



Volume 36
Number 3
November 2016

Early Years

An International Research Journal



ISSN: 0957-5146 (Print) 1472-4421 (Online) Journal homepage: <https://www.tandfonline.com/loi/ceye20>

Teachers' dispositions towards the role of digital devices in play-based pedagogy in early childhood education

Ioanna Palaiologou

To cite this article: Ioanna Palaiologou (2016) Teachers' dispositions towards the role of digital devices in play-based pedagogy in early childhood education, *Early Years*, 36:3, 305-321, DOI: [10.1080/09575146.2016.1174816](https://doi.org/10.1080/09575146.2016.1174816)

To link to this article: <https://doi.org/10.1080/09575146.2016.1174816>



Published online: 20 May 2016.



Submit your article to this journal [↗](#)



Article views: 4152



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 29 View citing articles [↗](#)

Teachers' dispositions towards the role of digital devices in play-based pedagogy in early childhood education

Ioanna Palaialogou

Canterbury Educational Services, UK

ABSTRACT

A body of research is emerging on early childhood education teachers' views on the integration of digital technologies in their practice. Despite evidence of the digitalisation of homes in affluent societies and children's interactions in highly mediated digital environments, few teachers so far have integrated digital devices into a play-based pedagogy. Thus, this project aimed to examine the attitudes and aptitudes towards digital devices of teachers in their personal lives and professional practice in five countries (England, Luxemburg, Malta, Greece and Kuwait). An online survey designed to collect broad-scale data was followed by focus group interviews. The findings demonstrated that although teachers are digitally competent in their personal lives, there is a dominant ideology regarding the nature of play-based pedagogy that hinders the integration of digital devices into their practice.

ARTICLE HISTORY

Received 20 December 2015
Accepted 2 April 2016

KEYWORDS

Digital devices; early childhood education; play-based pedagogy; teachers' attitudes and aptitudes; dispositions

Introduction

The term 'digital devices' is used here as a collective term for all equipment that contains a computer or microcontroller and to which adults and children might have access, a list which now includes toys, games consoles, digital cameras, media players and smartphones as well as handheld, laptop or desktop computers. Research into early childhood education (ECE) in recent years has been concerned with the use of digital devices both at home and at school. Emergent evidence illustrates that many children inhabit high specification technological home environments where digital devices are part of their lives (Holloway, Green, and Livingstone 2013; Kalas 2010; Ólafsson, Livingstone, and Haddon 2014; Plowman and McPake 2013). Findings suggest that children use a range of devices from a very young age and that their digital imprint begins from birth. Studies from around the world (Fleer 2013a; Marsh et al. 2005; Plowman 2015; Terreni 2011), and cross-national comparisons (Chaurdon 2015; Livingstone et al. 2015; Palaialogou 2014; Rideout, Foehr, and Roberts 2010; Wartella 2013) have illustrated that many children grow up in technologically rich homes and are interacting with digital devices daily which parents see as positive, although some researchers express concerns about the online use of such devices. Research also examines how digital devices can support children's learning (Falloon 2013) for instance of literacy (Gonzalez

and Fryer 2012; Marsh 2012; Nash 2012), arts (Terreni 2011) and maths (Jowett, Moore, and Anderson 2012), concluding that they 'may offer an exciting platform for consuming and creating content in a collaborative, interactive way' (Melhuish and Falloon 2010, 1).

Other research examines teachers' views and competencies and the opportunities for integrating digital devices into a play-based pedagogy (Hatzigianni and Margetts 2012; Inan and Lowther 2010; Kerckaert, Ruben Vanderlinde, and van Braak 2015; Nikolopoulou and Gialamas 2015a; 2015b). These studies conclude that, compared to primary and secondary education, the integration of digital devices into ECE has been slow and limited. Consequently, although children are interacting with digital devices from infancy and even have experiences at home with the Internet (Teuwens 2011), discussions about how digital devices can be integrated have not fully developed and there is evidence of concern that they might harm a play-based pedagogy (Lindahl and Folkesson 2012a, 2012b; Morgan 2010; Plowman and Stephen 2005). It is important, therefore, to examine what is meant by play-based pedagogy in early childhood and the factors that may influence the integration of digital technologies into ECE.

'Play-based Pedagogy' and 'Digital-play' pedagogical practices

In the field of ECE, play and pedagogy are two constructs that have informed recommendations for a learning environment for children that should be based on exploration, creativity, imagination, motion and emotions that integrate play in daily practices in ways that align with planned outcomes (Dahlberg and Bloch 2006; Hedges and Cullen 2011; Taguchi 2010; Wood 2014). Play-based pedagogy is based on the ideology that play has motor, spatial, cognitive, emotional, social and moral values in children's development and is dependent on the idea of an active child who engages in actions that will lead to deep understanding and meaning making experiences. Pedagogical practices in ECE derive inspiration from practices that value 'embodied hands-on experience based teaching and learning, often using aesthetic means of expression as a way [for children] to learn differently' (Taguchi 2010, 23). Central to a play-based pedagogy is the assertion that 'these activities are imbued with children's concerns with agency, power and self-actualisation, as well as their motivations to learn' (Wood 2014, 154). Research suggests, however, that perspectives and practices in relation to play and digital devices in ECE show a schism between researchers and teachers (Edwards 2013; Marsh and Bishop 2014; Verenikina and Kervin 2011; Wood et al. 2008). Despite the technologically rich homes of children, there are still concerns as to whether digital devices have a place in ECE (Howard, Miles, and Rees-Davies 2012; Yelland 2011) and about their inadequate integration into practice (Parette and Blum 2013).

There has been relatively limited examination to date of children's interactions with digital devices in ECE. The research that emerges either examines the extent to which children's interactions with digital devices can be characterised as play (Verenikina and Kervin 2011), or is concerned with comparisons of traditional vs. technological play (Bergen 2012). Such research defines play via a stereotypical ideology where children choose from a range of materials or activities in order to create experiences for meaning making. The relationship between play and digital devices has been limited in investigations, however, by a lack of clarity as to what the purpose of children's play is and what interactions can be seen as play.

Edwards (2013, 204) opposes the separation of play and digital devices, arguing that addressing the gap between play and technologies in early childhood curricula requires a perspective that helps teachers see how children's digital play supports their cultural meaning making, not further research that tells them how digital play compares to traditional play.

