"Maybe Some Learn It the Hard Way": A Nexus Analysis of Teachers Mediating Children's Online Safety

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Abstract. Worries over children's online safety increase as ever younger children have their personal digital life. As digital technology use also increases in schools, teachers have natural opportunities to mediate children's online safety. However, a better understanding of how it can be integrated with schoolwork is needed. We study how teachers mediate children's online safety in primary schools. Through nexus analysis, we examine discourses of trust, control, and involvement that the teacher's engage in. We also uncover many actors and history and experience related issues that shape the mediation of children's online safety. This study results in a variety of ideas as regards how IS research can support teachers and schools in mediating children's online safety.

Keywords: Online safety · Safety mediation · Children · Teachers · Schools

1 Introduction

Mobile and online technologies open great possibilities for learning, identity creation, and participation [1] and ever younger children have a digital life [2]. Their digital literacy and safety skills increase with use, and European teens and preteens are generally not unskilled [3]. Younger children however tend to lack skills and confidence [3]. Worries over children's online safety increase [2], e.g., as Internet use is becoming more private [4], and as youthful tendencies for heightened risk-taking and independence can sometimes be magnified by the opportunities of online interactions [5]. Threats associated with Internet use include 'content threats', i.e., inappropriate (e.g. adult/abusive) content [6], 'contact threats', i.e., grooming, bullying, privacy loss [6], 'conduct threats' where a person participates in activities such as illegal file sharing or bullying [7], or 'computer threats', e.g., malware, phishing, data theft/loss, password stealing/cracking, Internet addiction [6]. These threaten information security (i.e., protecting private information and systems from unauthorized access, use, disclosure, disruption, modification, or destruction [8]), and personal safety (i.e., ability to go about their everyday life without threats or fear of psychological, emotional or physical harm [9]). Online safety can thus be defined as protecting persons' physical and

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psychological safety as well as their reputation, identity, and property online [10], property including hardware, software, information, and intellectual property.

Parents and peers are usually identified as significant actors in children's online safety [11]. However, teachers are also central actors [11]; they together with parents are 'significant adults' in children's lives, whom children are dependent on in many respects [12]. As use of digital technologies increases in schools [13], education leaders, policymakers, and teachers face the question of how to promote technology use while safeguarding children [14]. Teachers are in a central position, as they have good opportunities to inform children about online safety [11] and to shape children's attitudes and behaviour [11, 15]. Yet, they are currently under-researched actors [16]. Even though information security is an established field within information systems (IS) research, research concerning children and their online activities is still lacking [17]. We believe IS research could contribute to this fascinating field, especially in the school context.

To this end, we ask in this study: How do teachers mediate children's online safety and how IS research could help teachers in this significant task? We answer these questions though a nexus analytic [18] enquiry into how Finnish primary school teachers use digital technologies in their classroom and what they do to mediate children's online safety. We focus on primary school teachers as there is a lack of research particularly on younger children [16]. This inquiry offers a nuanced and rich account as well as opens a variety of possibilities by which IS research can support teachers in this important endeavour. Moreover, IS researchers interested in school context in general can get valuable insights into teachers' multifaceted work and how technology shows in it.

This paper is structured as follows: The next section contains related research on mediation of children's online safety and teachers' role in. This is followed by introducing the research design and the theoretical lens used to make sense of the data. Then our results are outlined, and finally the implications of them are discussed together with limitations and paths for future work.

2 Related Research

Online safety of children is mediated using different mechanisms developed by industry, policy makers, and governments [17]. People close to children also seek to help children to make the most of online opportunities while minimizing possibility of harm [11]. Parents and peers are important actors here, but teachers are also central [11]. People close to children use different strategies to mediate children's online safety, including, e.g., active mediation by talking and offering help or restricting and monitoring Internet use [11]. It is argued that restrictions reduce online risks but they reduce also online opportunities and skills [19]. Although monitoring is recommended, there are considerations whether it is ethically acceptable [6]. Usually, active mediation is encouraged as it is linked to lower risk and harm and to children having more online activities and skills [19].

Teachers and schools mostly practice technical mediation [20] or restrictive mediation by setting rules for Internet use [11]. Teachers' active mediation mostly focuses on instructive remarks [15]. Teachers who incorporate digital technologies in their every-day life are more effective in promoting online safety also in the class compared to those less enthusiastic about digital technologies [21]. However, despite growing interest in digital literacy within educational policies, guidance of how it should be included in teaching is lacking [22] and teachers sometimes find themselves responsible for delivering the online safety message with little support [23].

