and creators.

IS not only influence children, but the children with their unbridled imaginations also shape the future of IS. IS research already uses a lot of data that comes from children, as children often use IT artifacts such as smartphones and digital games. Children are the technology users of tomorrow (Fulton, 1998), future digital innovators (Iivari et al., 2016) and the future IS workforce. In many aspects, children's IS experience today is crucial for their later use of IS. For example, it is already decided in childhood whether girls can be inspired to pursue a profession in the IS world or not (Clayton et al., 2012).

While IS brings many advantages for children and their education, there are also dangers and stumbling blocks associated with children's use of IS. Existing

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concerns regarding the private use of IS of adults are partially reinforced in the space of children. For example, online privacy and end-user manipulation take on a different dimension when dealing with children, who might not yet understand those abstract concepts. Children are not aware of the implications of data sharing; they are often in an unobserved environment if they go online and might not be able to differentiate reality and fiction (Taylor & Howell, 1973).

Whether IS are good or bad for children and their education also depends on the goals of the developers and the (technical) design of the IS (Cooper, 2005). Our discipline shares responsibility for developing recommendations, guidelines, and best practices on the basis of which IS can be designed to maximize the benefits and advantages for children and their development. The same applies to research with children, which we must design in a way that children receive the protection and care they need.

Other disciplines have been doing research with children for decades with the goal to improve the understanding of children and their behavior (Greig et al., 2012). For example, psychology, sociology, biology, design, and the learning literature all deal with children excessively. In IS research, however, children are a very large, neglected fringe group (Kinnula et al., 2017). While the topic of children has been tackled in IS already years back (Joyce & Joyce, 1970), it has never received the attention it deserves (Kinnula et al., 2017). IS has the potential, on the one hand, to design child-centric artifacts for children, that supports them in education and health related topics. IS research on the other hand also has the potential to validate and further develop theories of child development and learning. But how can IS research with children succeed? To make IS research ready for the next generation, it is important to establish knowledge on how to do research with children in the IS space. So far, there are no guidelines in the IS space that address the specificity of children.

However, these specificities are crucial because children differ not only physically from adults but also cognitively and have very different abilities at different ages (James et al., 2010). Children think, act and learn differently from adults (Thomas, 1980). For IS research, it is important to consider the contexts in which children use IS (compared to adults), the involvement of adults when children use IS, and the assumptions about children and technology usage that are posed by society (Read & Bekker, 2011). Important differences of children that are relevant for IS researchers can be derived from the field of human-computer interaction (HCI), see for example Read & Bekker (2011) and Bruckman et al. (2012), .

Since IS not only has the potential to help children learn successfully, but can also jeopardize their development, lead to addiction (Dere, 2022), and pose further threats like cyberbullying (McInroy & Mishna, 2017), IS research is of paramount importance in the context of children. Thus, our research question reads as follows: what are specificities of research with children that are relevant for IS researchers? What are recommendations for IS researchers to deal with these specificities? Literature and guidelines for research with children from other disciplines can only serve as an introduction for IS researchers. For the future, existing guidelines from other disciplines should be adapted and complemented by specific IS guidelines to guide researchers dealing with children in the field of IS.

The paper is structured as follows. In section two, we briefly touch upon the relevance of research with children in different disciplines and mention important concepts that emerged from those disciplines. While section two incorporates a brief overview on the theoretical level of research with children, the rest of the paper aims to show how IS researchers can operationalize research with children on the empirical level. Section three describes the methodology used in the paper. The subsequent section, the core of the paper, discusses the specificities of children in research in general and for the IS world in specific. Section five contains the discussion and section six closes with a conclusion.

2. The research with children in adjacent disciplines

Child research has a long history in many disciplines. Traditionally, researchers viewed children as objects (Morrow & Richards, 1996) and performed research *on* children rather than doing research *with* children (Darbyshire, 2000; Hill et al., 1996). The break with the traditional view coincides with the children's right discourse, where for example the United Nations Convention on the Rights of the Child (United Nations, 1989) emerged. At that time, researchers and practitioners alike, revoked the perspective of children as objects and replaced it with a perspective of children as social actors (Morrow & Richards, 1996). The mindset shift was accompanied with a shift in research: not only the view on ethical aspects changed, also new methodologies and the call for more involvement of children in the research process emerged. Researchers from a growing number of disciplines turned their attention to children, and got fascinated by their development which can be completely different even if they act in similar environments or have similar biological backgrounds (Greig et al., 2012). This fascination is reflected by the wealth of knowledge about children's behavior that exists across disciplines.

