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Abstract

Teachers' beliefs about young children's technology use at home are intertwined with their beliefs about parents and parenting practices. This paper reports a qualitative study of eight purposefully selected Chinese preservice early childhood (EC) teachers' beliefs about children's home technology use and associated representations of parents and teachers. The participants possessed inflated positive beliefs about young children's natural technology competence but were worried that parents would expose children to contents for prolonged periods. Teachers' role was seen as responsible guides for children and educational authorities over parents. Implications for research and teacher education are discussed.

Keywords

Early childhood education, teachers, belief, children, parents, technology, home

1. Introduction

Young children's access to and use of digital technologies[1] at home has grown immensely in recent years, which has been used as a reason to either support or confront the use of digital technologies in early childhood (EC) education: Some teachers argue that EC settings should provide technology access for young children so that teachers can guide and correct children's inappropriate technology practices developed at home (Dong, 2016) or teach them the skills needed in the ever-digitizing society (Palaiologou, 2016). Others, in turn, contend that EC

[1] In this paper, both technology and digital technology terms are used interchangeably to refer to a broad range of digital devices available in young children's everyday life, such as audio-video resources and interactive toys. In the Chinese context, educational policies and curriculum documents have used 'Xin Xi Ji Shu' (officially translated as Information and Communication Technologies (ICT)) to refer to technologies that can access, store, manipulate, produce and exchange information and enable communication (Ministry of Education, 2012). For this study, ICT is used as synonymous with the term of technology and digital technology.

settings should be a technology-free space to maintain a healthy balance between on-screen and off-screen activities (Friedrichs-Liesenkötter, 2015) –a view which is typically based on assumption that children use technology at home for prolonged periods (Mertala, 2019b).

It is important to acknowledge that these beliefs are about the youngest children, whose actions and routines are largely determined by their parents. Thus, beliefs about children's technology use in the home are intertwined with beliefs about parents and home rearing. Put differently, EC teachers' concerns about children's excessive technology use means that they assume that parents are not interested in or capable of regulating their technology use. For instance, EC teachers believe that parents allow children to use too much technology, such as watching screens to make their parenting 'easier' (Mertala, 2019a).

We use the terms "belief" and "believe" to pinpoint that that EC teachers are generally not well informed about children's actual technology experiences at home (E.g., Aubrey & Dahl, 2014; Lehtikangas & Mulari, 2016; McPake, et al., 2005, Dong & Newman, 2016). Indeed, many EC teachers lack knowledge about children's complex technology experience outside educational settings, which is mediated by many contextual factors, such as parental beliefs about technology (Plowman, 2007; Edwards et al 2016), family cultures (Chaudron et al., 2015), and socioeconomic status (Common Sense Media, 2017) to provide only a few examples.

To gain a more fine-grained understanding of teachers' beliefs, this qualitative study examines interview data from eight purposefully selected Chinese preservice early childhood (EC) teachers. By doing so, the present study advances research on teachers' beliefs in the context of technology integration in three ways. First, it expands the thematic scope on teachers' beliefs which is dominated by the research on beliefs about teaching and learning (Kim et al., 2013) thus, neglects other important aspects of teachers' beliefs including those about children's home rearing (Baum & McMurray-Schwarz, 2004) and the essence of teacherhood

(Lasky, 2005). Second, as beliefs are shaped by the surrounding culture (Mansour, 2008) having China as the research context provides novel knowledge as the research on EC teachers' beliefs is dominated by studies having Western in-service teachers as participants (Mertala, 2019b; Li et al., 2018).

Last, preservice teachers provide an important and interesting target group in educational technology research for various reasons. Preservice teachers are often thought to relate positively to educational technology integration as they are said to consider 'computers as just another part of their world and everyday life' (Zaranis, Oikonomidis, & Linardakis, 2016, p. 204). These discourses reduce preservice teachers as members of a fictional homogenous generation of digital-native preservice teachers (Szeto et al., 2016) instead of teachers in training, who interpret and evaluate things from the perspective of a (future) educational professional. Such claims also fail to acknowledge that preservice teachers have a lifetime experience of witnessing, participating in, and socializing into pedagogical cultures and traditions (Bullock, 2011). Furthermore, preservice teachers –who are typically in their early 20's and have no children– are found to possess simplistic beliefs about children (Avgitidou, Pnevmatikos & Likomitrou, 2013) and parents (Baum & McMurray-Schwarz, 2004; Meehan & Meehan, 2018).

2. Background

2.1. Teachers' beliefs in the technology integration context

Theoretically and conceptually, this paper builds on Richardson's (2003, p. 2) definition of beliefs as "psychologically held understandings, premises, or propositions of the world that are felt to be true". Despite being a psychological phenomenon, beliefs do not emerge or shape in isolation but within specific historical, material, and cultural contexts (Mansour, 2008), as well as by chance and anecdotal observations (Nespor, 1987). The importance of studying teachers'

beliefs is that beliefs play a significant role in teachers' work: Through its over 60 years of history, research on teachers' beliefs has provided robust evidence on how beliefs guide teachers' decisions and actions in the classroom and influence how and why teachers may or may not incorporate a new curriculum or instructional strategies (Biesta et al., 2015; Fives & Buehl, 2012; Levin, 2015). Thus, not surprisingly, teachers' beliefs have for long been a major branch of research in the educational technology integration context (Tondeur et al., 2017, Levin, 2015).