In other words, we need to make digital devices available as tools that extend possibilities for children as part of their play.

Factors affecting the integration of digital technologies in ECE

Research is emerging on teachers' views and attitudes towards the integration of digital devices (Aldhafeeri, Palaiologou, and Folorunsho 2016; Inan and Lowther 2010; Kerckaert, Ruben Vanderlinde, and van Braak 2015; Morgan 2010; Nikolopoulou and Gialamas 2015a; Sang et al. 2010; Teuwens 2011). Examination of these findings indicates that three conditions affect the integration of digital devices into ECE practice: teachers' agency; the ambiguities of play-based pedagogy ideology; and concerns for the dominance of materiality and for children's safety and well-being.

(1) Teachers' agency

Research suggests that teacher beliefs, digital capabilities and capacity to conceptualise how digital devices can be integrated shape their receptiveness towards them. There is a belief that digital devices harm child-centred pedagogy (Morgan 2010), prevent and limit children's physical activity (Cordes and Miller 2000) and lead to emotional and social isolation. Levin and Wadmany (2008) further suggest that technology adaptation requires a cognitive transformation in teacher beliefs. In that sense, transforming practice is a complex task (Mills and Tincher 2003) as it 'shapes practitioners' [teachers'] tacit theories-in-action in ways that compete with or override ideas encountered in initial or continuing professional education' (Stephen 2010, 19). Transformation is further prevented by lack of resources and poor planning (Smerdon et al. 2000), inadequate training (Aubrey and Dahl 2014) and teachers' experience in education (Hermans et al. 2008).

(2) The ambiguities of play-based pedagogy ideology

Researchers have argued that the notion of play is poorly articulated (BERA ECE SIG 2003; Moyles, Adams, and Musgrove 2002; Stephen 2010; Wood 2014) and that a play-based pedagogy is associated with first-hand experiences rather than 'a set of contextualised practices that are constantly adapting to circumstances' (Beetham and Sharpe 2007, 6). Instead of agonising about whether technologies can be included in a play-based pedagogy, ECE should deconstruct the characteristics of play and seek an evidence-based rationale. It is time for critical empirical and theoretical investigation of the contribution of digital devices in children's play and the opportunities offered for children to experiment with meanings. It is also time to move away from asserting relationships between play and digital technologies, questioning the efficacy of digital technologies in play-based pedagogy, and, instead, to offer technological continuity between home and school (Bittman et al. 2011; Edwards 2013; Marsh 2010; Plowman, McPake, and Stephen 2008).

(3) Concerns about the dominance of materiality, and about children's safety and well-being

There is a view that digital devices are objects that require a material framework and that such a framework has transformed their potential effects on young children (Alliance for Childhood 2004; Palmer 2006, 2008; Sewlyn 2011). Critics of digital technologies view them as having a negative impact on children's safety, health and well-being (Kabali et al. 2015; Radesky et al. 2015) and distracting children's attention from educational content (Roseberry et al. 2014). Studies examining the use of digital devices in relation to socio-economic status, parents' education status and personality traits claim that these devices are used as a 'shut up toy' during parental daily routines (Radesky et al. 2014) with detrimental consequences for children's later social-emotional outcomes. Finally, it is suggested that interactions with technologies may affect children's development by replacing interactions with parents, carers or teachers (Kirkorian et al. 2009).

The factors influencing the integration of digital devices in ECE include external aspects such as resources and training and internal factors such as beliefs and views. This has led to 'a dualism where problems and benefits are pitched against each other' (Fleer 2013a, 57) and play-based pedagogy is separated from children's digital interactions, undermining the integration of digital technologies into ECE (Bittman et al. 2011 and Falloon 2013; Fleer 2011, 2013b). Research cautions us to focus on working 'towards the common goal of increasing children's digital autonomy and critical thinking for a safe and balanced life' (Chaudron 2015, 29) in order to 'bridge the gap between play and technologies' (Edwards 2013, 209).

Central to this is the role of teachers in terms of beliefs, feelings and behaviours towards digital devices (attitudes) as well as their capacity to use digital devices (aptitudes) and their dispositions. Thus, the research reported in this study aimed to examine teachers' attitudes and aptitudes in order to investigate what dispositions teachers exhibit towards the integration of digital devices in play-based pedagogy.

Theoretical underpinning of the study

Attitudes and aptitudes affect how we make sense of children's interactions with digital devices and therefore give direction to our behaviours, motives and intentions and consequently inform our dispositions and responses. Hence, a synergy between attribution theory and attitude theory from social psychology underpins this study in order to examine teachers' attitudes and aptitudes in relation to digital devices in ECE. This study considers how human actions, interactions, motives and intentions are shaped by the perceptions of a certain situation, and how attitudes and aptitudes offer meaning and direction based on personal experience, providing frames of reference which influence individuals' responses and dispositions towards a phenomenon or situation.

The study was guided by Weiner (1986) attributional theory of motivation, Schachter's (1964) cognitive labelling theory, Bem's (1972) self-perception theory, Katz's (1960) four functions of attitudes and Stahlberg and Frey's (1988) three component views of attitudes. Following their ideas for tracking the causes of human behaviour, the project aimed to move beyond teachers' views and focus on their attitudes and aptitudes – positive or negative – as an indicative and evaluative way of examining emotional and cognitive dispositions towards the integration of digital technologies in ECE.

Research context

The study utilised an online survey followed by focus group interviews across five countries: Greece, Malta, England, Kuwait and Luxemburg. In two previous studies (Aldhafeeri and Palaiologou 2016; Aldhafeeri, Palaiologou, and Folorunsho 2016; Palaiologou 2016), these countries were studied in relation to children's access to digital technologies at home. Since the completion of these projects, links were developed with these countries which allowed us to carry out the current project. As these countries have different languages, the challenge in this project could have risen from translation issues, but this difficulty was minimised because the languages were all in the repertoire of languages of the research team. The countries also offer an interesting comparison on the basis of the extent to which they have been digitalised. Kuwait, England and Luxemburg have introduced near universal digitalisation whilst Greece and Malta have only recently introduced the digitalisation of services.

In the first stage of research, an online survey was developed with the data collected used to identify any similar or different themes in teachers' responses. This was followed by focus group interviews. This mixed methods design was considered appropriate as the first stage generated themes across all countries which informed the focus groups. The EECERA code of ethics (2014) was followed throughout.

