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A cross-cultural study on technology use in preschool classrooms: early childhood teacher’s preferences, time-use, impact and association with children’s play

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ABSTRACT

Technology plays a large role in the daily experiences of young children. Presently, technology is used both to support and enhance ‘educational’ activities and in the context of children’s play. The aim of the present study is to understand how much time teachers in early childhood centres across 8 countries implemented technology into their classrooms. Our data revealed major similarities across countries, with technology play being the least used type of play by teachers and indoor non- technology and outdoor play being the most frequently used forms of play across the 8 countries studied. Similarities were also found in early childhood teachers’ perceptions regarding the value of technology play, even though they do not use it extensively and despite different aspects of technology contribution being reported. The research further revealed differences in the time allocated to technology play the types of technology equipment and resources available to children in each country.

KEYWORDS

Technology; early childhood education; play; culture

Introduction

Technology driven portable devices have become one of societies’ most important and irreplaceable tools. Adults are not the only consumers in the explosion of portable technology we have seen in the past decade. Children are just as likely to engage with technology as more and more media and mobile apps are targeted at them as early as 1 year old (Heider & Jalongo, 2015). Today, everyone is immersed in many forms of technology use regardless of age.

Ruslan recently took his son, Jacob, to his orthodontist appointment. Ruslan looked around the room (there were 12 adults and 2 young children in the waiting room) and noticed that everyone was interacting on a hand held device. The adults were all on their smart phones, one young child had an iPad and another toddler was watching a video with mom on her cell phone. There was very little social interaction as everyone had their eyes steadily focused on their digital devices. This is not a rare occurrence as many of us have seen adults and children sitting together at a restaurant table not talking, but rather preoccupied with their digital screens. With technology taking up such a large part of our social time, how much is left for non-technology play? This may not be an important question to ask of adults but it is when we are thinking about children who rely on non-technology play as a necessary tool for brain growth and development (Goldstein, 2012).

Parents clearly value technology by providing and promoting technology to their children and many of them believe that it in fact promotes school readiness skills (Erdoga, Johnson, Dong, & Qiu, 2018). Whether it be through smart phones, tablets or other forms of technology, children today are using technology up to 2.5 hours per day, the same amount of time they engage in non-technology play (Slutsky & DeShetler, 2017). With technology play taking up such a large chunk of young children’s lives and often replacing the time children previously played with traditional toys and even outside, we set out to explore preschool teachers’ perceptions of technology use in their classrooms across eight different countries. Were teachers promoting technology in their classrooms as much as it was being used in the homes and did they value technology use as a learning tool in their respective classrooms?

Theoretical framework

This research study is framed within the sociocultural perspective that assumes that individuals in social groups/settings construct a unique culture around everyday living (Kantor, Green, Bradley, & Lin, 1992). Furthermore, these social groups engaged in interaction over-time develop norms and ways of living. These socially constructed cultural norms form on a local level with each group developing their own ways of engaging in daily life (Zaharlick & Green, 1991).

Cultural norms, along with teacher and parental beliefs play a large part in children today gaining access to technology and portable devices early on. With this in mind, we understand that teachers at local levels will have their own beliefs and expectations of technology use in early childhood classrooms. Our goal was to understand how differently or similarly early childhood teachers in eight countries viewed technology and its impact on children's play and learning in their classrooms.

Present perceptions of technology across the eight countries studied

Cyprus

Cypriot National Curriculum for ECE states that technology 'is an integral part of the learning process and it is important that children familiarize themselves with technology and technology-related terms within an organized framework aiming at their overall development' (Ministry of Education and Culture [MoEC], 2016, p. 32). However, it is up to the teachers how they will use technology in their classrooms. Despite technology being acknowledged in the Cypriot curriculum as important, it is not closely linked to or viewed as a 'play type'. Existing research from Cyprus investigating play (Loizou, 2017) does not explore or include technology as play. On the contrary information technology (IT) use seems to be primarily linked to educational activities.