Research suggests that EC teachers have generally positive attitudes towards the use of digital technologies in their personal (Aldhafeeri et al., 2016; Palaiologou, 2016) and professional lives (Dong, 2016). A careful reading of previous research, however, reveals that preservice and in-service teachers have a more cautious stance towards using technology with children under three (Mertala, 2019a; Fotakopoulou et al., 2020; Hatzigianni & Kalaitzidis, 2018). This notion highlights the various, chancing, and sometimes competing roles and tasks that are included in being a teacher: education (teaching and learning) is put in the center in the latter years of EC education whereas the caring dimension (taking care of children's physical and psychological wellbeing) is emphasized with the youngest children (Mertala, 2019b).

The multidimensionality of teacherhood serves as an important reminder that while research on teachers' beliefs in technology integration contexts has been rich in amount, thematically it has focused on beliefs about teaching and learning (see the reviews in Mertala, 2019b; Kim et al., 2013; Tondeur et al., 2017). This means that even though previous research has provided detailed and important information on learning-related beliefs, it has neglected other fundamental beliefs including those about the context in which teachers work, subject matter, as well as moral dilemmas and societal issues that affect teachers' work (Biesta et al., 2015; Fives & Buehl, 2012). One important sub-set of beliefs to explore is teachers' beliefs about children's technology use at home.

The added value of exploring teachers' beliefs about children's technology use at home is that not all beliefs are valued alike but they are ranked in order of importance (Rokeach, 1968). When a situation produces conflicting beliefs the belief with the higher-ranked importance overrides the other (Ottenbreit-Leftwich et al., 2010). Research indicates that for teachers, children's holistic wellbeing is a priority over their academic performance (e.g., Lasky, 2005). Put differently, if teachers believe that children use too much technology at home, they may be reluctant to use technology in early childhood education even though they believe it would have academic benefits. This notion is associated with the widespread scientific (Orben & Przybylski, 2019) and public (Laidlaw et al., 2019) debate about the impact of technology use on children's physical and psychological wellbeing which has "focused largely on a single blunt measure—screen time" (Daugherty et al., 2014, p.1).

Furthermore, it should be borne in mind that beliefs about young children's technology use at home are not only about the children but also the quality of children's home rearing as in such cases "parents are (implicitly) represented either as uninformed, incapable, or unwilling to regulate their children's screen time, which causes them to jeopardize their children's well-being" (Mertala, 2019a, p. 394). The veracity of the negative beliefs about parents is not well supported by empirical research. Instead, research suggests that parents are cautious about potential harm to children's social and health development and concerned about the dangers and risks of unrestricted digital use (Jiang & Monk, 2015; Lepicnik & Samec, 2013; Plowman et al., 2011; Palaiologou, 2017). As a result, parents are found to employ a range of approaches to managing the relation between children and digital technologies and are using mediation strategies including active co-use, technical restrictions, interaction restrictions, and monitoring (Aarsand, 2011; Livingstone & Helsper, 2008).

The problem with unfounded beliefs is that they do not provide a sound basis for pedagogical decisions and practices. Several scholars pinpoint that sensitive and high-quality

technology integration requires that EC teachers acknowledge and pay attention to children's existing technology-related experiences, skills, needs, and interests (e.g., Arnott & Yelland, 2020; Hernwall, 2016; Zevenbergen, 2007). As put by Arnott and Yelland (2020) understanding of children's home technology use has the potential to support teachers to embrace the complexities and multiplicities of children's multimodal lifeworlds and make connections of children's learning across contexts. To draw on Ackoff's (1989) taxonomy, a prerequisite for understanding things is to have knowledge of them. Knowledge of children's technology use at home, however, is something that in-service (Aubrey & Dahl, 2014; Lehtikangas & Mulari, 2016) and preservice teachers (Mertala, 2019a; Friedrichs-Lisenkötter, 2015) are identified to lack. Instead, presumptions about children's technology use at home are often interpretations made from the themes of children's role-play (Lehtikangas & Mulari, 2016; Nuttal et al., 2015).

2.2. Representations of and discourses around young children and technology

In public discussion children and technology are often represented in ways that are best described as decontextualized and spectacular, and terms such as "touch screen generation" (Rosin, 2013), and "iPad generation" (Donnelly, 2016) have been recently used to refer to the children born in 2010 and after (Laidlaw et al., 2019). Regardless of the name, all these representations are based on a view that technology use is unequivocally beneficial or injurious for children.

An illustrative example of this polarized discourse is the headline of an article on the website of YLE (the Finnish Broadcasting Company): 'Will the kids of the digital world become top experts or grasshoppers?' (Portaankorva, 2015). The 'grasshopper' analogy refers to the view that increasing technology use makes children unable to concentrate on any single subject for long. The 'top expert' discourse, in turn, suggests that via technology use "ordinary"

children transformed into “exceptional” children (see, Selwyn, 2003). Such representations are not just a contemporary phenomenon. Selwyn (2003) has analyzed how children and technology were portrayed in commercial and policy documents from the 1980s to the early 2000s and identified six representations, which are summarized in Table 1.

Table 1. Representations of the child the computer user (Selwyn, 2003).

Representation	**Content**
The natural child computer user	Children are naturally adept users of technology with innate capabilities in mastering digital devices
The successful child computer user	Technology use can transform any ordinary child into an exceptional child
The adult child computer user	The child teaches and mentors his/her parents and teachers when comes to technology related issues
The dangerous child computer user	The child who is actively and aggressively using technology at the ultimate risk of harming both themselves and others
The victimized child computer user	The child is an ‘innocent’ user of technology who may be inadvertently exposed to undesirable violent or sexual material
The needy child computer user	The child is presented as ‘needy’ in terms of gaining the skills needed to use technology successfully

Recently, Mertala (2019a) applied Selwyn’s (2003) categories to study Finnish preservice teachers’ beliefs about children and technology at home and the ways how parents were represented in these beliefs and came up with three revised categories. The first one, “the naturally competent children of invisible parents” suggests that children learn to master digital technologies independently with no help from parents. The second category, “the victimized children of victimizing parents”, refers to a belief that children use too much and wrong kinds of technologies as parents are either uninterested in or incapable of regulating children’s technology use. The third category was “the needy children of disadvantaged parents”. It contains a belief that due to some family's less-fortunate socioeconomic situations some children lack the technological experiences that are crucial for future schooling and work-life. That said, it is important to acknowledge, that Mertala’s (2019a) data were collected from first year preservice teachers during their first semester. Thus, the findings are about the kinds of beliefs preservice teachers possess when they enter their initial training and not enough is known about the kinds of beliefs preservice teachers possess when they enter the labor market.