Educating children about online safety can be problematic, e.g., if children feel that they are better users of digital technologies than their teachers [24]. Researchers report, e.g., on teachers' lack of knowledge about online safety [13], cloud-based applications [25], and activities that pupils engage in [25]. Some report complexities when teachers connect with children online [26]. However, if a knowledge gap exists, it can be closed by gaining skills and interacting with digital technologies [27]. As some teachers might lack skills for exploring the Internet with children and giving guidance, a more systematic approach to online safety in schools is advocated [21]. If rules and procedures are not defined, in many cases restrictive mediation is employed [28]. Information campaigns targeted at teachers are recommended [11] as well as training to increase teachers' knowledge of threats, policies, and programs, thus increasing their capability to provide help [29]. To this end, there are many materials already produced, including, e.g., educational games [24] and guidebooks for teachers [30]. There, however, is a lack of research on what works and what does not [16].

Schools are also advised to engage with parents and peers in online safety education as they can help shape children's behaviour [31]. While it can be difficult to effectively involve parents [32], schools can assist them in becoming Internet savvy and help them in monitoring home usage, thus strengthening home-school relationship [33]. Positive experiences also indicate that online safety message can be better received from peers than from awareness-raising exercises [34].

Discourses on control, trust and involvement have been identified to characterize public debate on online safety of children and argued to have an effect on the practice as well [35]. *Control* aims at predictable behaviour [36], e.g., by setting rules, goals and rewards [35]. Sometimes adults, however, have to rely on children behaving responsibly even when they don't know where children are or what they do [37]. They have to trust children, such *trust* being based on the knowledge of children's past and present behaviour [37]. This knowledge can be obtained by children voluntarily sharing information, adults actively asking for the information from children, or adults setting rules and restrictions [38]. *Involvement*, then again, is seen to include communication, supervision, adults' aspirations for children, and active adult participation [39] and it can, hence, be seen as interlinked both with control and trust. Thus, it is important to notice that these concepts are not mutually exclusive but intertwined [35] and a close and caring relationship between children and adults combined with a suitable amount of control is considered to reduce children's undesirable conduct [40].

3 Methodology

3.1 Theoretical Lens

As our theoretical lens, we use nexus analysis (NA) [18]. In NA, the unit of analysis is social action that happens in a specific moment in place and time but is viewed as a cross-section of three different aspects: historical bodies [41] of participants, interaction order [42] between them, and discourses in place [18]. In this study, the social action under scrutiny is mediation of children's online safety, as carried out by teachers. *Historical body* of a person refers to histories of actors that affect the situation. For example, teachers' personal histories as pupils, teachers, and digital technology users may shape the social action under scrutiny. *Interaction order* can be used to explain why and how people interact in certain ways in different groupings and how this affects the social action in question. For example, teachers' interaction with pupils or parents can shape how they mediate children's online safety. Finally, *discourses in place* means that all social action and discourses circulating around happen in real time and place, the participating actors using different resources available to make the action meaningful. NA is interested both in discourses in specific place and time as well as in the broad discourses of our social life and how they are engaged in our everyday life [18].

3.2 Data Gathering

Data for this study consists of theme interviews (duration 20–63 min) of nine teachers from our three partner schools. Selection of the teachers was purposive, which is usual in qualitative research [43]: they were chosen due to their familiarity of the subject, i.e., use of digital technologies in classroom and efforts to educate children on online safety. Teachers of 9–12-year-olds were approached as there is a lack of research on younger children on this topic [16] and some data collection tools we use require participating children to be able to read and analyse their own behaviour at a certain level. We asked all teachers of grades 3–6 to participate in our research and also sent out reminders. Out of the 43 teachers contacted, nine volunteered.

The interviews were carried out at schools. Interview themes were based on the literature review and included teachers' digital technology and Internet use; teachers' assumptions on children's digital technology and Internet use; online safety mediation at school; and, guidelines and training related to mediating online safety. This was an exploratory study; we wanted to keep an open mind and gather as diverse data as possible. The interviewees were allowed to concentrate on the issues they felt important. We let the conversation flow freely, trying to stay neutral in our language and reactions. Interviews were transcribed and, to ensure authenticity, the transcripts were sent to the interviewees for credibility check.