Still, many barriers and challenges prevail both in terms of the status of play and in terms of IT use. As far as technology use is concerned, a study conducted by Angeli (2004) revealed that the majority of pre-service teachers had negative beliefs and certain misconceptions regarding the pedagogical uses of IT. On the other hand, play seems to be in danger in Cypriot early childhood classrooms since 'free activities are basically organized around structured and teacher-directed activities' (Loizou & Avgitidou, 2014, p. 1884).

Denmark

In 2011, the Agency for Digitisation was established and tasked with working to promote the use of IT in all public and private organizations as well as in all Danish households. For children, the policy is that they must use technology so they are competent in using and engaging critically with it. In 2014, 90% of Danish children had access to an ipad at home, and 30% of 5–6 year olds had their own ipad.

Danish law on ECE from 2016 covers six learning areas (language, social competences, personal competences, nature, cultural expression and values, body and movement), technology is not mentioned at all. However, many Danish municipal councils have passed guidelines regarding the use of technology in schools and early childhood centres. Therefore, many schools provide all children with an iPad, and the majority of Danish children have smartphones shortly after starting school. Some schools have dispensed with books altogether and work exclusively with digital content. Many Danish parents and preschool teachers would prefer that children receive hands-on experience during their time in the childcare centre and playing with other children, as many Danish children have access to iPads at home.

Estonia

When it comes to early childhood curriculum, technology is only briefly mentioned and even then, mostly from the point of dangers and user security (The Government of the Republic Estonia, 2008). Due to children spending more and more time using computers or watching TV, many teachers promote learning in the outdoors, to offer a chance to exercise and experience the real world instead of the virtual one. To compensate for the excessive use of media devices at home, many teachers are trying to avoid using all kinds of technology in kindergartens. At the same time, in the Estonian Lifelong Learning Strategy 2020 (Ministry of Education and Research, 2014) it is pointed out that one of the main goals in education in Estonia is to promote a digital revolution in lifelong learning.

The aim of the digital revolution is the more effective use of technology in teaching and learning, improvement of digital skills in the overall population and helping people to access the new generation of digital infrastructure. In accordance to the Professional Standard (The Estonian Qualifications Authority, 2013), the expectation for teachers is that they use appropriate IT devices to plan and carry out educational activities. Government aids in purchasing digital and robotic devices for kindergartens and training courses for teachers are provided for free in order to promote the digital devices in learning activities.

Greece

Greek Infant/Child Centers make no reference to the operation and regulation of technology use. In terms of kindergarten classrooms, IT is one of the 8 learning areas that should be taken into consideration during planning and implementation of meaningful and purposeful activities to the children.

According to the Kindergarten Curriculum (2011) the use of IT aims at

> a) searching, organizing, managing and producing information in multiple forms, the development of ideas and the personal expression and creation; b) communication and collaboration; c) exploring, experimenting, inventing and problem solving in subject matters; and d) understanding of the role of digital technologies in modern society and culture. (p. 114)

IT is used in everyday activities as object lessons, tools for exploration, experimentation and problem solving and as tools for managing information, digital grammar and expression via different means and for creativity, and communication and collaboration (Kindergarten Curriculum, 2011, p. 114). IT use seems to be linked to play since according to the curriculum the IT use in ECE is important because 'they reinforce the importance of play as a major factor in their development' (Kindergarten Curriculum, 2011, p. 114). In addition, explicit reference is made to technology play and technological equipment in play areas.

Despite the fact that the Curriculum supports IT use, a study conducted by Nikolopoulou and Gialamas (2015) in Greece revealed that there is inadequate integration of IT in early childhood education. In addition, the authors found that according to ECE teachers, IT play is an effective mode of learning for young children, that IT use is not only a free play activity and that computer use should be embedded in formal learning activities (Nikolopoulou & Gialamas, 2015). Manessis (2011) also found that early childhood teachers believe digital games work as a useful education tool for infants and that use of educational digital games may provide models of good learning practices. By playing such games infants will develop practical competencies and social practices.