Additionally, since beliefs are shaped by the cultural sphere (Mansour, 2008) findings generated from one cultural context cannot be straightforwardly generalized to apply other contexts.

2.3. Characteristics of the Chinese context

Over the last three decades, China has gone through massive socioeconomic development. The use of digital technology has become common in many households for both adults and children. In Shanghai, 96.5% of families with young children own smartphones, 89.4% have iPads, and nearly half of children use smartphones and iPads at least once a day at home (Niu et al., 2018). Since digital technologies are increasingly accessible to Chinese children, social expectations and promises, issues of concerns, fears, and moral panic about the influence on the younger generations among politicians, parents, educators, and researchers occurred. The government has been actively facilitating educational modernization through the use of digital technologies to enhance children's competitive knowledge and skills in the technological world (Ministry of Education, 2012b; State Council, 2001). The government issued the Ten-Year Development Plan on Information and Communication Technologies (ICT) in Education (2011–2020) to harness the power of technology for developing creative citizens for the future and increasing national competitiveness (Ministry of Education, 2012b).

Accordingly, the *Early Childhood Teachers Professional Standards* (abbreviated as Standards), EC teachers should develop modern technology knowledge to some extent as general knowledge required for their profession (Ministry of Education, 2012). The Standards (Ministry of Education, 2004) set the tone for teachers' technology training and professional development in terms of objectives, content and assessment, but the government has no specific guidelines for preservice teacher education (Lim et al., 2015). Therefore, teacher education institutions have autonomy and flexibility in implementing educational technology programs to develop preservice EC teachers' technology competence (Lim et al., 2015). A common

approach adopted by most teacher education institutions is to provide foundational computer courses for preservice teachers to learn basic computer skills (e.g. teaching how to use Word and Excel) and then offer them advanced courses to learn to design and to implement technology-supported lessons and activities (Han & Wang, 2010).

While it is the national interest to equip the new generation with technological knowledge and skills, young children's technology use has been a controversial topic. The influential organizations and media in China emphasized the negative impact of technology use, especially health related issues. In urban China, various forms of bad eyesight have been growing rapidly among children and adolescents (Ku et al., 2019), and the increased screen-time has been criticized as one of the main causes in public discussions (Guarino, 2018). As a result, the Ministry of Education and the seven other authoritative government agencies (e.g. National Health Commission) jointly issued *"Implementation Plan for Preventing and Controlling Myopia in Children and Adolescents*" (Ministry of Education, 2018) to regulate children's technology use by limiting the screen time.

Competing views like the ones discussed above exist among Chinese EC teachers as well. On the one hand, they see young children as competent technology users who can gain broad knowledge about the world and develop skills in literacy and numeracy through technology use (Dong, 2018). On the other hand, they have expressed great concerns over children's health and social development and over relying and being addicted to technological products through games or the internet. In particular, the negative effects are believed to be due to undesired forms of parenting as EC teachers often blamed parents/grandparents for allowing children too much screen time (Dong & Mertala, 2019). Such a problem is often referred to as the "4-2-1 syndrome", that is, four grandparents and two parents lavish too much attention, luxuries and opportunities to one child (Tobin et al., 2009) due to the Chinese one-child policy active from 1979 to 2015. Early education settings and teachers as social representatives were

seen as a solution to this problem, with the task and responsibility to correct the tendency of parents to spoil single children and to provide children the experience of living in a group (Tobin et al., 2009; Tobin et al., 1989). This tradition also draws from the communist educational ideology, where the child is seen to belong primarily to the state whose delegates the teachers are (Buharin & Preobrazhenski, 1921). Chinese teachers' authority role is deeply rooted in Confucius's culture where teachers were accorded high prestige (Cleverley, 1991). EC teachers carry authority into their interactions with parents and see their roles as supporting and correcting parents (Tobin, et al., 1989), without being aware of their sense of authority (Wang & Mao, 1996).

To sum up**,** the above literature indicates the great importance of studying teachers' beliefs as it influences teachers' educational practices. Teachers' beliefs about young children's home technology use are not only about children themselves but also the quality of parenting at home. Preservice teachers who are typically young and have no children themselves, tend to hold simplistic beliefs or misassumptions about children and their parents. It is important to note that individuals' beliefs are shaped and formed within their specific sociocultural contexts (Mansour, 2008). In this study, we are interested in exploring preservice teachers' beliefs in a culturally different context- China, as a unique study in terms of place, time and social context. The study seek answers to the following three research questions:

1. What beliefs do Chinese preservice teachers have about young children's technology use at home?
2. How are parents represented in Chinese preservice teachers' beliefs about young children's technology use at home?
3. How are teacher's professional roles discussed in relation to preservice teachers' beliefs about children and parents?