3.3 Data Analysis

The interview texts were first coded into different categories emerging from the data, going through the interviews several times until no new categories could be identified.

Then, the authors discussed the results examining first discourses of teachers, using the existing literature on discourses of trust, control and involvement as a sensitizing device [35]. Afterwards, the NA lens guided us to identify how the teachers' historical bodies and their interaction with other actors were shaping the social action of mediating children's online safety.

4 Results

4.1 Discourses in Place

Regarding discourses in place, we examined the interview talk to see how the teachers positioned themselves and children when talking about online safety: how they discursively constructed children's online safety and their own role. There was variety in the teachers' talk and several discourses could be identified. Then again, one teacher could be engaged in different discourses during their interview. We noticed that particularly the discourses on control, involvement, and trust that have been seen to permeate debates on children's online safety in our society [35] stood out also in these interviews: the discourse on **trust**, characterized by the teachers' trust in children's skills and capabilities in technology use; the discourse on **control**, characterized by the teachers arguing for more control over what children do, and the discourse on **involvement**, characterized by the teachers asking for more involvement from different actors – parents, children, themselves, school administration, and possible external parties. Example quotations from our data are seen in Fig. 1.

In the discourse on **trust**, the teachers constructed children as skilled digital technology users who might learn a bit of a hard way, but the more they grow and interact with technology, the more skilled technology users they become (DP1 by teacher 6 in Fig. 1). They viewed children as sometimes even capable of instructing their teachers on digital technology use and positioned themselves as enthusiastic and open-minded in experimenting and teaching with digital technologies (DP2, DP3). Children were viewed as capable of handling problematic online safety issues, e.g. scary material, by themselves (DP4) and capable of determining what they can or cannot do online and instructing also others, e.g. not to spam on WhatsApp (DP5).

In the discourse on **control**, the teachers criticized children's digital technology use as light-hearted or entertainment oriented. Children were seen as handy with social media, gaming, and smart phones, but their basic computer skills (e.g. in productivity software use) were seen to be limited (DP7). As for online safety, the emphasis was on control. Even though children might be viewed as handy with many things, they were also seen as unthinking and easily excited and their skills and knowledge as lacking (DP8). Teachers and parents were to monitor, instruct, and limit children's technology use (DP9). Addiction was a concern and it was seen as legitimate to restrict technology use at school (e.g. banning smart phone use during recess) and the teachers hoped parents would do the same at home (DP10). The teachers positioned themselves as overseers of children and they were to inform also parents about possible problems (DP16). The teachers also advocated parental control while acknowledging that it is challenging nowadays because of mobile devices and data (DP11).

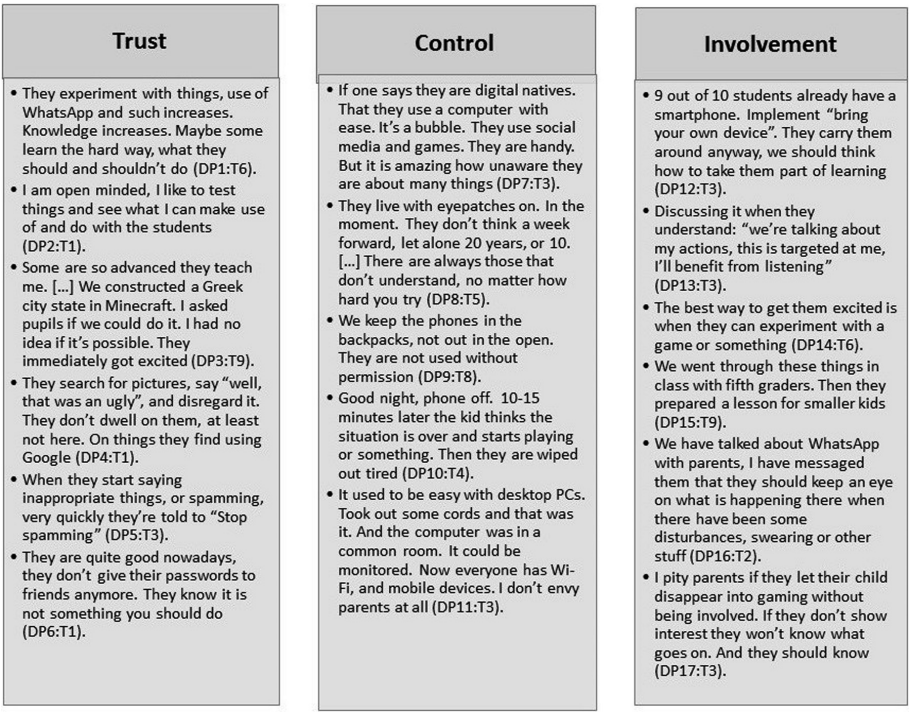

Fig. 1. Example quotations regarding discourses in place.