Italy

Providing opportunities for play is highly valued in Italy. Building relationships is one of the most important values, which is emphasized by inviting children to play as a vehicle to initiate and nurture those relationships. Technology has not been implemented into the early childhood centres with traditional iPads, personal computers and specific computer software targeted to assist children in their academic learning. On the contrary, specific technological tools have been used by young children to explore and investigate topics at deeper levels, especially in Reggio Emilia early childhood centres

and in centres inspired by this approach (Trepanier-Street, Hong, & Bauer, 2001).

Technology is seen as a tool that provides young children with the opportunity to play and learn (Alper, 2013). For example, in Reggio Emilia schools in Italy, technological tools are implemented in many ways for different purposes. For instance, using the internet to research a specific topic under examination in depth, using video recordings of their learning experiences to revisit and discuss their learning, producing their own videos to nurture their imagination and creativity, using cameras to capture moments or artifacts that documents their learning process and their relationships with others, being these two the core of the Italian culture, as well (Alper, 2013; Mitchell, 2007). Playing with technology is highly valued in Reggio Emilia early childhood centres and in centres inspired by this approach.

Spain

Increasing children's participation in ECE is important because it enables children to engage in early learning experiences and play activities. In Spain, play has an important role in children's learning and development (Ministerio de Educación y Ciencia [MEC], 2008), and henceforth it is embedded in the ECE curriculum as a means of encouraging children's social, physical, cognitive, and emotional development (MEC, 2008). Furthermore, use of technology play is promoted in the Spanish curriculum to promote early childhood education setting experiences. In fact, the use of IT is one of the cornerstones of the early childhood education curriculum in Spain.

Spain clearly prescribes in its ECEC curriculum that IT is one of the early learning goals in areas that substantiate children's learning and development. As stated in the Spanish ECE curriculum (MEC, 2008), the use of technologies such as computer and peripheral devices are encouraged to express and communicate ideas and diverse IT activities are planned in the classroom to further the communication developmental needs. In addition, as the Spanish ECE curriculum indicates, educators need to develop children's awareness of an effective, critical and moderate use of technology (MEC, 2008); and also use IT when learning a second language (MEC, 2008). Furthermore, as part of the ongoing assessment system within the early years setting, ECEC educators focus on several areas of children's learning and development including technology uses.

Turkey

The Preschool Education Program developed in 2013 (Ministry of National Education, 2013) presents the aims of early childhood education, the developmental outcomes and predictors of those outcomes, and some examples of monthly plans, environmental layouts, and daily routines. When the programme is reviewed, very limited number of references to IT use in ECE could be found. Only three places in the document have a specific reference to computers or technology use in early child- hood centres. One is under the title of developing self-care skills, protecting one from accidents and dangerous situations. Within the explanation, spending too much time watching television or playing games on the computer are viewed as harmful. Technology use in ECE is still an issue in Turkey. When school readiness is considered, the majority of academic work involves textbooks and review articles (Kartal & Guven, 2006), a few is on develop- ing questionnaires to measure attitudes of teachers about IT use in early childhood centres (Kol, 2012a) or studying opinions (Kol, 2012b). In Kol's study (2012b), out of 33 teachers, 9 reported that they never or rarely used computer-assisted software (CAS), the rest said that they used CAS from time to time. The challenge as reported by the teachers was hardware failure, followed by software problems and lack of skills by teachers. Early childhood teachers believe that CAS is for developing audiovisual skills and that using computers will cause antisocial behaviours.

United States

Play is arguably the most important and essential experience that children get to do experience in their early years. However, the type of experiences that children have and the types of play they engage in is changing. Technology now plays a very large role in the way preschool children play. From computers to video games to television to battery-operated toys, play is not what it used to be. Children are spending

large amounts of time in front of televisions, computer screens, phones and tablets which leaves less time for them to engage in dramatic, constructive or outdoor play (Slutsky, Slutsky, & Deshetler, 2014). Children are not to blame as there are more television shows geared for children of all ages with new content added weekly. There is even now a channel for babies. Along with television, children have tablets, smart phones, and video games that cut into play experiences.