3. Materials and methods

3.1 Participants and data collection procedure

The participants were selected from a pool of 410 preservice teachers who participated in a quantitative survey study (Dong & Xu, 2020). 21 participants left their contacts for the interviews in the questionnaire, but only 12 of them confirmed that they would like to take part in the interview when approached. Among them, all eight preservice teachers in their final year were recruited via purposeful sampling, which emphasizes the similarity and judgment-based representativity of the participants (Patton, 2002). Table 2 summarizes the background information of the participants and provides the rationale for sampling.

Table 2. Background information of the participants and the rationale for sampling.

Background information	Participants	Notes
Gender	All female	Representative as most preservice and in-service early childhood teachers in China are female (Xu & Wangangayake, 2017)
Age	20–22	Representative as the vast majority of preservice teachers begins their initial training straight after high school (Zhu, 2008).
Stage of studies	Final year in a 4-year bachelors-degree program	Information-rich cases as they had completed their required practicums and were close to obtaining their degrees.
ICT training	As part of their early childhood degree program, the participants were required to complete foundational technology courses in their teacher education institution to learn basic computer skills. No pedagogical themes and aspects were included in these courses.	Representative as the common approach to developing teachers' technology competence in Chinese teacher education institutions is to offer foundational computer training courses that teach the basic computer knowledge and skills such as using Word and Excel (Han & Wang, 2010)
Personal ICT use	All owned a personal laptop and mobile phone. All used social media and some played digital games.	Representative as the national survey reveals most teenagers and young adolescents own PCs and mobile phones, as well as having internet access (Li & Ranieri, 2009)
Geographical location	North-western regions	Socioeconomic status and technology infrastructure in this region is lower than other coastal areas (Sun, 2013), but represent the main inland areas.

The interviews took place in January 2018. The first author, who was responsible for conducting the semi-structured interviews in Mandarin, was located in Australia and the interviewees were in China. The interviews were therefore conducted via Skype™, a telecommunications application for video conferences and voice calls. The participants were given the opportunity to choose their preferred place, day and time for their interviews. The interviews were guided by a list of questions which is provided in Table 3.

Table 3: Interview questions

	Interview questions
1	What are important learning experiences or activities for young children in early childhood settings?
2	How do you see the place of information and communications technology (ICT[1]) in these important experiences or activities?
3	What are the effects of young children's use of ICT?
4	What is your opinion on young children's use of ICT at home?
5	From your point of view, what is the appropriate use of ICT in early childhood education?
6	In your opinion, how can ICT be used effectively for supporting children's learning and development?
7	What are your experiences with the use of ICT in your daily life or professional practices?

[1] The term 'ICT' was used, being the term used in Chinese pedagogical documents and curriculum guidelines

Translations into the participants' mother tongue, Mandarin, were carefully prepared in advance and piloted with four preservice teachers to avoid errors or misinterpretation of translation. Drawing from the feedback, the interview questions were re-read, discussed and modified in collaboration with a local Chinese early childhood education lecturer. The participants were informed about the nature of the study and what would be expected of them. They were clearly advised that participation in this study was voluntary and they could withdraw from the study at any time without giving any reasons, and no compensation was used for recruitment. This study was approved by the Human Research Ethics Committee from the author's institute. Throughout the paper, pseudonyms are used to refer to the participants. All the interviews were audio recorded with the permission of the participants to facilitate data transcription and analysis. The length of the interviews ranged from 50 to 65

minutes. The data were fully transcribed in Chinese and consisted of 72 pages. The present study did not use all the data collected with the interview questions presented in Table 3 and therefore not all 72 pages of the data transcription were used in this paper.

Since the participants and the first author spoke the same language, there was no language difference present in data gathering, transcription, and during the first analyses as the first coding phases usually stay close to the data (Nes et al., 2010). The codes were then translated from Mandarin to English, involving a process of checks and reviews. Part of this process involved the assistance of a native Chinese-speaking lecturer at an Australian university checking interpretation of responses. Additionally, a professional translator was also consulted to help with 'difficult' translations of the data. The original audio recordings and transcription were often re-examined to increase understanding of the participants' intended meanings and culture-specific words and their meanings were reviewed to avoid potential meaning loss.

3.2. Analysis

This study adopts an abductive approach as the means of data analysis. The abductive approach discards the idea that the researchers' observations and interpretations could be purely inductive and acknowledges that there is always a guiding theoretical thread included in the analysis (Grönfors, 2011). The main guiding theoretical thread was the different representations of 'child the computer user' (Selwyn, 2003) and of the parents associated with these representations (Mertala, 2019a) -introduced in Section 2.2. Since the original categories (Selwyn, 2003) and their more recent adaptations (Mertala, 2019a), were constructed based on data collected from Western contexts, the categories were considered to be subjects to change and refine. Indeed, unlike in deductive analysis, the following of a theoretical thread does not mean that the theory is taken for granted or the aim of the analysis process is to test the theory.

Instead, the researcher moves between inductive and deductive reasoning while practicing the constant comparative method (Suddaby, 2006). There are no universal and all-applicable rules on how constant comparison should be conducted but the research questions (Fram, 2013) and the materials used (Boeije, 2002) determine the number of steps taken and the types of comparisons conducted during the analysis process.

The analysis was built around the three research questions and broken down into three main phases which are illustrated in Figure 1 and discussed below. Following Mertala's (2019a) approach the analytical phases were more conjoined than separate. For example, as beliefs about children were understood to be intertwined with beliefs about parents and vice versa; the categories of children constructed during the first phase were not understood to be necessarily the final ones, but a subject to evolve when these representations are compared with those about the parents.