Finally, the discourse on **involvement** can be characterized as emphasizing cooperation among adults and with children. The teachers within this discourse tried to bring digital technology important to children (e.g. smart phones) into classroom in a meaningful way (DP12). When it comes to online safety, teachers maintained that lecturing is not the answer, but issues were to be addressed on the spot, when they naturally emerge (DP13). Concrete examples, learning by doing and reflection were encouraged, as was inviting children to teach each other (DP14, DP15). The teachers were collaborating with children in digital technology use and supported and helped each other in integrating technology and online safety into the classroom. Parents were to be involved, too: teachers were to inform parents and vice versa, e.g. if they had noticed problems or new developments (DP16). Parental responsibility was also called for and it was pointed out that it is a pity some are not involved in their children's life online, citing reasons such as unfamiliarity with the technologies that children use (DP17).

4.2 Historical Body

When looking at our data, interesting issues related to historical bodies of the teachers as well as of the pupils could also be identified – shaping teachers' mediation of children's online safety. Example quotations from our data are seen in Fig. 2.

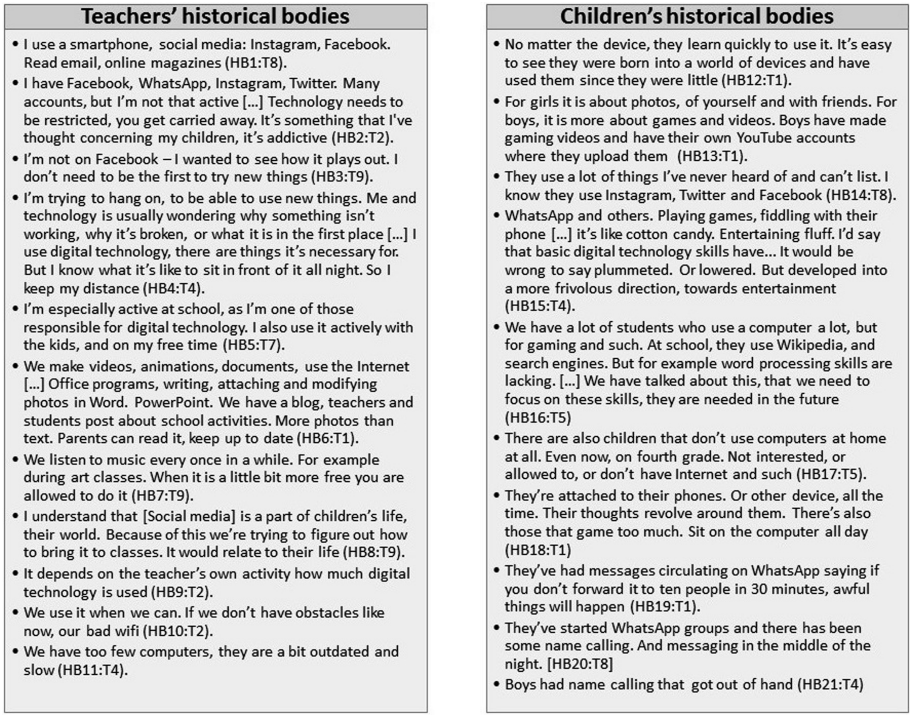

Fig. 2. Example quotations regarding historical body.

The teachers' own historical bodies in the sense of their digital technology use skills and experiences influenced in the background. All interviewed teachers told they have their own smartphones as well as PCs, laptops or tablet computers. Some were, however, hesitant towards using digital technologies on their free-time, e.g. as it takes too much time. Most interviewees described their technology skills as average. One even jokingly confessed of being a bit of a bungler when it comes to technology use (HB4). Only two of the teachers identified themselves skilled with computers. One had previous education and experience in digital technologies and the other one was responsible for technology support at school. Both were avid technology users and experimenters.