At the foundation of research efforts with children are theories that help researchers and practitioners understand why children behave the way they do. Theories are important guideposts for predicting behavior and the effect of interventions on children. However, resorting to theories based on adult behavior is insufficient because children are different from adults (Greig et al., 2012). Different theories specifically for children and thus also different views on the design of research with children emerged from different research fields. The main approaches are rooted in psychology and aim at answering the question how children interact with the environment. The five main streams in child psychology are the physiological, psychodynamic, behaviorist, humanistic, and cognitive approach (Davey et al., 2014). Especially important for the following considerations is the cognitive approach, which focuses on ways in which children learn to think and understand the world around them. They were mainly formed by Vygotsky (1926) and Piaget (1929) and one of the main contributions that the cognitive approach has made is the insight that children understand the world around them differently and have different thinking patterns than adults (Greig et al., 2012). The insight that children perceive the world differently is the reason why research with children needs to be conducted differently than research with adults as we have traditionally known it. This view is also promoted by Bandura and his social cognitive theory (Bandura, 1989).

While each research field has their preferred theory, all contribute to a better understanding of children (Greig et al., 2012). However, theories from the different disciplines make different assumptions about children, their abilities and needs which leads to different requirements for research with children across the disciplines. The IS space would also benefit from specific guidelines for child research, as socio-technical systems raise new issues and questions in researching with children. Inter alias, children are particularly in need of protection as implications of sharing data and content online are hard to grasp for them (Livingstone & Smith, 2014). While IS research on children is limited, literature regarding technology and children exists in other fields, examining the role of technology with regard to healthcare (Johnson & Davison, 2004), social skills (Kumtepe, 2006), and family life (Rudi et al., 2015; Stephen et al., 2013). In addition, the HCI field has studied and developed guidelines for child research. Those guidelines examine how technology fits into the world of play and education (Read & Bekker, 2011) and elaborate on the interaction of technology to incorporate children's unique physiological and psychological characteristics (Fang et al., 2011; Lehnert et al., 2022).

In research with children, just as in research with adults, two principal research methods can be employed: quantitative and qualitative research. Quantitative research is based on the assumption that behavior of children can be described with existing theory since it is objective, structured and universal (Greig et al., 2012). Aim of quantitative research is to empirically test existing theory by defining relationships with observable, measurable variables on the empirical level (McCall, 1994). Qualitative research on the other hand generates new emerging theories from data generated on the empirical level (Greig et al., 2012).

3. Methodology of the paper

The paper presents a literature review outlining existing knowledge on research with children. We relied on a traditional narrative literature review to get a comprehensive overview of the field (Boell & Cecez-Kecmanovic, 2015). As we are not aiming at answering a highly specific research question, we did not perform a structured literature review (Boell & Cecez-Kecmanovic, 2015) but rather extract the most cited guidelines and recommendations for research with children across all disciplines. The most cited books and papers that are relevant are the following ones (each published after 2000 and cited over 1000 times): Christensen & James (2017), Darbyshire et al. (2005), Greig et al. (2012), and Punch (2002). The four scientific works originate from the disciplines of education studies, nursing science, psychology, and sociology.

Since the most cited literature does not include any work from the wider IS space, we expand our literature search. A literature review of AIS Basket of Eight papers with the keyword child* leads to 33 results, of which only one paper (Iivari et al., 2018) is relevant for our context. The paper covers one specific aspect of research with children: the involvement of children in the development of digital technology. The other excluded papers focus on solutions for spaces where children are present, but do not further address research with children themselves (e.g., research on IT infrastructure in a children's hospital (Richardson et al., 2014)). As our literature review revealed, the literature on doing research with children is limited in the IS community. Therefore, we integrate literature from the neighboring field of HCI where more literature regarding research with children exists (for example Druin (2002) and Iivari et al.(2016)). Furthermore, the research draws on our own experience from doing IS research with children in large field studies investigating everyday health behavior of young children.

The identified guidelines for doing research with children can be subdivided into four categories, namely

(i) ethical aspects, including recruitment, (ii) the design of artifacts and interventions, (iii) methodological considerations, and (iv) result interpretation and analysis. We derived the categories from the four established scholarly works for research with children (Christensen & James, 2017; Darbyshire et al., 2005; Greig et al., 2012; Punch, 2002) mentioned above by identifying common themes. In the following, the categories are used to structure and present existing knowledge on research with children. The elaboration of each category is based on the aforementioned literature as well as on the literature we identified in a backward search. In many cases, existing knowledge from other disciplines can be well applied and transferred to the IS discipline. However, some ideas and concepts need to be adapted and complemented for IS research since the discipline offers new opportunities, but also new challenges. In those categories, where literature from the IS field or neighboring disciplines exists, it is presented in addition to the existing knowledge from other disciplines.