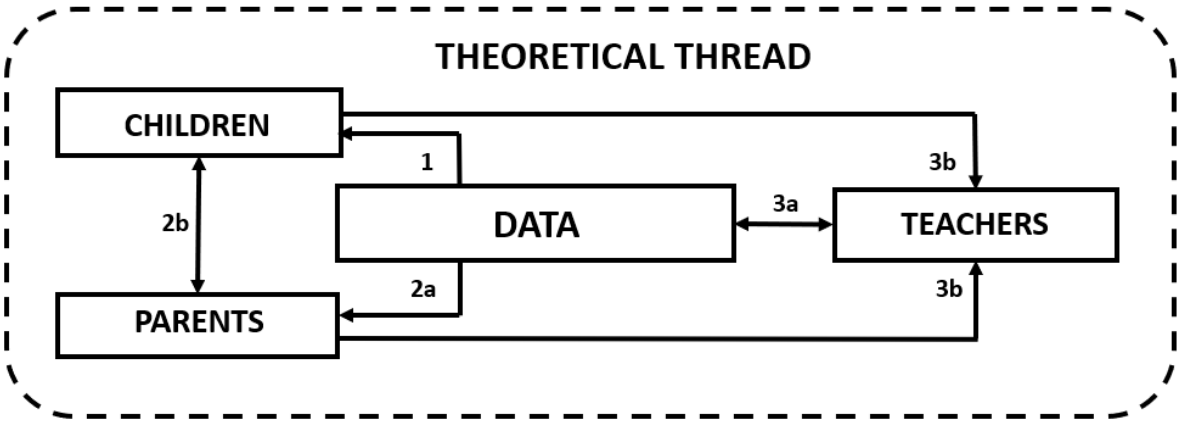

Figure 1: Summary of the analysis process

The first phase focused on participants' beliefs about children's technology use at home. The data discussing children's technology use at home were reread, highlighted, and interpreted in relation to the theoretical thread (arrow 1). In this process, the qualitative data analysis software NVivo was used to organize the data into broad categories such as beliefs

about children's home technology use. Under the main categories, multiple codes (e.g. beliefs about children's competence in using technologies) were created to house relevant excerpts from the transcripts. The data across these codes show that many participants believed that young children were able to master or/and use digital technologies at home. Besides, the participants expressed strong concerns about the negative impact of digital use (e.g. eye vision) and children's use of technology (e.g. watching videos), positioning children as victims and consumers. As a result, three categories were formed: the competent children, the victimized, and the consumer children. To provide an example, the following data extract was categorized under the label of the competent children: "I think it is very easy for children to learn the use of digital devices*"* (Du).

In the second phase, beliefs about parents concerning children's technology use were explored by reading the whole data (arrow 2a) as well as by re-reading the extracts about children's technology use to identify the kinds of implicit representations of parents included in them (arrow 2b). At this point, it was, for instance, identified that besides one exception, parental input was not discussed within the competent child belief. Instead, children's learning about technology was believed to be an autonomous process and/or innate skill. Thus, the initial category was redefined as "naturally competent children" which was paired with a category "invisible parent". Two additional categories formed were "incapable parents" and "consumer parents". The following extract is an example of the former category: "parents are unable to download some programs on their cellphones to support children's learning and growth*"* (Yang).

In the third phase, references to teachers were first located from the whole dataset (Line 3a) and then positioned in relation to representations of children and parents identified in previous phases (arrow 3b). It was noticed that the perceptions of teacherhood varied depending on whether the participants were approaching teacher professional role to children

or parents. Thus, two categories were formed: responsible guides (for children) and educational authorities (over parents). The following extract is an example of the latter category. “parents are unable to recognize this issue [negative effect of technology use] as we early childhood student teachers and in-service teachers do” (Fan).

The initial codes and themes were then reviewed by the second author to eliminate inconsistencies in interpreting the data due to who was coding. In this process, the researchers were collaboratively refining and defining themes, which involved numerous ‘conversations’ and text comments about the data interpretation and categorization. The researchers also used strategies such as redefining the themes to reach an agreement on data coding. More extracts are provided in the Findings section to improve the transparency and reliability of the study.

4. Findings

The findings are discussed in detail under two main sections. The first section focuses on the participants’ beliefs about children’s technology use and associated beliefs about parents. The second section is about the participants’ beliefs about teachers’ professional roles related to young children’s technology use. The main categories and how they are related are summarized in Figure 2 to help the reader to navigate between the remaining sections.