The greatest challenge for adults is that many children are opting to play with technological devices rather than engaging in traditional (non-technology) forms of play. Research on the subject of technology, however, is quite mixed, showing both negative and positive results. Johnson and Christie (2009) explain that technology is here to stay so we need to figure out how to 'maximize the positive consequences of these new media so that they enrich rather than hinder children's play experiences' (p. 285). Play is still viewed by early childhood centres and teachers as a critical part of the learning and growing process, but is often at odds with parents more interested in academic and more school readiness type skills.

Methodology

Design

With society becoming more reliant on technology for daily experiences, we wanted to understand early childhood teachers' perspectives on technology use in their classrooms. Specifically, whether non-technology play and outdoor play were being less utilized to provide more technology play and use in the classroom?

This qualitative research study was a collaboration of researchers from 7 universities (2 in the United States and 5 in Europe). The research presented here is part of a larger study looking at teachers' perceptions of dimensions of play in ECE across 8 countries. This particular study aims at exploring teacher use of technology in the classroom and how it impacts non-technology play. The study also attempts to explore variations across 8 countries in terms of how technology is conceptualized and used in ECE classrooms. It is hypothesized that the way ECE teachers understand, value and conceptualize technology would affect the way it was used in their classrooms. The countries represented in this research study included: Cyprus, Denmark, Estonia, Greece, Italy, Spain, Turkey, and the United States (USA). One researcher having access to both countries collected data from Greece and Cyprus. A researcher based in the United States collected data from Italy.

Sample and demographics

Data for the present study was collected employing snowball and convenience sampling techniques. The total number of participants was 212. Table 1 provides demographics of participants from each country.

Table 1. Participants' demographic information.

Country	Denmark	Turkey	Cyprus	Italy	Estonia	Spain	USA	Greece
n	25	30	18	25	29	18	36	31
Mean age in years	44	31	30	38	39	40	37	38
Mean teaching experience in years	15	8	7	15	12	15	13	13
Full-time employed teachers (%)	52	77	89	52	100	100	92	81
Taught age group (%)								
Under 3 years	44	0	28	0	28	11	42	13
3–5 years	52	80	44	100	34	78	58	87
Older than 5 years	0	17	28	0	34	0	0	0
Other	4	3	0	0	4	11	0	0
Level of education (%)								
University level education (BA and MA, PhD)	96	60	94	44	79	89	44	90
Vocational or vocational secondary education		37		8	21	11	53	7
Other	4	3	6	48	0	0	3	3

Data Collection

Each author collected data from their respective countries using a co-constructed 30-item questionnaire. The questionnaire created by the authors had two parts. The first part consisted of 8 items that aimed at collecting participants' demographic information. The second part of the questionnaire consisted of 22 closed and open-ended questions aiming at recording participants' definitions, uses and beliefs about play. Surveys were administered either as paper questionnaires (Estonia, USA, Turkey, Denmark and Italy) or online (Greece, Cyprus and Spain). The questionnaires were administered in the countries' native languages and translated by the researchers who are native language speakers in their respective countries to English.

Results stemming from the following open and closed- ended questions are presented: (1) How much time children in the classroom engaged with technology play, indoor non-technology play and outdoor play per week? (2) What types of technology were available to children to use in the classroom? and (3) Whether teachers thought that technology play/use in the classroom could benefit children's school readiness skills.