Stage 1: online survey

The survey developed around two key elements of the investigation – the attitudes and aptitudes of teachers and their views on two aspects of play: what children's behaviours they associate with play, and what they understand by play-based pedagogy. 'Attitudes' concerned teachers' beliefs, feelings and actions towards digital devices whilst 'Aptitudes' focused on their capacity to integrate digital devices into their personal and work life. Although in psychological studies scales are used to examine a person's attitudes and aptitudes, the intention in this research was not to provide direct or indirect measurements. Instead the intention was to investigate teachers' perceptions of their familiarity with digital devices. Thus, this part of the survey was developed around three key themes:

- (1) *Task-behavioural orientation* aimed to collect data about tasks they undertake in their personal and work life using digital devices (19 items).
- (2) *Emotional orientation* which aimed to collect feelings towards digital devices in their personal and work lives (28 items).
- (3) *Coping orientation* focused on their intentions when using digital devices in their personal and work life (25 items).

The second part of the survey asked teachers to rate items of behaviours they associate with play when children are participating in activities such as symbolic play, role play and play with digital devices (17 items). It also asked them to rate statements associated with play-based pedagogy (13 statements).

The online survey was piloted three times in each country. It was developed firstly in English and then translated by the research team in the other countries so all the participants were presented with the questionnaire at all stages (piloting and main phase of research) in their own language. The Fundamental Lexical Hypothesis (FLH) technique was used in

the design of the questionnaire in order to limit the translation effect in the survey (Barrett and Kline 1982; Cattell 1973). This technique offers researchers the opportunity to develop items that are related to individuals' beliefs, feelings and perceptions and express them linguistically and eventually to encode them into their own language. Although FLH encodes personality characteristics in single words, in this research the development of the statements was not limited to single words, but FLH was used as a technique to develop statements that would correspond in all languages.

For ethical reasons, descriptive statistics were used as they are accessible to inexperienced researchers, meaning the results could be communicated to all participants.

All participants in the project were recruited from lists provided by the responsible Ministry for ECE. An email was sent to the teachers in each country in their own language asking them whether they were willing to participate in the online survey and the sample was chosen from the responders. The survey intended to capture the views of teachers who were relatively new to the profession, but who also had some work experience. In keeping with standard procedures in cross-country comparisons, the same number of responses were analysed (184 teachers from each country who had worked between 5 and 10 years in ECE and were working with children from the age of 2–4 years), a total population of 920 participants. The average age of the teachers was 25–30 (73.7%) with the exception of England, where the average age was 20–25 (71.6%). Only 9.4% of the overall population were graduates and 32.4% were enrolled in a university course. All participants are referred to as teachers, although the majority do not have graduate status, since all are working in ECE and are responsible for delivering educational activities.

Quantitative results

In terms of attitudes towards digital devices in their personal life teachers showed a high level of approval across all countries (73.21%) with few disapproving of them (14.7%). The most common digital devices were iPhones (56.3%), smartphones (52.1%) and tablets (54.3%). Favourite activities were listening to music with a digital device (65.4%), watching TV (87.6%) and using social media (72.6%). Data showed consistency in terms of teachers' personal attitudes with no significant differences between countries.

The picture was similar for aptitudes in the use of digital devices in their personal lives and showed high levels of competence with digital devices (72.4%). High levels of confidence were also exhibited (64.4%); as well as coping strategies when faced with a problem with a digital device (72.1%) or with changing digital devices (63.2%). Again there were no statistically significant differences among teachers' aptitudes between the countries.

The picture was different, however, when it came to their practice in ECE where levels of attitudes and aptitudes towards digital devices dropped across all countries (with only Luxemburg showing a slightly higher percentage of positive attitudes towards digital devices in their practice >4.7%). Although teachers indicated they had the ability and willingness to learn new skills required in their teaching in relation to digital devices (73.2%), they felt unprepared to handle them in their classroom (65.4%), unsure about how they facilitate children's play (57.3%), confused about how they can be embedded in their practice and concerned about how they could recognise children's play behaviours and reactions when interacting with technologies (64.3%).

Teachers associated play with children's activities (83.2%), exploring materials (71.3%), socialising (83.2%), experiencing materials (92%), playing outside (82.3%) and self-chosen activities (73%). A large majority of teachers felt confident that they recognised playful characteristics when children are engaging with activities (92%). Table 1 illustrates their association of play behaviours with digital devices in comparison with other activities.

As can be seen all items have been associated with play for other activities, but when it comes to children's interactions with digital devices the percentages are lower. Teachers thus seem to have an understanding of play as being the result of engagement in activities that are related with spontaneity (98%), pleasure (96.3%) and motor (70.1%), spatial (93.2%), emotional (76.4%), social (67.8%) and cognitive (87.4%) experiences.

Table 2 illustrates teachers' views on play-based pedagogy and whether they think digital devices can become part of it. The table presents the collective results among all countries as there were no statistically significant differences. The statements used in this part of the survey were to investigate a potential definition of play-based pedagogy that was not coming from an academic-oriented terminology, and also any features of the digital devices which contributed to a play-based pedagogy.

The findings demonstrated that although teachers have attitudes and aptitudes which would enable them to integrate digital devices in their lives, they are hesitant about integrating these in their practice. Thus, focus groups were undertaken to gain an understanding of this difference.

Table 1. Teachers responses (%) on whether children exhibit playful behaviours when they interact with digital devices (n = 920).

Do you recognise the following as behaviours of play when children	Engage with activities on their own	Engage with activities with peers	Engage with planned activities by an adult	Engage with planned activities by another child	Engage with digital devices
Self-chosen interactions	86	65.4	54	28.4	21.1
Self-inspired interactions	65.3	46.6	31.6	22.1	14.5
Self-regulated interactions	38.2	46.7	29.8	45.6	7.1
Children are inventive	83.1	50.1	21.4	23.8	6.3
Children are creative	76.3	50.5	43.2	52.6	8.4
Children are motivated	69.3	50.1	43.6	38.9	78.3
Children lead	80.7	50.2	28.4	26.8	17.9
Children enjoy	96.3	82	67.8	68	87.4
Children are active	96.7	70.4	67.5	70.2	10.5
Children use a range of vocabulary	50.6	62.9	73	69.1	6.3
Children make choices	74.3	54.9	34.7	55.8	13.7
Children use a range of skills	89.1	76.4	76.9	72.6	15.8
Children make meaning through the experiences they acquire during the activity	63.2	67.9	68.4	66.9	23.2
Children attempt problem solving	66.1	67.4	70.3	56.8	55.8
Children are attentive	72.6	69.6	70.3	65.4	50.5
Children engage physically	93.2	72.6	69.1	80	4.2
Children engage emotionally	87.6	76.5	65.9	73.4	38.9

Table 2. Teachers' perspectives (%) on play-based pedagogy and digital devices (n = 920).