The teachers explained that it depends on them how much digital technologies are used in the classroom (HB9). All reported using digital technologies in their teaching at least weekly. They believed that basic computer skills will be important in the future, and the children practiced, e.g., searching for information online and using productivity software like word processing and presentation programs (HB6, HB16). Transitioning to cloud computing was seen as a learning situation for children and a big change for the teachers.

Regardless of their own skillset, some teachers had a more enthusiastic approach to introducing new digital technologies into children's education. Smart phones were utilized, e.g., to search for information or to listen to music during art classes (HB7).

One teacher noted that utilizing smart phones is a nudge towards trying to connect to the children's world, as children carry them around anyway (DP12). Children also learned content production at school, in the form of, e.g., photography, animation, and videos. Some of the work had also been uploaded to social media (HB6). Class-related WhatsApp groups were also common. The teachers who were more reserved in using new digital technologies in class cited reasons such as excessive free-time technology use, need for the children to learn the basic functions of a computer first, or technological issues like lack of computers or bad wireless connections at school (HB10-HB11).

Issues related to children's historical body became also foregrounded during the interviews. The teachers described their understanding of their pupils' historical bodies regarding technology use and expressed their beliefs that most of the children spend a lot of their free-time using a computer or a smartphone (HB16, HB18). However, the teachers also acknowledged that there are children who cannot use digital technologies on their free-time, or even wish to do so (HB17). The teachers reported on gender differences in the pupils' use of digital technologies. For girls, photos were seen as important and one of their social media favourites was Instagram. On the other hand, the teachers believed that boys were more active in gaming and in making videos that some uploaded also to YouTube (HB13). According to the teachers, the most popular use of Internet among pupils was WhatsApp; they however also noted that they might not even know all of children's favourites (HB14). Online safety issues had also manifested in school or some children had taken them up – such issues therefore already being part of children's historical body. These issues included content threats like scary material, contact threats like cyberbullying, and computer threats like data theft, and privacy loss (HB19-HB21).

In general, the teachers believed children to be quick to learn and quite handy with technology, while individual differences could be big. The teachers more enthusiastic about technology also saw children's historical bodies with technology in a more positive light, positioning children as skilled and capable, while others were concerned of children's skills or the lack thereof.

4.3 Interaction Order

In our data, it was also evident that various kinds of interactions with a multitude of different stakeholders were involved in teachers' mediation of children's online safety: the participants, naturally, included children themselves and their parents, but also educational administration and different kinds of external actors. Example quotations from our data are seen in Fig. 3.

Some educators from outside institutions, such as a school police and an information security specialist from Microsoft, had visited the schools holding seminars and classes to children on online safety. Their visits were usually mass events meant for the whole school, and the teachers believed the impact might be limited (IO14 in Fig. 3). Parents were positioned as important actors in ensuring children's online safety. Parents and teachers also cooperated when troubles had emerged e.g. concerning smart phone use (IO5). However, sometimes the division of responsibilities between parents