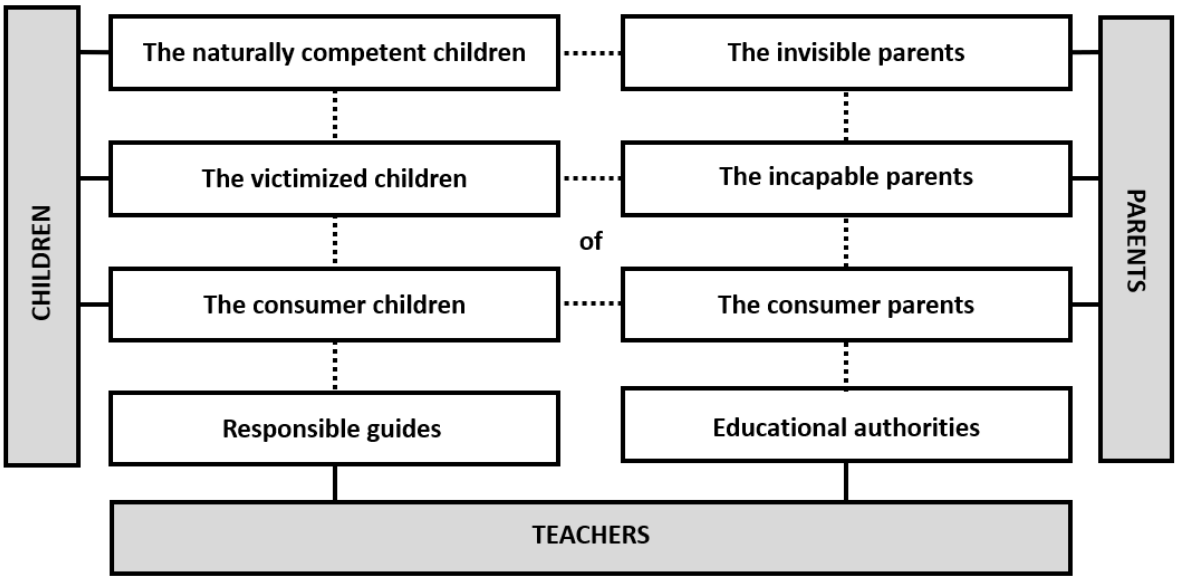

Figure 2: Summary and relations of the main categories

4.1. Beliefs about children and parents

4.1.1. The naturally competent children of invisible parents

The preservice teachers shared the belief that young children are adept users of technologies. For instance, Ma commented that young children "can access media technologies in their daily life and use them without trouble". Another participant, Yang, went even further by stating that children as young as three can be more competent technology users than adults. According to her: "children aged 3-4 years old are more skillful in playing online games than we adults." Some of the participants referred to their personal experiences when justifying their views. Du, for example, told that

> Young children are very skillful in using digital products. --- My preschool-aged cousins can use and play digital technologies without being taught. (Du)

As the extract above illustrates, children were not believed to need assistance or teaching for learning how to master digital technologies. The only exception was found from

Ma's data: While recalling young children's use of cameras to play the role of photographers in kindergarten, she briefly stated that "parents have told [children] how to use cameras before they played photographers".

4.1.2. The Victimised Children of Incapable Parents

Several participants expressed their concerns about the negative effects of technology use on young children. In these views, parents were often blamed to be incapable of or uninterested in regulating and steering their children's technology use. One participant, Du argued that

> Some parents give children to watch cartoons and play video games using their cellphones to make themselves easier without being troubled by children. I think this is very irresponsible for young children. *(Du)*

In other words, Du is stating that parents are "buying" leisure time and freedom for themselves by engaging their children to play digital games and watch videos. She was not alone with such a belief. Another example was that Fan referred to a personal experience and told that "for instance, my aunt would give her 3-year-old daughter an iPad to play whatever the child wants and then she can do her own things".

Unsupervised and unregulated technology use was believed to cause physical and psychological harm for the children. With regards to the physical issues, Ai commented that extensive technology use "will be harmful to children's eyes and spine" and supported her argument with an observation of how "nowadays very young children are wearing glasses; I think this also relates to their technology use". Ai's concerns about the relationship between technology use and children's eyesight echo the public opinion where the growth of myopia is seen as a consequence of increasing technology use (Guarino, 2018). A typical example of psychological harm, in turn, was that children would be exposed to inappropriate content such as violence when playing games and watching videos unsupervised. One participant, Ai expressed her concern that because parents do not monitor what children watch from mobile

devices, the whole repertoire of online videos is available for children, and because "young children have no way to evaluate and select videos… the content they access might be fun for them but violent and harmful for their development."

4.1.3. The consumer children of consumer parents

In the third category, the children and the parents were believed to be alike concerning their relationship with digital technologies. Fan, for instance, commented that "[parents] allow children to play for relaxation and entertainment without any guidance and time limits." The choice of words suggests that technology use is seen as recreational activity: an entertaining and relaxing way to spend time. Interestingly, beliefs about the types of children's technology use are identical to how parents were believed to use technology. As noted by Ai, the younger generation of parents *"*are willing to let their children try things such as using videos to learn facial making up or making videos to imitate adults." Put differently, instead of blaming parents for making things easier for themselves here (as in the victimized children of incapable parent category discussed in Section 4.1.2), the parents were thought to enculture their children to their own technology practices.

An illustrative example is found from Yang who commented that parents, whose "smartphones nearly are all games and videos --- can't set themselves as examples [for children]" because they are unable to "avoid these technologies" and this "will lead the children to learn how parents use technologies". In other words, she was suggesting that parents themselves are lacking the self-regulation skills they should be able to teach their children. Instead, the consumer parents were thought to raise their children to become consumers as well. The term "consumer" here refers to a view that engaging in games or videos is not a cognitively demanding process that would require concentration. As put by Du:

> Watching the content looks like developing children's attention, but it does not. It is just like us playing games which can distract us from doing other things because we can only focus on games.

4.2. Beliefs about teachers' professional role

Two intertwining roles for teachers were identified from the data: a responsible guide for children and an educational authority over parents.

4.2.1. Teachers as responsible guides for children

A major task for teachers as responsible guides is to 'correct' the inappropriate technology practices children had learned at home. Fan, for example, mentioned various times that teachers should "guide children to use technologies in positive ways" and "use efforts to guide them on the right path" (Fan). Ma, in turn, approached the same phenomenon by emphasizing teachers' guiding role and responsibility saying that teachers should contribute "by helping [children] understand the good side of technologies". All the expressions listed above contain a strong conviction that children's informal technology experiences are negative by nature and lead children in the wrong direction by familiarizing them with what they considered bad sides of technology use only.