4. Distinctive nature of children in research

Many issues that arise in adult research need to be reconsidered when researching with children. There are three reasons that make this reconsideration necessary: children and their characteristics themselves, children's standpoint in an adult-led society, and the view and biases of adults on children (Punch, 2002). The specifics of children that need to be considered in the different categories are outlined in the following. While many of the following statements apply to a range of ages, we focus on children between the ages of three and six (i.e., preschool-aged children).

4.1. Ethical aspects

Children have a distinctive position in today's society. While informed consent, confidentiality, and power relationships are always sensitive questions in research, they are even more sensitive when working with children (Cree et al., 2002). Children are highly vulnerable and, compared to adults, powerless. The unequal power relation between adult researchers and children has an impact on research that should not be neglected (Morrow & Richards, 1996). In general, ethical considerations are about balancing different interests: giving children a voice and supporting strict gatekeepers and guidelines. Since every research project has its own complexities and specialties which need to be considered, existing ethic codes can only serve as guiding frameworks (Punch, 2002). The following elaborates on important ethical considerations.

Participation and access. Doing research with children is challenging because access to them is difficult and their time is limited (Morrow & Richards, 1996). Many researchers report difficulties to recruit participants when doing research with children. To get access to children, researchers must collaborate and rely on so-called gatekeepers. Gatekeepers could be parents and professionals working with kids, for example teachers, or caregivers, who play an important role regarding consent. Gatekeepers have an inherent interest to protect children and often show great caution when it comes to research (Cree et al., 2002). This is positive and necessary, as children need to be protected, but at the same time there is a risk that children will be censored (Masson, 2005). Furthermore, a multitude of obligations often further hinder gatekeepers and thus children's participation. In addition to gaining initial access to children, maintaining a high level of participation is an equally difficult undertaking, as early gatekeeper involvement does not necessarily mean participation throughout the whole project (Cree et al., 2002). IS researchers should keep gatekeepers well informed and make research objectives transparent at an abstract level, without disclosing details that could lead to bias in implementation. This is particularly relevant in IS research, as data collection and processing are often "invisible", and the implications are rarely fully apparent to participants.

Consent. Researchers all come to the conclusion, that children must agree to participate in research in some form and should have an opportunity to stop their participation at any point of time (Anderson et al., 2019). If children give their informed consent, it should be given freely, without any pressure and coercion, which is especially critical considering the unequal power distribution between children and researchers (Masson, 2005). Children should not feel pressured to participate in the research or to give desirable answers – this could be the case, for example, in schools where the researcher is perceived as a teacher (Punch, 2002). Researchers have to explain the background and aim of their research clearly (Morrow & Richards, 1996) to ensure children to understand the purpose of the research project. It can be challenging to tangibly explain to children what the research entails (Lindsay, 1999). Thus, some researchers have developed creative ideas on how to present the research to children and ensure their understanding, e.g. the production of movies (Fargas-Malet et al., 2010). Other researchers argue that children lack the competence to give informed consent and should rather assent (agree to participate) in the research after an adult has given their informed consent (Kellett & Ding, 2004). Another consent related issue is the pay of children for research. In Europe, this ethical question has been solved by an

EU directive that prohibits paying children for participating in research (Cree et al., 2002). Rewards, even if not in the form of money, are therefore problematic. IS researchers seeking consent for their research with children should keep in mind that communication must occur at multiple levels: guardians, other adult gatekeepers, and children must be informed. Communication with children can succeed well by using examples and IS artifacts for demonstration purposes.

Confidentiality. Child protection means ensuring their confidentiality. Adults are often not used to listening to children's voices and granting them the right of confidentiality and autonomy (Barker & Weller, 2003). While anonymity in research is the guiding principle, it must be decided in advance how to deal with information that must be passed on to prevent harm (for example child abuse) (Cree et al., 2002; Fargas-Malet et al., 2010). In general, the choice of context is important to consider since it always represents a trade-off between privacy and confidentiality (Barker & Weller, 2003). IS researchers should be especially careful: the ethical requirements for IS research projects with children should go beyond the requirements of the legal guardians. Parents regularly do not reliably know the consequences of their decisions in the IS environment, as for example the unfiltered publication of children's pictures in social media shows. IS researchers should take action and support guardians by developing particularly careful ethical guidelines, inter alias by involving the ethics committees with special care.