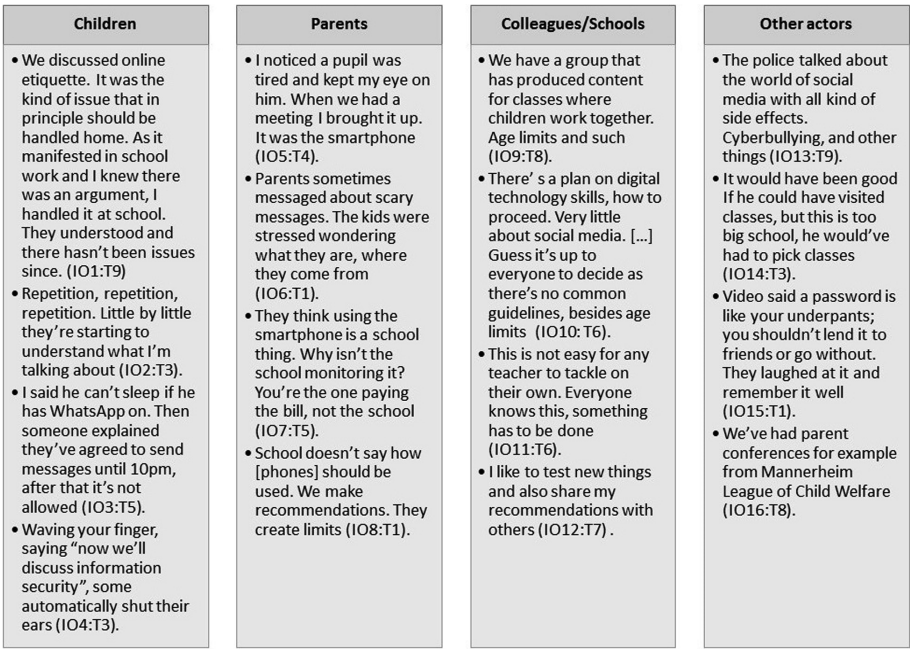

Fig. 3. Example quotations regarding interaction order.

and teachers was seen a bit confusing. The teachers maintained that they do educate children, but parents should take more responsibility and become involved in their children's life online (IO7-IO8). To this end, some education and guidance was already provided by the school for parents, e.g. during parent nights (IO16).

When it came to interacting with children and teaching them online safety, the teachers were sceptical if traditional lecturing makes a difference (IO4). They felt that online safety related issues were not a major concern among pupils. Children had managed smaller problems in their groups, and if there had been problems that manifested in class (e.g. cyberbullying or addiction), the teachers had handled them when they occurred (IO1). Indeed, the teachers felt that when the message was tied to the children's own experiences, it was more readily received than through lecturing (DP13, DP14). The teachers also emphasized the power of repetition to get their message through (IO2).

The teachers were also collaborating with children in online safety education as well as in digital technology use, for example inviting older children to teach the younger ones (DP15). However, there was a variety in how the teachers saw their and children's relationship in online safety mediation, as mentioned: some saw themselves as controllers and instructors, others saw children even as teaching their teachers, while many saw active collaboration with children as the way to go.

There were common guidelines given to schools about educational use of digital technology, and what skillsets children should acquire during each school year (IO10). To some extent teachers had also supported and helped each other in integrating

technology and online safety into children's education, e.g., by gathering material to be used in classes (IO9). However, there is so much material available that the teachers had difficulties in managing this information and selecting the best pieces. Some extra education was offered, but taking part was voluntary, and the teachers attended only if they felt it added some important knowledge.

The teachers felt they were left mostly on their own to decide how much digital technologies are used in their lessons, and if online safety issues are taught during them (HB9, IO10, IO11). As this might produce big differences in the skillsets of the pupils, the teachers were hoping that the schools would make more effort to help them. The teachers' concern for help from the school also reflects more broadly the background and history of Finnish school system, in which the pedagogical independence of teachers is emphasized. This leaves teachers quite alone regarding digital technology use and children's online safety education, balancing between wanting to provide them with new, exciting opportunities, and wanting to keep them out of harm's way.

5 Concluding Discussion

This study enquired *how teachers mediate children's online safety and how IS research could help teachers in this significant task.* We examined three discourses (trust, control, and involvement) on children's online safety in primary school teachers' talk and on how they taught it in school, and explored how the concepts of historical body and interaction order shaped the situation. Our analysis showed the complexity of teachers' work, trying to connect digital technology use and online safety to everyday schoolwork in a meaningful way, at the same time needing to collaborate with multiple stakeholders. Next, we present the three main issues that emerged from our study and where we think IS research could make a difference.

5.1 Developing Teaching Practices that Fit Children's World

In line with previous research, the importance of integration of digital technologies and web 2.0 to school life [13, 14] was visible in our data. The discourse on involvement was connected with this: even though not all teachers were enthusiastic about new technologies in their personal life, they were trying to incorporate those tools into their teaching when possible, in a safe environment (cf. discourse on control). They tried to prepare children for the future and to close the gap between school and children's free-time by utilizing tools that children are familiar with. This is an important step from the point of view of children's rights, too, as digital technologies continue to be an important part of their lives from an early age. Instead of focusing on controlling and restricting, one should concentrate on improving the supply of information and offering opportunities for self-expression and participation together with adult support and awareness [16].

With regards to online safety, the teachers believed that traditional lecturing of online safety is not very effective, but instead tying the teaching into children's experiences as issues arise (cf. [15]). The teachers believed educational materials from

different organisations can be useful in teaching children online safety. Most effective seemed to be, e.g., videos with a message, games, and exercises where children reflect on their actions together in a group. However, there is a lack of research concerning which of these materials actually work and which do not [16].