Interestingly, the examples of "good" technology use in kindergartens were often identical with the ones described as "bad" technology use at home. Zhang and Yang, for instance, described the utility of using digital technologies in kindergarten by stating that

> If we only teach lessons and do activities [without using technologies], children may not be interested in them. But if we play some short programs or animations, children really want to watch. Once they finish watching, they ask teachers to allow them to watch programs again. (Zhang)

> If you use an electronic projector to play cartoon programs to teach, this will raise children's huge interest. They have a better concentration on what they are learning. (Yang)

However, as illustrated in Section 4.1.3. parents allowing children to watch videos at home was described as mere consuming of content – not as a reflective learning process like in the extracts above. This contrasted difference between the effects (e.g. learning outcomes) of children watching screens at home and in kindergarten implies the presence and/or the knowledge of the teacher can turn potentially problematic technology use into a pedagogically appropriate method for teaching and learning. Some participants also commented that unlike parents, teachers are capable of identifying resources –namely games and videos– that are more educational than the ones introduced by parents –a theme to be discussed in detail in the following sub-section. That said, the high expectations expressed towards educational applications are rather inflated. A recent study by Callaghan and Reich (2018) revealed that the pedagogical design of educational apps for young children are often far from optimal. The use of feedback that could explain failures and how to succeed in the game, for instance, is rarely used.

4.2.2. Teachers as educational authorities over parents

The participating preservice teachers explicitly portrayed teachers as educational authorities over parents. In this view, teachers' task was not only to educate the children but also their parents. Even though some participants used terms such as 'collaborate' or 'cooperate' when referring to the nature of the teacher-parent relationship, the descriptions of the forms of interaction they offered were unidimensional supervision. This is by taking a look at the data from Yang. She first underpinned that, in order to guide young children's technology use, "teachers and parents need to actively collaborate". However, descriptions of the concrete actions of collaboration were one-way communication between knowledgeable teachers and 'uninformed' parents without respecting parents' role and their expertise as the primary educators of their children. Yang, for example, commented that "teachers should often guide parents and tell parents not to use cellphones too much in front of their child".

She was not alone with these views, but they were shared by others too. Du noted that "parents should be taught to select appropriate content for children to learn, rather giving children cellphones to play games" whereas Ai, stated that instead of creating a shared understanding, teachers should "tell the families about the pros and cons of these technologies". The frequent use of the term "should" in participants' expressions stresses the imperative for teachers to intervene in family life. This notion reflects the Chinese educational tradition where children are seen to belong to the state (Buharin & Preobrazhenski, 1921) and teachers' role is to ensure that children are not harmed by home education (Tobin et al., 1989). The profound nature of the general distrust towards parents is perhaps best illustrated in the following data extract from Fan:

> I think home is a relatively heavy disaster place for early childhood education. For instance, many people say five plus two less than zero. That is, young children spend five days in kindergarten and will need to rebuild everything after coming back from two days on the weekend. I think children have made big progress in kindergarten, but their family education is relatively a disaster.

5. Discussion

In this section, four themes generated from the findings are put under further discussion. The themes are the inflated nature of the beliefs, the distrust towards parents, the global imaginaries of young children and technology, and the absence of the "needy" child. After that, the implications for future research and teacher education are addressed.

5.1. The inflated nature of beliefs

Preservice teachers' beliefs about children's independent learning are not supported by empirical evidence. Although young children have experience in using digital technologies and possess some operational skills, the belief that children would know more knowledge than adults is notably exaggerated. The same applies to beliefs about children's independent

learning: research shows that children learn about technologies at home via parents' intentional tutoring or unintentional modeling and that the children are well aware of the role of their parents in their learning (Mertala, 2019c; Plowman et al., 2008). While children learn rudimentary skills through these interactions, the proliferation of digital technologies in young children's living environments has not resulted in sophisticated technology competences that would outshine the ones of adults (Dong, 2018; Kirschner and De Bruyckere, 2017; Marsh et al., 2018).

Additionally, the participants paid no attention to the fact that the operating systems and user interfaces of contemporary touchscreen devices are relatively easy to use. Unlike traditional keyboard and/or mouse which requires a certain level of physical and motor skill development to use, the touch screen technology is viewed by educators to have the potential for use in early years education (Plumb et al., 2013). For example, dragging an object across the screen –a typical feature in many touchscreen apps aimed at children– requires no technological expertise and is motorically something that three-year-old children (and younger) master with ease (Marsh et al., 2018). The same exaggeration was present in preservice teachers' beliefs about the poor quality of parenting –a topic to be addressed in the following sub-section.

5.2. Only bad things are learned from the parents

The second interesting notion was that parents were believed to impact their children's technology use only in a negative and harmful manner. Put differently, children were believed to imitate and assimilate to parents' unhealthy technology practices (see Section 4.1.2) but to learn to master operational technology use independently (see Section 4.1.1). Three different – yet not mutually exclusive explanations for the distrust towards parents were sought to understand the nature of preservice teachers' beliefs. The first one –influenced by Chinese

culture and educational traditions– suggests that teachers are regarded as educational authorities above parents and have responsibilities to correct overindulgent parents (Tobin, et al., 1989). The second explanation is that the participants were generally young, in their early 20s, with no experience of being a parent. While parenthood is hardly a prerequisite for being a good teacher, it is found that young childless preservice teachers' understanding of the complexity of parenthood and family life is generally restricted (Baum & McMurray-Schwarz, 2004; Meehan & Meehan, 2018). Third, it appears that research-based information about children's technology use at home is not included in the contents of teacher education (Salomaa, Palsa & Malinen, 2017). This means that preservice teachers ground their views on other sources one being media, where parenting and technology are often represented in a negative and incriminating manner (Kaarakainen & Lehto, 2018).

The negative beliefs about the quality of parenthood are mainly without empirical support. Research suggests that parents acknowledge that children's technology use includes risks (Palaiologou, 2017). Thus, regulating and monitoring children's technology use is understood to be good parenting (Aarsand, 2011), and the time children spent alone with technology is used rather for household tasks or working instead of relaxation by the parents (Chaudron, 2015). Parents are also found to mediate their children's technology use via various strategies including rules, time restrictions, and promotion of offline activities for children (Hatzigianni & Margetts, 2014; Livingstone et al., 2015; Smahelova et al., 2017). In addition, parents explain and enforce restrictions during their co-use and role model the use of digital technologies for children (Smahelova et al., 2017).