Statements	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
Play-based pedagogy is offering an environment where children have opportunities to explore first hand experiences, enjoying and at the same time help them to develop and learn through play	10.3	66.8	14.9	6.7	2
Play-based pedagogy is based on play where children are actively involved, self-motivated and activate their psychical, cognitive, emotional and social skills	16.7	69.1	11	2.2	1
Play-based pedagogy is based on teachers facilitating children's play for their development and learning	21.1	55.8	18.9	1.1	3.2
Play-based pedagogy is the creation of an environment where children have opportunities to re-enact life experiences for educational purposes	31.6	57.9	6.3	3.2	1.1
Play-based pedagogy is a planned educational environment where play is a central element to support children development and learning	18.7	57.8	14.3	5.6	3.6
Play-based pedagogy is an environment where children re-enact life scenarios through play	17.9	56.8	17.9	5.3	2.1
Digital devices can enhance a play-based pedagogy	33.7	46.3	18.6	1.3	0.1
Digital devices facilitate play-based pedagogy as a cooperative tool	9.5	14.7	53.7	14.7	7.4
Play-based pedagogy should include digital devices for technological continuation between home and school in order to enhance children's experiences	10.5	22.1	50.5	8.7	8.2
I integrate digital devices as part of play-based pedagogy	3.2	4.2	25.3	35.8	31.6
I integrate digital devices for educational purposes	7.4	9.4	11.6	38.9	33.7
I intend to include digital devices as part of play-based pedagogy	13.7	26.3	46.3	13.7	1.1
I intend to include digital devices for educational purposes only	11.6	33.7	38.7	8.4	7.4

Stage 2 focus groups

All participants in the survey were asked if they would participate in focus group interviews. There were two groups in each country with five teachers in each, all of whom were randomly chosen and gave their permission. Audio recording was used during the focus groups except in Kuwait where the teachers did not want to be recorded, so notes were kept during the interview. Interviews were conducted in the language of the participants.

All the interview transcripts were translated into English, before the thematic analysis took place. There was a lot of discussion about translation issues. A literal translation was initially chosen, but the data appeared unnatural and unrealistic and the naturalistic language responses of the teachers were lost. Instead, free translation was adopted in which the thematic interpretation of the interviews offered the opportunity to seek for explanations and themes that moved beyond language barriers and developed an empathy towards the data. In the presentation of the qualitative results, the chosen extracts are indicative of the points made in the thematic analysis.

Qualitative results

There was a cross-situational consistency in the thematic analysis of the focus groups interviews from which seven themes emerged:

- (1) Child active vs. passive;

- (2) Child as independent vs. dependent learner;
- (3) Child's safety vs. risk/danger;
- (4) Child as natural explorer vs. non inquisitiveness;
- (5) Child as social learner vs. isolate;
- (6) Child initiated play vs. directed play;
- (7) Child's self-directive dispositions to learning vs. mediating, mechanical learning.

Child active vs. passive

Teachers expressed concerns about whether the digital devices encourage active or passive learning. Both of these terms were used by teachers in ambiguous ways. The typical view was that children have to be active in the classroom and thus need to move around, interact with materials, construct their understanding and experience materials 'first hand' with their senses. Conversely, teachers felt that digital devices were a secondary activity where *children see the world through a screen most of the time rather than seeing the real materials [...] how is it possible for children to understand the world through the screen of these devices?* (Greek teacher)

In regard to interactive digital toys, teachers felt that children might rely too much on what they can do rather than what can be done with them. They also felt that there is not much opportunity for active engagement in the absence of 'real materials' as the following contribution illustrates:

but I do not get it, how a child can see the difference between let's say a rainy day and a sunny day through a digital toy? The children need to be able to see, smell the rain and then on a sunny day see the sun, smell the earth, feel [...] play is about using all the senses and physical interactions that I am not convinced digital devices offer to our children. (English teacher)

Child as independent vs. dependent learner

Teachers perceived themselves as facilitators, supporters and coaches of children's play and learning in their practice. With the digital technologies, however, they felt that: *children play on their own with these [...] there is no room for any interactions* (Maltese teacher), unlike other activities where teachers felt they could support children, such as writing, drawing or linguistic activities such as storytelling, singing and arts where the teachers *can use words, symbols, images, pictures, language* (English teacher) to share meanings. They felt that digital devices do not offer these possibilities as they are one-way interactions with children; the question was: *how can children be developed into independent learners where they are in control?* (Kuwaiti teacher).

This dichotomy between children as independent vs. dependent learners raises the argument about the role of the teacher in a play-based pedagogy. The teachers considered that digital devices limit children's independent actions, and asked how children could perform a task without assistance in the future if they are dependent on a digital device to execute the activity:

How can children perform the activity independently? For example when we are about to play music chairs, we do explain to children how it is played, we do try and then we allow children to perform this on their own [...] I cannot see this happening with a digital toy. Or maybe I do not know how. (Luxemburg teacher)

Play is and should be self-directed, but it seems to me that with all these technologies, children are limited to creating self-directed, self-regulated activities. The technology does it for them and they mechanically just follow the instructions, they do not have any power or control to change rules as they do with their other play. (Greek teacher)

Child safety vs. risk/danger

The discussion on this topic was around Internet-based digital devices and well-being. Teachers considered the children were too young to be exploring the Internet even with guidance. Concerns were also raised about children's physical posture when interacting with digital devices and the limited opportunities for motor development which teachers considered essential in early childhood.

Child as natural explorer vs. non inquisitiveness

Teachers agreed that children should construct their understanding of the world around them through actively exploring the environment. They used the term 'natural' environment to describe children's engagement with materials (such as leaves, fruits, pieces of wood, sea shells and animals) in the outdoor environment, including the school playground. They believed that children's engagement in play through interactions with natural materials could lead to deep learning. Conversely, digital devices could not help children to engage in the same ways as natural materials. Teachers thus did not acknowledge digital devices as providing opportunities that facilitate and support children's play.