Data analysis

The constant comparative method was utilized to analyse the data (Strauss & Corbin, 1994). This approach allowed the researcher's to stay close to the data as well as to what was actually happening in the field. The constant comparative method is a credible and trustworthy approach to data analysis that ensures the results, and any theory generated, remains true to the data that was collected. Constant comparative method uses multiple back and forth movements sometimes referred to as iterations, and the process continues until the researcher is satisfied with the review of codes and themes (Creswell, 2013). The themes emerged directly from the questionnaire's open ended questions. Teacher responses from the questionnaire where then compared across the different countries to evaluate differences and similarities from participating teachers. Closed ended questions were tabulated and reported as percentages or as hours devoted to technology and play in the classroom.

Results

Teacher's play type Preferences

As shown in Table 2, overwhelmingly the top choice for the preferred form of play for teachers was outdoor play across all countries, with the USA reporting the lowest percentage (36%). Indoor play (non-technology) was the second highest rated form of play for teachers with the United States reporting the highest percentage (36%). Technology play was avoided by teachers in each country with the exception of Spain that reported one teacher selecting it as their top play choice. Table 2 below shows the specific breakdowns per country of technology play, indoor play and outdoor play in classrooms on a weekly basis.

Table 2. Percentage of teachers preferred type of play for children in their classrooms.

	Cyprus	Denmark	Estonia	Greece	Italy	Spain	Turkey	United States
Technology Play						7		
Indoor (non technology) Play	23.5	8	10	13	4	13	23	36
Outdoor Play	76.5	60	90	87	71	80	70	36
Other (combinations of play preferred)		32			25		7	28

Technology use in the classroom

As seen in Table 3, teachers in most countries underline that children should not spend too much time on technology play while in preschool classrooms. In Estonia, 22 teachers reported that children play with technology zero hours per week, while in the USA, 11 teachers reported that their students played with technology 3 or more hours per week. The most commonly mentioned reason for not preferring technology play was that children must have hands on experiences in order to learn and that children learn through interactions with objects, other children and adults. Also, teachers in most countries mentioned that socio-emotional development was the most important skill to learn during the early childhood years. Teachers in Turkey point to negative consequences of children playing computer games/using computers – such as problems with focusing attention and asocial behaviour. Teachers in Spain and Cyprus point to developmental benefits for children and explain that technology prepares children for school, e.g. reading and math. This may help explain the higher usage of technology versus that found in Turkey.

Table 3. Number of hours engaged in technology per week.

Country	0 hours per week	1 hour per week	2 hours per week	3+ hours per week	Average hours per week
Cyprus	2	3	2	6	2.5
Denmark	8	7	4	4	1.4
Estonia	22	7			.24
Greece	12	7	3	4	1.0
Italy	10	7	4		.74
Spain		6	2	7	2.5
Turkey	12	11	1	2	.88
United States	13	7	3	11	2.2

Indoor (non-technology) play

Indoor play is a highly valued experience in the classroom as reported by teachers. Table 4 provides the breakdown of each country and shows that a lot of indoor non-technology play is provided to children each week.

Table 4. Number of hours engaged in indoor (non-technology) play per week.

Country	0–4 hours per week	5–9 hours per week	10+ hours per week	Average hours per week
Cyprus	6	2	6	10.2
Denmark	1	5	17	16
Estonia	1	6	22	14.8
Greece	5	10	12	8.6
Italy	1	4	12	14.6
Spain	1	8	5	8.5
Turkey	6	12	12	8.2
United States	1	3	25	23.6

The majority of teachers provided children with 10+ hours of indoor non-technology play each week. A total of 111 teachers reported that they provided children with 10+ hours of indoor non technology play, another 50 teachers reported that children played 5–9 hours per week and only 22 teachers reported that children played between 0 and 4 hours of indoor non-technology play per week. Indoor play is clearly still valued and supported by teachers regardless of culture and country.

Outdoor play

Although children are not spending a lot of time outdoors when at home, however, in ECE centres this form of play was the most valued by teachers (see Table 5).

Table 5. Number of hours engaged in outdoor play per week.