5.3. Global imaginaries of young children, technology, and teacherhood

It is worth acknowledging, that the beliefs of the Chinese preservice teachers did not differ remarkably from their western in-service and preservice colleagues or Chinese in-service

teachers. As Chinese in-service teachers shared similar views (Dong, 2016), this finding can be interpreted as echoing the traditional Chinese view of teachers as the government-mandated protector of the children (see Tobin et al., 1989). The authoritative position held by the preservice teachers shows their decontextualized self-perception as professional educators because they generally believe that due to their training, their knowledge of children is more relevant than parental knowledge (Graue, 2005). This reflects preservice teachers' one-dimensional understanding of parenthood and stereotypical view of family life (Baum & McMurray-Schwarz, 2004; Meehan & Meehan, 2018).

Both western in-service and preservice teachers tend to view children as born-competent technology users (Mertala, 2019b) and held distrust towards parents' abilities, which is a common theme in research conducted in western contexts too (Mertala, 2019b; Baum & McMurray-Schwarz, 2004). While worries regarding the effect on children's eyesight can be interpreted to reflect the Chinese public (Guerino, 2018) and political (Ministry of Education, 2018) discourses, similar concerns have been expressed by western teachers as well (Hatzigianni & Kalaitzidis, 2018). Explicit and implicit references to children and adolescents being digital natives are common in public and academic discourses in western (Mertala, 2020; Zevenbergen, 2007) and Chinese (Li & Ranieri, 2009; Shen, 2017) contexts. These similarities suggest that some imaginaries of young children and digital technologies are global by nature and contribute to constructing what can be referred to as a "universal child". We find this notion problematic. First, the idea of the universal child is not a realistic one –a critique presented by the proponents of the new sociology of childhood already back in the 1990s (James, Jenks & Prout, 1998). This argument is supported by empirical research on young children's technology-related knowledge, competence, and preferences, which are notably varied (see e.g., Mertal , 2019c). That said, there is emerging evidence that in-service and preservice teachers' technology related

pedagogical decisions are often based on the "universal child" rather than the needs and competence of the actual child-subjects of the center (Mertala, 2020; Lehtikangas & Mulari, 2016).

5.4. The absence of the "needy child"

Last, unlike in previous research (Mertala 2019a) study, none of the participants expressed beliefs that some children would be deprived of possibilities to learn how to use technologies even though the representation of the "needy child" was identified from Chinese policy documents guiding the digitalization processes of institutional education (State Council, 2001; Ministry of Education, 2012b). One explanation for this difference is the time gap between the data collection (2014/2018) as the number of digital technologies in households with young children has increased rapidly during the 2010s globally (Niu et al., 2018; OECD, 2018). Thus, it is possible that the preservice teachers participating in this study simply thought that all children have access to digital technologies at home –a belief that is supported by recent reports of technology provision in urban China (Niu et al., 2018). Another explanation is that the provision of digital technologies in early childhood education settings has increased as well (Blackwell et al., 2015) so that the participants may have believed that the provision of digital technologies in kindergartens is sufficient to teach children the fundamental skills and dispositions.

However, due to the limited number and geographical homogeneity of the participants, the findings presented in this paper cannot be straightforwardly generalized. For example, teachers working in rural areas typically more traditional beliefs than the ones working in urban areas (Wang, 2010). Another issue relates to the terminology used in the interviews. The term 'ICT' was used, being the term used in Chinese pedagogical documents and curriculum guidelines (Ministry of Education, 2010, 2012a). We are aware that the concept of ICT is linked with connotations that may have had a role in shaping the participant's perceptions.

Nevertheless, the findings of the present study provide implications for future research as well as for teacher education.

Initial teacher education programs are focused on teaching preservice teachers about how to use different kinds of devices and applications (Han & Wang, 2010; Salomaa et al., 2017). The findings of the present study contest the appropriateness of such courses. To correct preservice teachers' misassumption about children's technology use, it is useful to introduce preservice teachers to the state of the art scientific knowledge on young children's use of and meaning-making around digital technologies. To make connections of children's learning across contexts (Arnott & Yelland, 2020), introducing preservice teachers to the latest research where children's voices are in the center would be especially valuable.

Given the fixity of beliefs (Brownlee, 2003), more experiential methods are recommended and needed. It would be valuable to engage preservice teachers into critical self-reflection on why they believe what they believe, which helps them to become aware of how beliefs are constructed. Additionally, initial teacher training programs need to focus more on addressing preservice teachers' misassumptions about technology use at home and negative perceptions of parents by providing authentic opportunities for them to gain knowledge about home technology use and to communicate and collaborate with families. Particularly, teaching practicums and participation in teacher-parent conferences would provide valuable opportunities for shifting preservice teachers' dispositions towards a fruitful educational partnership built on mutual understanding.

6. **Conclusion**

This qualitative study was the first to examine Chinese preservice teachers' beliefs about children's home technology use and associated representations of parents and teachers. Though the participants' beliefs were shaped by the Chinese educational traditions and culture, they

were not fundamentally different from their western counterparts in terms of beliefs about children's competence and attitudes towards parents. It appears that preservice teachers generally lacked evidence-based knowledge about children's home technology use and held a bias against parents. The participating preservice teachers were in the final year of their studies. Thus, their beliefs can be a potential barrier for them providing a continuum of children's technology experiences between home and educational settings, and building genuine partnerships with families in their future work.

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