5.2 Developing a Systematic Approach to Online Safety

In today's rapidly changing world teachers sometimes struggle to deliver online safety education to children. The reasons mentioned by the teachers echo those identified in the previous research: lack of common policies and educational resources [22, 23] and lack of knowledge in activities that children engage in [25]. Previous research has suggested that if there are no common policies in place on how to manage online safety, a common response will be restricting access [28]. Indeed, relying on the discourse on control, some teachers noted that restrictive mediation of online safety is warranted, e.g., when it comes to children's smart phone use. Monitoring was practiced, e.g., in WhatsApp. Then again, relying on the discourse on trust, most teachers favoured active mediation, as also is recommended in the previous research [19]. They approached online safety matters as they emerged in school. At the same time, however, they acknowledged that children might not be telling them everything that is going on.

We concur with the previous research [21, 28] that a more systematic approach is needed for teaching online safety in schools. Some schools had already tried to compile their own educational packages based on different materials, but the efforts were not consistent. In addition to tackling issues that emerge in school life, we need to find interesting ways to educate children also on the matters that do not emerge naturally there: even if children have not experienced certain threats in their digital life, it doesn't mean they shouldn't learn what to do if they ever encounter those. A systematic approach to online safety should include an investment in teacher training to increase their online safety knowledge and capability to provide help in difficult situations [11, 29]. Some education had been arranged for teachers, but not much and only on voluntary basis. The interviewees wished for more guidance. They had tried to get familiar with the educational materials produced by different actors, but there was simply too much available and it was sometimes considered extra work. Common policies and training would reduce the pressure of an individual teacher.

5.3 Linking School and Other Actors Together

The discourse on involvement as well as the nexus analytic concept of interaction order made visible how schools are an important nexus of activities that contribute to children's online safety. This nexus connects peers, parents, teachers, and other actors in a shared dialogue. As previous research [11] suggests, teachers position parents as important mediators of children's online safety. Previous research stresses the need to educate also parents [33], and the teachers reported efforts of this, e.g., in the form of arranging lectures for parents. The teachers also gave parents advice on online safety

and hoped for a more active role for parents in online safety mediation (cf. discourses on control, involvement). Previous research also suggests involvement of peers [34] in children's education. This is also connected with our findings: the teachers reported positive experiences of using children to teach online safety to each other, e.g., older children teaching younger ones or children setting rules for digital technology use by themselves, maybe even teaching their teacher. However, the teachers found their responsibilities and roles sometimes conflicting or blurry. Engaging in a dialogue for making responsibilities between different actors clearer would help keep children safer in the online world.

5.4 IS Research Could Make an Important Contribution Here

IS research has remained negligent of this important topic, while our study enables IS research to start taking action. IS expertise, e.g., in information security policy building and organizational education and awareness should be applicable in the school context. We should combine that with teachers' expertise on meaningful teaching practices and with children's knowledge of their lifeworld, issues, and interests, and through this contribute to the development of novel education practices that engage children and fit their lifeworld. Especially Scandinavian participatory design community could make a valuable contribution here – by arranging and facilitating collaboration among these various actors involved in ensuring children's online safety. Online safety education as well as associated tool support should be collaboratively developed. It would be game changing to focus our efforts to schools as the next "organisation of interest": helping schools to educate children to become responsible, knowledgeable, cyber savvy citizens. As professionals in the field, we should take responsibility – we have technical knowledge and methods for helping to find solutions for this problem area. No child should learn about online safety the hard way.

Regarding limitations for the study, as typical for qualitative research, this study has a relatively low number of participants and rather than statistical logic, we hoped to build a convincing narrative based on richness and detail. In addition, this research has been carried out in one urban area in Finland. We maintain, however, that the discourses we examined can be used as a lens for studying mediation of children's online safety also in other contexts and countries, even when school system characteristics and actors differ, taking into account that emphasis between them may vary in different cultures. Then again, only teachers' viewpoint was asked in this exploratory study, as we were interested in seeing how teachers, in the position of great influence on children's education and behaviour, see the situation. However, as evident both in the previous literature and our data, children's online safety is an issue that requires teamwork from many parties. While we feel that this was a good way to explore this area, also other methods are needed for capturing the interplay between different actors. We plan to continue such research, within which we will include children and parents as informants, and study how they approach and appreciate online safety, and how they think related technical and educational solutions should be developed.

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