Even after conducting the actual experiment, there are still aspects to consider in terms of ethics. Ethical research requires a debriefing from the participants, and this also applies when researching with children (Fargas-Malet et al., 2010). Research should be concerned about the long-term effect of their work and giving back to participants, especially when working with marginalized groups such as children. Furthermore, researchers should avoid building up relationships and projects that leave a gap after the research is completed, but rather seek long-term engagements. While ethics are often seen as the main difference between adult and child research, and thus often dominate other debates (Punch, 2002), there are other important aspects, that are considered in the following.

4.2. Design of artifacts and interventions

Especially when it comes to design, it is important to remember that children are not just little adults, but a completely different target group with different desires, needs and behaviors (Berman, 1997). Children find it difficult to verbalize, especially when they are young and the topics are abstract (Piaget, 1964). This affects the possibilities to involve children in the design processes as well as the methods that are appropriate for doing so. Even though challenging, researchers advocate the active role that children should play throughout the research project (Einarsdóttir, 2007). Historically, the space allocated to children in the design process has been small. This has to do with the already mentioned peculiarities of researching with children, for example ethical aspects, difficult recruitment, power disparities, existing prejudices, and difficulties to use traditional methods successfully, especially with young children. (Druin, 2002)

Different classifications of the roles for children in the design process exist. The choice of roles depend on the goals, resources, and time frame of the research project, as well as the background and attitude of the researchers (Druin, 2002). One possible role differentiation are the user-centered design, contextual design or inquiry, participatory design, cooperative inquiry, informant design, and learner-centered design (Kinnula & Iivari, 2021; Nesset & Large, 2004). Another possibility used in the HCI space is the division into user, tester, informant, and design partner (Druin, 2002; Fails, 2012; Kinnula & Iivari, 2021), depicted in Figure 2 (where roles are sorted by the deepness of involvement of the child in the design process) and briefly explained in the following paragraph.

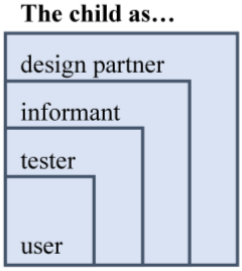

Figure 2. Role of children in the design process, own illustration based on Druin (2002).

The child in the role of a user is the role with the longest history. Adults try to make sense of the child's behavior while the child is using the technology. A common research method that is used when the child is seen as user is the observation technique. Another role is the child as the tester of technology. Here, children test prototypes of products to help shape the technology. Aim is to give children a voice before the product is finalized and commercialized. In this stage, observation techniques are used as well, often paired with direct feedback questions. The third role is the child as informant. Here, the child informs the design process in different ways. Researchers observe children using existing technology to derive implications for new

technology or researchers ask for input from the child for example by having the child draw their wishes. The final role in which the child's involvement in the design process is greatest, is as a design partner. The role extends the informant role in a sense that now the child is viewed as an equal contributor throughout the entire design process. New methods, for example the mosaic approach where children create maps incorporating their own drawings and photographs (Clark, 2005), can be used. Each of the described roles relies on different methods and inherits different benefits and challenges. For an overview, see Druin (2002) and Kinnula & Iivari (2021).

IS researchers have recognized the importance of involving children in the design process of IS to empower them (Kinnula et al., 2017). However, there are only individual cases demonstrating the design of artifacts and interventions with and for children in the IS space (for example Kowatsch et al. (2014)). These cases are only exemplary and far from establishing universal design principles for IS. For guidelines on how to handle the design process when doing research projects with children, IS researchers can rely on emerging knowledge from the HCI field, or more specific the child-computer interaction (CCI) community. There, the topic was first picked up in 1982 (Malone, 1982) and has continued to evolve since then, as the above presented role definitions in the design process show.

4.3. Methodological considerations

The spectrum of views on how research with children should be conducted is wide. Some researchers pretend that research with children is almost indistinguishable from that with adults and thus the same methods should be used. Other researchers rely on ethnography as a research method because they see fundamental differences between research with children and adults. In between these two extremes, there are researchers who attribute similar attributes to children as adults, but with different abilities. (James et al., 2010) Many new or adapted research methods for children have emerged from this perspective and the earlier mentioned mindset shift from children as objects to a view of children as competent social actors. Additionally, the described unequal power relations of children and adult researchers are a reason for the development of child-centered research methods (Barker & Weller, 2003). The new or adapted methods for research with children are discussed below.