Country	0–4 hours per week	5–9 hours per week	10+ hours per week	Average hours per week
Cyprus	7	4	2	5.5
Denmark	1	1	22	14
Estonia		13	17	11.3
Greece	10	13	5	5.9
Italy	5	6	7	6.8
Spain	7	3	3	5
Turkey	15	9	1	4.1
United States	1	14	15	11.1

Although not as formidable of a play choice as indoor non-technology play, outdoor play was clearly a highly desirable option as illustrated by teachers in Denmark, Estonia and USA where on average children played outdoors 11+ hours per week. Seventy-two teachers reported that children played 10+ hours per week outdoors, while an additional 63 had children playing outdoors between 5 and 9 hours per week. Only 46 teachers reported that children played outdoors less than 5 hours per week.

Children's access to technology in the classroom

Children had access to various forms of technology while in the ECE classrooms. These included iPads/Tablets, computers, radio/CD players, Smart/Digital/Interactive boards, digital cameras and televisions. Many teachers also reported that children in their classrooms had no access to technology. Table 6 summarizes the types of technology children had access to per country.

Table 6. Technology teachers reported children had access to while in early childhood centres.

	Cyprus (n = 18)	Denmark (n = 25)	Estonia (n = 29)	Greece (n = 31)	Italy (n = 25)	Spain (n = 17)	Turkey (n = 30)	United States (n = 36)
No technology	1	8	15	12	8	1	9	10
iPad/Tablet	1	13	1		2	3		16
Computer	10	1	8	7	3	7	11	17
Smart/Digital/Interactive Board	7		1			11	1	
Cameras				1	1			
Televisions	2		2		2		7	
Radio/CD Players	2	3	4	1			2	

A total of 64 teachers reported that their students did not have access to any technology in their classrooms. Tablets and computers were the most readily available technology for children to use. Televisions once highly prevalent in ECE centres were absent completely in four of the 8 countries studied. Although some form of technology was available in many of the classrooms, teachers did not spend a lot of time engaging children with it as illustrated in Table 2.

Teachers beliefs on how technology benefits/does not benefit children's school success

Analysing the data revealed similarities and differences across countries. The teachers' beliefs on how technology benefits or does not benefit children's school success can also account for some of the reasons why teachers only spend limited time on technology in everyday practices. No teachers from Italy responded to this question.

In Spain, early childhood teachers believed that technology should be integrated into other areas of the classroom and that learning and using technology is important because it is everywhere, and children are exposed to it continuously. Spanish teachers are the most positive about using technology in the classroom and believed it is useful and could motivate children to learn.

In Estonia, early childhood teachers were somewhat divided. Some teachers stated that children learn through technology, others that they do not. The teachers in favour of using technology believed it could help children to develop persistence, visual memory, dexterity, improve children's

reading and math skills, help with focus, thinking and perception. However, one third of the teachers felt that the most important skills and competences children needed could not be learned through technology.

Turkish teachers were least in favour of using technology in the classroom. Nevertheless, some teachers said they believe that computer programmes that children use help prepare them for school as they learn concepts, numbers and shapes. Children can also interact with the content when using technology, which is beneficial to learning. However, most teachers stated that technology does not prepare children for school, and they were very concerned about the use of technology in early childhood, due to the children's age and development.

Teachers in Cyprus stated that technology is interactive, indispensable and necessary for daily living. Technology teaches children how to search for knowledge in the digital age. However, some teachers stated that children should not spend more than 10–15 minutes at a time with technology, and that technology does not prepare them for school, as small children learn best through hands on experiences.

Danish ECE teacher's valued technology because it was used in schools and children needed to know how to use it early on. Teachers believed that technology could help children improve their concentration and motivate them to learn. Technology allows children to be curious about the world and learn about their curiosity. However, the Danish teachers also believed that using technology had limitations. In particular they highlighted that small children learn better via other means such as hands on experiences and interactions with peers. Thus, most Danish teachers felt that using technology in early childhood should be limited to allow room for other ways of playing and learning.