Child as social learner vs. isolate

There were fears raised about children not interacting with other children when playing with digital devices, especially screen-based ones. Teachers considered that this could result in isolation, with the integration of digital devices hindering the social interactions of children.

Child initiated play vs. directed play

Teachers expressed concerns about the extent to which children's use of digital devices could be considered as play or free play as it is directed more by the applications or software. They considered that digital devices direct play and this indicates what teachers considered as play as opposed to what children might consider as play. The remaining question is whether play is a medium of learning and as such should lead to children's learning or is play a way for exploring and making meaning of the world around them? Digital devices might have a place as a toy.

Among focus groups, the dominant view was that play should be about children being able to learn in an enjoyable way, and that the role of the teacher is to facilitate children's play. When digital devices are used, however, it appeared that teachers felt they did not have control of these interactions and consequently of children's learning. In terms of how they see digital devices as a medium for play, they felt confused and considered that the opportunities offered by digital devices were ones which teachers could already create in the classroom.

It is difficult, as it is, to know what is going on in their minds [children] let alone understand their perspectives. Children play and take things on board that obviously are different from ours [meaning goals of outcomes] [...] because I think we do not know really what they learn and what they get out of this, so if this is difficult how do we control all these technologies in the class?. (Maltese teacher)

Child's self-directive dispositions to learning vs. mediating, mechanical learning

Teachers were anxious that digital devices did not allow children to initiate activities, and so impeded their imagination and creativity. They felt that digital devices might lead to the acquisition of a limited range of skills. The concerns were around how children could be stimulated and how they could be offered the necessary physical contact with materials. Teachers voiced concerns that most of these toys just offer directions for use, with no space for children's imagination, and no richness in language:

Take Minecraft, for example. [...] It is supposed to be something that children can build, construct, explore with geometrical shapes, but it is so limited to what children can do [...] when a child draws on a piece of paper they can draw a line which is not straight and they can also create shapes and designs so they are not restricted by the graphics of a game. (Luxemburg teacher)

Child inclusion or exclusion

Concerns were raised that the integration of digital devices might widen the gap between children from technologically rich homes and children from disadvantaged backgrounds who, for economic reasons, do not have the same experience to inform their use of the digital devices in the classroom. They also felt that they were not equipped, by training or guidelines, to support children who do not have experiences with digital devices at home.

If I have them [digital devices] do I give them to the children that I know are disadvantaged and do not have opportunities at home, or do I allow equal time with children who will have them the moment they go back to their homes? This is an ethical dilemma. (Greek teacher)

It was evident during the interviews that teachers expressed concerns about children's behaviours and how they might react if their classrooms had integrated digital technologies, but that they admitted that their fears were exaggerated:

In real life children are using them [digital devices] all the time. Last week there was a parents' evening and parents came with their children. When talking to us they gave them their smart phones for children to play and keep them busy. The children were happily contained on their own with them. (English teacher)

Discussion and conclusions

It is evident from the data that ECE teachers have fully integrated digital devices into their everyday personal lives, have positive attitudes towards them, have developed appropriate skills and were coping with their use. When it comes to their beliefs about their use in ECE, however, this study demonstrates their hesitation in integrating digital devices. This hesitation begins with their view of play-based pedagogy as a situation where children enjoy active first-hand experiences in the physical environment. Digital devices are not seen as offering such opportunities and are viewed as static and controlling children's creativity, motivation and exploration. Although the teachers did not suggest that digital devices have

no role in ECE, they could not see, or were not convinced, that they could support children. They felt unprepared, unsure, confused and concerned about different recommendations for children's use of digital devices.

From the quantitative and qualitative data, it is evident that digital devices were viewed as being socially and physically limiting, directive and not offering mediated activities. Furthermore, teachers considered their use to be in opposition to what they actually try to do, believing that digital devices do not create opportunities for play in which children explore all their senses, but tend to limit both language interaction and opportunities for self-directed actions. They feared that digital devices could not support them in their role as teachers, feeling that they had very little control over how the applications were developed or how they felt as users:

In other activities as teachers we plan, design, choose materials, but with the digital toys everything is designed for us and we just give them to children, so where does this leave us?
(Maltese teacher)

These findings correspond to the work of Plowman and McPake (2013) who described seven myths that dominate the discourse of the use of digital devices at home:

- the extent to which digital devices are part of children's lives or still in the periphery of their lives;
- issues around children being isolated while interacting with devices;
- the degree of dominance in their lives;
- the tensions between play and learning;
- the extent to which technology offers opportunities to combine play and learning;
- the educational purpose of these devices considering the nature of interactions they provide;
- the problematisation of whether children need to learn to use these devices as lifelong learning skills.

This study found that similar myths still dominate teachers' attitudes towards digital devices. It seems that there is a cross-cultural consensus about the nature of play-based pedagogy, and that digital devices are not seen as offering interactions or experiences that can be considered as playful and thus part of a play-based pedagogy.

Drawing upon the theoretical underpinnings of this study, which aimed to understand how attitudes and aptitudes related to teachers' behaviours, feelings and intentions, three key dispositions can be identified – functional, emotional and cognitive – that might hinder the integration of digital devices in ECE.

Firstly, the functional dispositions are related to the voices for and against the integration of digital devices in ECE. As voices against digital devices promote scepticism on whether they should be used by children (i.e. Kabali et al. 2015; Radesky et al. 2015), teachers' readiness to create playful opportunities for their integration into ECE is shaped by concerns about children's well-being, safety and health and the risk of social isolation. Digital devices are seen as static, controlling children's creativity, socially and linguistically limiting children and not providing opportunities for mediating activities. Consequently, these functional dispositions impeded the integration of digital devices.

Secondly, the emotional dispositions towards the integration of digital devices in ECE determine the impact and acceptance of digital devices in play-based pedagogy. These dispositions can be described as:

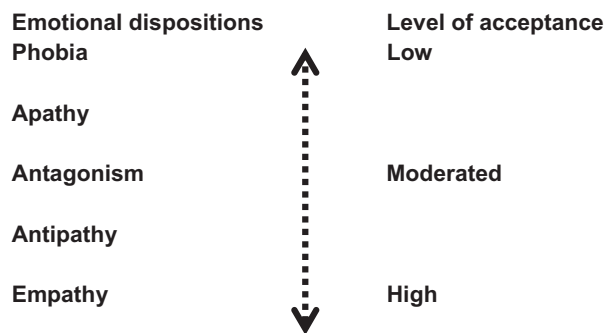


Figure 1. Emotional depositions towards digital devices in ECE.