Generally, child-centered research methods enable children to express their views and feelings, and help promote an equal relationship between children and the researcher (Barker & Weller, 2003). Often, those methods are qualitative. However, also quantitative methods have their raison d'être (Barker & Weller, 2003). Questionnaires can become a child-centered research method if they are designed to be child-friendly with pictorial Likert-scales (Lindsay et al., 1999). Researchers can for example depict scales as smiley faces to make them understandable for children. Qualitative research methods that are often mentioned in connection with child research are task-based research methods like drawings, photographs, appraisal techniques, and diaries (Fargas-Malet et al., 2010; Hart, 1992; Punch, 2002). Those new methodologies enable children, depending on their age, to communicate and are often more visual and digital (Christensen & James, 2017).

While those task-based research methods are methods considered to be child-friendly, they do not only have benefits (Punch, 2002). For example when researchers employ drawing as a methodology, they often have children draw pictures but then the interpretation of the pictures is done by adult researchers which represents a big source for misinterpretation (Darbyshire et al., 2005). Generally, child-centered research methods are to be used with care: what adults perceive as child-friendly may be perceived by children themselves as adult-centered (Oakley, 1994). Appropriate methods when doing research with children make participation in research fun for children, and must be aligned with their skills, interest, and concentration span. One-on-one situations for example with adults can be intimidating. Generally, building rapport with children is challenging for adults, especially when they lack experience. (Punch, 2002) During data collection, it is very important for the researcher to create a basis of trust with the child and a respectful interaction. This could for example be done with certain non-verbal behavior (for example nodding and eye contact) (for more ideas on how to establish a good basis for research with children see Fargas-Malet et al. (2010)). Furthermore important is the conscious and clear use of language of the researchers, because young children often use different language and fewer vocabulary (Punch, 2002). To implement all of these recommendations effectively, researchers need experience with children. Thus, IS researchers who are new to research with children should form partnerships with researchers who are experienced with children.

Researchers do not have to rely on one single method when doing research with children. They can use a combination of methods and adopt a multi method approach (Morrow & Richards, 1996). Using different methods and techniques helps to understand children with different childhoods and experiences (Punch, 2002). Children can have very different preferences and their emotional and intellectual development can vary

greatly also within the same age group (Grieve & Hughes, 1990). Thus, multiple methods can produce richer results, complementary insights and a better understanding than relying on one single method (Darbyshire et al., 2005).

In general, all research methods used with children need to be critically reflected upon in connection with the research aim and the context (for example regarding participants, location, and culture) (Punch, 2002). The context in which research is situated is important for the choice of methodology as well as for the result analysis. The space and associated power relations where methods are employed can have a high influence on success and efficacy of a research method and thus on the research findings (Barker & Weller, 2003). To conclude, researchers must be flexible when doing research with children, also methodologically. Methodological changes and flexibility should not be attributed to unreliable research execution, but rather as necessary to adapt to children's needs (Darbyshire et al., 2005).

The IS space opens new methodological possibilities for doing research with children. IS enable the measurement in long-term field studies (Goes, 2013). Other than traditional observation techniques, where researchers are observing behavior and might be intimidating children, IS enable objective and person independent measurements that are not perceived as controlling by children. Field research compared to laboratory studies is particularly suitable for children, as a familiar environment is important for children. With the help of technology, research can be integrated into the everyday life of children and thus, IS methodologies can be very interesting also for other research disciplines. To make full use of the potential of methodologies based on technology, further research in the IS space with children is necessary.