In Greece, teachers believed that technology helps children to acquire knowledge through the Internet. They stated that technology is the foundation for cognition. Only a couple of teachers felt that it does not prepare children for school.

In the USA, teachers believed that technology was important at an early age because schools were using it, and preschool children should learn it, as they will need it for success later in school. Teachers stated that technology helps children with problem solving, concentration and curiosity as well as learning letters, numbers and objects around them. On the other hand, some teachers stated that they did not believe that technology helps support the most important skills children should learn at this age such as social interactions and exploration of the environment.

Discussion

Though very little time is devoted to technology play in the classroom, this does not mean that teachers do not value its importance in the lives of children. The majority of teachers in the study believed that technology is important in preparing children for school.

Teachers saw technology as helping children to learn about the world around them and help them to know how to use it when starting school. Technology helps children to learn about the different subjects they will study in school as well as motivating children to want to learn. While many teachers saw technology as valuable for school success, others still worried about its impact on overall child development.

Teachers in the USA, Cyprus and Spain emphasized the importance of children learning to use technology. In Denmark, Turkey and Estonia, teachers agreed with this but underlined that, as children spend a lot of time at home with iPads and computers, it is better for them to spend their time in ECE centres playing and exploring the world in other ways. In the USA in particular teachers stated that technology would prepare the children for school success. In the USA, Spain and Estonia, teachers placed particular emphasis on children learning math, reading and writing through technology, while in the other countries studied, the view was that technology is a way for children to find information about the world.

The primary reason cited across all countries except Spain for not using technology in ECE is that children need hands-on experiences and to develop socio-emotional skills that are gained through play. Teachers in Estonia, Denmark, Cyprus and the USA found this important. Especially teachers from Turkey, who were least in favour of technology play for young children and expressed concern that too much technology hinders social development. Teachers from Turkey were concerned that children would become addicted to technology, and mentioned that frequent use of technology would cause attention deficits in children. Teachers felt that children were already spending too much time on technology and needed more outdoor play rather than more technology play in their daily lives.

Spanish teachers were, as mentioned, most positive towards the use of technology in the classroom. In Spain, technology is covered by law is one of the learning outcomes specified for ECE. Spanish teachers spent more hours on technology in the classroom than teachers in other countries in this study (except Cyprus), and all teachers stated that technology prepares children for school. Looking at other data from this study, Spanish teachers stated more often than teachers in other countries that play is used with the purpose of teaching children academic skills and to a lesser extent to support the development of socio-emotional skills. Similarly, 93% of Spanish teachers said that children cannot choose to play freely because there is a fixed curriculum for the day.

The USA has no national law for preschools. Studies have shown that today technology plays a large role in children's play, and that American children spend a great deal of time watching television, using computers and iPads (Slutsky et al., 2014). American teachers stated many examples of how technology can help children learn different subjects, e.g. math, reading, writing, and gain general knowledge of the world. They also described multiple ways in which technology can be used to prepare children for school – more examples than teachers in any of the other participating countries. American teachers had the most overall positive approach to the use of technology in the classroom.

Spain and USA are countries where the teachers have the clearest focus on technology as a way to facilitate children's learning and prepare them for school by improving their literacy and math skills. In Denmark, the national law for ECE focuses more clearly on children's play and their rights to a good childhood as a life period in itself and not only as preparation for school. Thus, less emphasis is placed on academic training for school. However, as Denmark is one of the most digitalized countries in the world, there is also political pressure towards teaching children to become familiar with using technology. Danish teachers therefore felt that children should learn about technology as part of today's world and that technology can prepare them for school in certain ways. Nevertheless, Danish teachers felt it was important to support socio-emotional development in everyday practices, and that children can learn about themselves and the world though play and hands-on experiences. For this reason, they believed that technology should not be used or used sparingly with young children.