Table 3. ECE teachers’ attitudes and aptitudes towards digital devices.

Cognitive Dispositions	Characteristics	Outcome
Digitally reactive	Teachers differ their responses towards digital devices depending on the ideology they are working with because they interpret this ideology in different ways	Rejection
Digitally diffident	Teachers differ their responses towards digital devices depending on the effects they think they might have on children’s behaviour	Scepticism
Digitally open	Teachers recognise children’s digital experiences and the need for technological continuity between home and school	Cooperation
Digital proactive	Teachers determine their responses towards digital devices with active choices and recognise them as a cooperative tool	Integration

- *Phobia*: anxieties around the role of teacher in the integration of digital devices, and about the mediation of children’s play and learning.
- *Apathy*: avoidance of discussion, or of holding an opinion, on the integration of digital devices.
- *Antagonism*: belief that children’s interactions with digital devices, like the devices themselves, are controlled by manufacturers
- *Antipathy*: belief that digital devices impede social interactions and limit opportunities for creative thinking.
- *Empathy*: teachers showed responsiveness and compliance towards digital devices in ECE.

Figure 1 shows the levels of acceptance in terms of involvement.

Thirdly it is suggested that ECE teachers’ attitudes reveal four cognitive dispositions towards digital devices as shown in the first column in Table 3.

Final thought

Assumptions about the nature of play-based pedagogy and the potential uses of digital devices have created tensions and confusion among teachers in ECE and have influenced their dispositions towards the integration of digital devices. Although teachers view the integration of digital devices as a potentially positive development of their practice, the dominant ideology is that play-based pedagogy leaves no space for digital devices to be included. Consequently their attitudes and aptitudes towards the use of digital devices have

produced dispositions where teachers at a functional, emotional and cognitive level have been oriented by tensions as to what extent they should respond favourably or unfavourably to the integration of digital devices in their practice. This has implications for research as there is a need to review and challenge the ideology of play-based pedagogy. Similarly, it has implications for pre- and in-service training of ECE teachers. Dispositions which cause teachers to see use of digital devices as static and controlling will not promote integration and acceptance. Instead, more research is needed on how and why children are using digital devices and the nature of these interactions.

Disclosure statement

No potential conflict of interest was reported by the author.

References

- Aldhafeeri, F. M., I. Palaiologou, and A. Folorunsho. 2016. "Integration of Digital Technologies in Play-based Pedagogy in Kuwaiti Early Childhood Education: Teachers' Views, Attitudes and Attributes" *International Journal of Early Years Education* 8 (1): 3–18. doi:<http://dx.doi.org/10.1080/09669760.2016.1172477>
- Aldhafeeri, F. M., and Palaiologou, I. 2016. "Interactions with Digital Technologies of Children from 3 to 6 in Kuwaiti Homes." *Educational Futures*.
- Alliance for Childhood. 2004. *Tech Tonic: Towards Literacy of Technology*. College Park, MD: Alliance for Childhood.
- Aubrey, C., and S. Dahl. 2014. "The Confidence and Competence in Information and Communication Technologies of Practitioners, Parents and Young Children in the Early Years Foundation Stage." *Early Years* 34 (1): 94–108.
- Barrett, P. T., and P. Kline. 1982. *Factor Extraction: An Examination of Three Methods*. Person. Group Behuc.
- Beetham, H., and R. Sharpe. 2007. "An Introduction to Rethink Pedagogy for a Digital Age." In *Rethinking Pedagogy for a Digital Age: Designing and Delivering E-learning*, edited by H. Beetham and R. Sharpe, 1–10. Abindgton: Routledge.
- BERA ECE SIG. 2003. *Early Years Research: Pedagogy, Curriculum and Adult Roles, Training and Professionalism*. Accessed November 11, 2015. file:///C:/Users/loanna/AppData/Local/Microsoft/Windows/INetCache/IE/6GETA52E/beraeearlyyearsreview31may03.pdf
- Bergen, D. 2012. "Play, Technology Toy Affordances and Brain Development: Research Needs and Policy Issues." In *Play: A Polyphony of Research, Theories, and Issues*, edited by L. Cohen and S. Waite-Stupiansky, 164–173. Maryland: University Press of America.
- Bem, D. J. 1972. "Self Perception Theory." In *Advances in Experimental Social Psychology*, edited by L. Berkowitz, Vol 6, 2–67. New York, NY: Academic Press.
- Bittman, M., L. Rutherford, B. Brown, and L. Unsworth. 2011. "Digital Natives? New and Old Media and Children's Outcomes." *Australian Journal of Education* 55 (2): 161–175.
- Cattell, R. B. 1973. *Personality and Mood by Questionnaire*. London: Jossey-Bass.
- Chardon, S. 2015. *Young Children (0–8) and Digital Technologies: A Qualitative Study across Seven Countries*. Italy: Publications Office of the European Union.
- Cordes, C., and E. Miller. 2000. *Fool's Gold: A Critical Look at Computers in Childhood*. Alliance for Childhood. http://www.allianceforchildhood.net/projects/computers/computers_reports.htm.
- Dahlberg, G., and M. Bloch. 2006. "Is the Power to See and Visualise Always the Power to Control?" In *The Future is Not What It Appears to Be: Pedagogy, Genealogy and Political Epistemology*, edited by T. S. Popkewitz, K. Petterson, U. Ollson, and J. Kowalczyk, 39–50. Stockholm: HLS Forlag.
- Edwards, S. 2013. "Digital Play in the Early Years: A Contextual Response to the Problem of Integrating Technologies and Play-Based Pedagogies in the Early Childhood Curriculum." *European Early Childhood Education Research Journal* 21 (2): 199–212.