4.4. Analysis and result interpretation

The interpretation of research results should be done with exceptional care. Leaving the interpretation of words and actions of children to the adults is challenging. While children give honest feedback, the interpretation of their words and actions is not straightforward as it has to be incorporated in the wider context of the child and its experiences (Druin, 1999). The way that adults and the society perceives childhood has large influences on the understanding of children (Punch, 2002). We all make assumptions about children, have our own biases and incorporate our personal experiences as parents and as grown-up children into the research process (Barker & Weller, 2003; Druin, 2002). Since we were all children once, we pretend to understand something about childhood, but we do so from the point of view of an adult with different experiences (Punch, 2002). Our adult-centered perceptions are often misleading when interpreting children's actions (Barker & Weller, 2003). Result analysis can be improved when children themselves interpret their produced material. For example, when using drawing as a research method, interpretation should be done by the children themselves, as the adult perception might be different from the child's motives (Barker & Weller, 2003). If researchers are involved in the interpretation of results, it is recommended that they be very experienced with children. For IS researchers, it is advisable to work in interdisciplinary teams with researchers who have a high level of expertise with children. Also the research context and location (who is conducting the research, when and where) affects what children say, how they act and behave (Barker & Weller, 2003; Hill, 2006; Punch, 2002). Children behave differently in different environments, for example in adult dominated spaces and in schools versus at home. Furthermore, as always with the evaluation of results in research, the question of validity and reliability arises. With children, the danger of exaggerating or lying to please the researchers is more pronounced due to the unequal power relations (Punch, 2002). Researchers should consider using a larger sample as they would in IS research with adults due to the higher variance in responses. In conclusion, when conducting and evaluating research with children, it is important to be aware of possible biases and prejudices. Researchers should be careful not to impose their adult views and interpretations when interpreting children's words and actions (Punch, 2002). It is important to be aware that ultimately it is the adult (who did not grow up with technology) who puts the children's perspective into words.

5. Discussion

There is no general truth of child development that can be uncovered with research (Barker & Weller, 2003). Children are unique and so is research with them. The field of research with children is very broad, especially since a variety of disciplines have developed knowledge in this area. The paper considers specificities and research guidelines in the light of children as social actors and users of IS. It gives IS researchers an overview of existing literature on the most critical points that need to be considered when doing research with children and can be understood as a guide, especially for those IS researchers who are engaging in research with children for the first time. In the area of ethics, concepts from other disciplines have to be extended due to the IS's ability to "invisibly" collect (sensitive) data on a large scale. In the area of design, the IS community can

draw upon experience in the HCI and CCI community, which stress the involvement of children in the design process. Regarding methodology, the IS field enables new possibilities for child-friendly (long-term) field studies and the integration of research into the daily life of children. New methods based on IS (for example measurement of behavior with technical systems) can help to overcome the struggle of imposing adult-centered views on the actions of children.

However, considerations made for one research project with children may be inappropriate for another. The diversity of abilities among children of different ages, as well as among the same age group, requires adjustments in research considerations (even within a single project) and participant recruiting. The same holds true not only for age differences in children, but also for other areas such as race, gender identity, nationality, culture, and socioeconomic status of the children.

Generally, researchers should critically reflect on all steps of a research project, from defining the research question to analyzing and interpreting outcome data to make research truly suitable for children (Darbyshire et al., 2005). This is especially true for IS research and for research that is conducted in the field (rather than in the lab). Implications for children are often far-reaching and virtual and real worlds are particularly difficult for children to distinguish.

In our paper, we present important considerations for doing IS research with children for all steps of a research projects, largely based on findings from other disciplines. The lack of recourse to IS experiences is a limitation of the paper, which is due to the fact that these experiences simply do not yet exist in the IS world or are not yet captured in the research literature. For the IS community to change this and successfully contribute to research with children, all steps of a research project must be thoroughly understood and reconsidered in the context of children. This is timely because in a number of data-mining studies, IS researchers already use data from children, even if unconsciously, e.g., when children use IS artifacts such as their parents' smartphones. Future IS research can approach the topic of research with children with case studies. Cases can help the IS research community to better understand (Walsham, 1995) and learn to deal with problems and specifics with children. In the coming years, as IS researchers become more experienced in the field, guidelines for research with children should be detailed, expanded, and updated. Consequently, additional guidelines will emerge. This contribution shall serve as a starting point.

6. Conclusion

IS do not only impact economies and organizations, but also people's personal lives, especially that of children. We live in a digital age, where children, a large IS user group and the future workforce, are repeatedly confronted with digital solutions. For a sustainable digital economy, the IS community has to prioritize children on its research agenda to uncover how children behave in relation to IS, what their needs are, what they want, and what helps them learn and develop. Researchers and practitioners alike need to be enabled to design IS in a child-centric, empowering way. Neither current IS research methods for adults nor research methods for children of other disciplines can simply be transferred and adopted. Research should be based on theory, child-centered, and follow interdisciplinary approaches. The paper provides initial guidance for IS researchers who wish to approach research with children and IS.

In conclusion, IS research is exciting for yet another area. Research with children in IS has not only the potential to empower children with child-centric technical systems, to expand existing theories of children's behavior that are relevant for multiple disciplines but will also enrich the diversity in the IS community in the long term.

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