There is a political focus on technology in Estonia. One of the main goals in education focuses on promoting a digital revolution in lifelong learning (Ministry of Education and Research, 2014). Thus, some teachers believe that technology prepares children for school as it helps them develop different skills, whereas other teachers believe it should be avoided in early childhood, as small children need to learn socio-emotional skills and have hands on experiences.

In Cyprus, technology is considered an important learning tool and is covered by the national law (MoEC, 2016). The law also specifies how technology in early childhood begins with electronic fairy tales, games, digital cameras and other forms of technology appropriate for young children. Technology use in Cyprus is not considered play but is instead linked to educational activities (Loizou, 2017). Research has also shown that teachers seem reluctant to use technology in the classroom (Vrasidas, 2015) – a result that is supported by this study, in which teachers expressed the importance of young children interacting directly with the environment with a strong focus on socio-emotional development.

In Greece, technology is one of the eight learning areas described in the Kindergarten Curriculum (2011) which states in detail how technology can be used for finding and organizing information, for communication and collaboration, for exploring and problem solving and for understanding the role of digital technologies in modern society and culture. However, Nikolopoulou and Gialamas (2015) revealed inadequate integration of technology in early childhood education. This study also showed that Greek teachers found play to be the most effective way for young children to learn. In the present study, Greek teachers also felt that technology can help children to learn and prepare them for school, though some Greek teachers stated that outdoor play is better for young children and that the use of technology should be limited.

Teachers in Turkey were most reluctant to integrate technology in everyday practices. In the Turkish Preschool Education Program (Ministry of National Education, 2013) which presents the Turkish aims and objectives for ECE, technology is only mentioned in the sense that spending too much time watching television or playing games on the computer can be harmful. This view of technology is reflected in the responses from Turkish teachers, who, with few exceptions, explained that play is much better for young children's learning and development, and that spending too much time on technology can harm children's development. They also felt it can lead to attention deficits and cause asocial behaviour.

This study shows that although there is pressure at the policy level in all eight countries to engage children in technology proficiency, teachers still view using it in classrooms to be very limited compared with non-technology and outdoor play. Although teachers believe technology helps children prepare for school, they still valued the importance and the enrichment children received from inter- acting with traditional non-technology-driven toys. Across all eight countries, it is illuminating to see the very limited value teachers attach to technology play, preferring instead to allow children to play indoors with non-technology artifacts as well as playing outdoors. Teachers across all eight countries only engaged children in technology play for 1.4 hours per week, compared with 13.1 hours spent on non-technology indoor play and eight hours on outdoor play.

Teachers who opposed technology use felt that children need more hands-on experiences and opportunities to develop socially and emotionally, which is achieved through interactions with peers during play. Others were concerned about children becoming addicted to technology and the lack of creativity that can develop when the technology carried out all the work for the child. Technology can be positive and negative for children as discussed by the teachers across all countries, but the most telling sign is how little they actually use it in the classroom. Yes, technology is valued, and children spend a large amount of time using technology outside early childhood settings, but in early childhood classrooms teachers are opting for more traditional indoor and outdoor play to help children develop the social, emotional and cognitive skills that they will also need for school success, even more so than technology.

Conclusion

While technology is quickly becoming the go to items for play and distraction purposes for children and adults alike, in early childhood classrooms, however, technology is mainly invisible as children are spending less than 2.5 hours a week using it as opposed to 10+ hours a week engaging in indoor and outdoor play. So while a valuable artifact for children during non-school hours, in early childhood classrooms it is simply not valued as much as traditional experiences such as playing with toys and exploring the environment outside even though many teachers reported it being a valuable tool for later school success. Teachers see indoor and outdoor play as having benefits to children's development that outweigh the use of technology. We believe the present study helps shed light on how technology play is still controversial as some teachers feel it helps with learning but many others are concerned about the impact that such play has on development as a whole. The use of technology in early childhood is a global issue and how teachers in each country choose to address it is tied to cultural expectations and teacher beliefs.

Disclosure statement

No potential conflict of interest was reported by the authors.

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