- European Early Childhood Education Research Association. 2014. *Ethical Code, the European Early Childhood Education Research Association Ethical Code (EECERA)*. Accessed April 29, 2015. www.eecera.org/ethical-code
- Falloon, G. 2013. "Young Students Using iPads: App Design and Content Influences on Their Learning Pathways." *Computers and Education* 68: 505–521.
- Fleer, M. 2011. "Technologically Constructed Childhoods: Moving beyond a Reproductive and Critical View of Curriculum Development." *Australasian Journal of Early Childhood* 36 (1): 16–24.
- Fleer, M. 2013a. "Digital Positioning for Inclusive Practice in Early Childhood: The Cultural Practices Surrounding Digital Tablets in Family Homes." *Computers in New Zealand Schools: Learning, Teaching, Technology* 25 (1–3): 56–76.
- Fleer, M. 2013b. *Theorising Play in the Early Years*. New York, NY: Cambridge University Press.
- Gonzalez, M. R., and C. L. Fryer. 2012. "From Our Classroom to Their Classroom: A Community Partnership Toward Quality Early Intervention Programming." *Pennsylvania Teacher Educator* 11: 1–10.
- Hatzigianni, M., and K. Margetts. 2012. "'I Am Very Good at Computers': Young Children's Computer Use and Their Computer Self-Esteem." *European Early Childhood Education Research Journal* 20: 3–20.
- Hedges, H., and J. Cullen. 2011. "Participatory Learning Theories: A Framework for Early Childhood Pedagogy." *Early Child Development and Care* 82 (7): 921–940.
- Hermans, R., J. Tondeur, J. van Braak, and M. Valcke. 2008. "The Impact of Primary School Teachers' Educational Beliefs on the Classroom Use of Computers." *Computers and Education* 51: 1499–1509.
- Holloway, D., L. Green, and S. Livingstone. 2013. *Zero to Eight: Young Children and Their Internet Use*. LSE, London: EU Kids Online. Accessed August 1, 2015. <http://eprints.lse.ac.uk/52630/>
- Howard, J., G. Miles, and L. Rees-Davies. 2012. "Computer Use within a Play-Based Early Years Curriculum." *International Journal of Early Years Education* 20 (2): 175–189.
- Inan, F. A., and D. L. Lowther. 2010. "Factors Affecting Technology Integration in K-12 Classrooms: A Path Model." *Educational Technology Research and Development* 58: 137–154.
- Jowett, E. L., D. W. Moore, and A. Anderson. 2012. "Using an iPad-based Video Modelling Package to Teach Numeracy Skills to a Child with an Autism Spectrum Disorder." *Developmental Neurorehabilitation* 15 (4): 304–312. doi:<http://dx.doi.org/10.3109/17518423.2012.682168>.
- Kabali, H. K., M. Matilde Irigoyen, R. Nunez-Davis, J. G. Budacki, S. H. Mohanty, K. P. Leister, and R. L. Bonner Jr. 2015. "Exposure and Use of Mobile Media Devices by Young Children." *Pediatrics* 136 (6): 1044–1050.
- Kalas, I. 2010. *Recognizing the Potential of ICT in Early Childhood Education*. Moscow: UNESCO Institute for Information Technologies in Education.
- Katz, D. 1960. "The Functional Approach to the Study of Attitudes." *Public Opinion Quarterly* 24: 163–204.
- Kerckaert, S., S. R. Ruben Vanderlinde, and J. van Braak. 2015. "The Role of ICT in Early Childhood Education: Scale Development and Research on ICT Use and Influencing Factors." *European Early Childhood Education Research Journal* 23 (2): 183–199. doi:<http://dx.doi.org/10.1080/1350293X.2015.1016804>.
- Kirkorian, H. L., T. A. Pempek, L. A. Murphy, M. E. Schmidt, and D. R. Anderson. 2009. "The Impact of Background Television on Parent-Child Interaction." *Child Development* 80 (5): 1350–1359.
- Levin, T., and R. Wadmany. 2008. "Teachers' Views on Factors Affecting Effective Integration of Information Technology in the Classroom: Developmental Scenery." *Jl of Technology and Techer Education* 16 (2): 233–263.
- Lindahl, M.-G., and A.-M. Folkesson. 2012a. "ICT in Preschool: Friend or Foe? The Significance of Norms in a Changing Practice." *International Journal of Early Years Education* 20 (4): 422–436.
- Lindahl, M.-G., and A.-M. Folkesson. 2012b. "Can We Let Computers Change Practice? Educators' Interpretations of Preschool Tradition." *Computers in Human Behavior* 28 (5): 1728–1737.
- Livingstone, S., G. Mascheroni, M. Dreier, S. Chaudron, and K. Lagae. 2015. *How Parents of Young Children Manage Digital Devices at Home: The Role of Income, Education and Parental Style*. London: EU Kids Online, LSE.
- Marsh, J. 2010. "Young Children's Play in Online Virtual Worlds." *Journal of Early Childhood Research* 8: 23–39.
- Marsh, J. 2012. "Purposes for Literacy in Children's use of the Online Virtual World 'Club Penguin'." *Journal of Research in Reading*. doi:<http://dx.doi.org/10.1111/j.1467-9817.2012.01530.x>.

- Marsh, J., and J. C. Bishop. 2014. *Changing Play: Play, Media and the Commercial Culture from 1950s to the Present Day*. Maidenhead: Open University Press.
- Marsh, J., G. Brooks, J. Hughes, L. Ritchie, S. Roberts, and K. Wright. 2005. *Digital Beginnings: Young Children's Use of Popular Culture, Media*. University of Sheffield: Literacy Research Centre.
- Melhuish, K., and G. Falloon. 2010. "Looking to the Future: M-Learning with the iPad." *Computers in New Zealand Schools: Learning, Leading, Technology* 22 (30): 1–15.
- Mills, S. C., and R. C. Tincher. 2003. "Be the Technology." *Journal of Research on Technology in Education* 35 (3): 382–401.
- Morgan, A. 2010. "Interactive Whiteboards, Interactivity and Play in the Classroom with Children Aged Three to Seven Years." *European Early Childhood Education Research Journal* 18: 93–104.
- Moyles, J., S. Adams, and A. Musgrove. 2002. *SPEEL Study of Pedagogical Effectiveness. Research Report* 363. London: Department for Education and Skills.
- Nash, L. 2012. "Exploring iPads in Learning." *Learning and Teaching* 31: 7–13.
- Nikolopoulou, K., and V. Gialamas. 2015a. "ICT and Play in Preschool: Early Childhood Teachers' Beliefs and Confidence." *International Journal of Early Years Education* 23 (4): 409–425. doi:<http://dx.doi.org/10.1080/09669760.2015.1078727>.
- Nikolopoulou, K., and V. Gialamas. 2015b. "Barriers to the Integration of Computers in Early Childhood Settings: Teachers' Perceptions." *Education and Information Technologies* 20 (2): 285–301.
- Ólafsson, K., Livingstone, S., and Haddon, L. 2014. *Children's Use of Online Technologies in Europe: A Review of the European Evidence Base*. LSE, London: EU Kids Online. Second edition. Accessed November 25, 2015. www.lse.ac.uk/media@lse/research/EUKidsOnline/EU%20Kids%20III/Reports/D2.2RevisedEvidenceReview_sept2014.pdf
- Palaiologou, I. 2014. "Children under Five and Digital Technologies: Implication for Early Years Pedagogy." *The European Early Childhood Research Journal* 24 (1) (printed copy publication 2016). doi:<http://dx.doi.org/10.1080/1350293X.2014.929876>.
- Palaiologou, I. 2016. "Children Under Five and Digital Technologies: Implication for Early Years Pedagogy." *The European Early Childhood Research Journal* 24 (1): 5–24. doi:<http://dx.doi.org/10.1080/1350293X.2014.929876>
- Palmer, S. 2006. *Toxic Childhood: How the Modern World is Damaging Our Children and What We Can Do about It*. London: Orion Books.
- Palmer, S. 2008. *Detoxing Childhood: What Parents Need to Know to Raise Happy, Successful Children: What Parents Need to Know to Raise Bright, Balanced Children*. London: Orion Books.
- Parette, H., and C. Blum. 2013. *Instructional Technology in Early Childhood: Teaching in the Digital Age*. Baltimore, MD: Brookes.
- Plowman, L. 2015. "Researching Young Children's Everyday uses of Technology in the Family Home." *Open access in Interacting with Computers* 27 (1): 36–46.
- Plowman, L., and J. McPake. 2013. "Seven Myths about Young Children and Technology." *Childhood Education* 89 (1): 27–33.
- Plowman, L., and C. Stephen. 2005. "Children, Play, and Computers in Pre-School Education." *British Journal of Educational Technology* 36: 145–157.
- Plowman, L., J. McPake, and C. Stephen. 2008. "Just Picking It up? Young Children Learning with Technology at Home." *Cambridge Journal of Education* 38 (3): 303–319.
- Radesky J. S., C. J. Kistin, B. Zuckerman, K. Nitzberg, J. Gross, M. Kaplan-Sanoff, M. Augustyn, and M. Silverstein. 2014. "Patterns of Mobile Device Use by Caregivers and Children during Meals in Fast Food Restaurants." *Pediatrics* 133 (4). www.pediatrics.org/cgi/content/full/133/4/e843
- Radesky J. S., C. Kistin, S. Eisenberg, B. Zuckerman, and M. Silverstein. 2015. *Parent Views about Mobile Device use around and by Young Children: Implications for Anticipatory Guidance*. Abstract presented at the Pediatric Academic Societies, San Diego, CA. Accessed Feb 4, 2016. www.abstracts2view.com/pas/view.php?nu=PAS15L1_2195.2
- Rideout, V., U. G. Foehr, and D. Roberts. 2010. *Generation M2: Media in the Lives of 8- to 18-Year-Olds*. Menlo Park, CA: Henry J. Kaiser Family Foundation.
- Roseberry, S., K. Hirsh-Pasek, and R. M. Golinkoff. 2014. "Skype Me! Socially Contingent Interactions Help Toddlers Learn Language." *Child Development* 85 (3): 956–970.

- Sang, G., M. Valcke, J. van Braak, and J. Tondeur. 2010. "Student Teachers' Thinking Processes and ICT Integration: Predictors of Prospective Teaching Behaviors with Educational Technology." *Computers & Education* 54: 103–112.
- Schachter, S. 1964. "The Interaction of Cognitive and Psychological Determinants of Emotional State." In *Advances in Experimental Social Psychology*, edited by L. Berkowitz, Vol 1, 49–80. New York, NY: Academic Press.
- Sewlyn, N. 2011. *Schools and Schooling in Digital Age*. Abington: Routledge.
- Smerdon, B., S. Cronen, L. Lanahan, J. Anderson, N. Iannotti, and J. Angeles. 2000. *Teachers' Tools for the 21st Century: A Report on Teachers' Use of Technology (NCES 2000–102)*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Stahlberg, D. and D. Frey. 1988. "Attitudes, 1: Structure, Measurement and Functions." In *Introduction to Social Psychology*, edited by H. Hewstone, W. Stroebe, J. B. Cudol and G. M. Stephenson, 132–187. Oxford: Blackwell.
- Stephen, C. 2010. "Pedagogy: The Silent Partner in Early Years Learning." *Early Years* 30 (1): 15–28.
- Taguchi, L. H. 2010. *Going Beyond the Theory/Practice Divide in Early Childhood Education*. Abingdon: Routledge.
- Terreni, L. 2011. "Interactive Whiteboards, Art and Young Children." *Computers in New Zealand Schools: Learning, Teaching, Technology* 23 (1): 78–100.
- Teuwens, J. 2011. "Het gebruik van internet door preschoolers." [The Use of the Internet by Preschoolers.] Unpublished Master's dissertation. Brussels: Department of Educational Studies, Ghent University.
- Verenikina, I., and L. Kervin. 2011. "IPads, Digital Play and Pre-schoolers." *He Kupu* 2 (5): 4–19.
- Wartella, E. 2013. *Parenting in the Age of Digital Technology: A National Survey, Center on Media and Human Development, School of Communication*. California: Northwestern University.
- Weiner, B. 1986. *An Attributional Theory of Motivation and Emotion*. New York: Springer-Verlag.
- Wood, E. 2014. "Reconceptualising the Play-pedagogy Relationship." In *Sage Handbook of Play and Learning in Early Childhood*, edited by L. Brooker, M. Blaise, and S. Edwards, 145–156. London: Sage.
- Wood, E., J. Specht, T. Willoughby, and J. Mueller. 2008. "Integrating Computer Technology in Early Childhood Education Environments: Issues Raised by Early Childhood Educators." *The Alberia Journal of Educational Research* 54: 210–226.
- Yelland, N. J. 2011. "Knowledge Building with ICT in the Early Years of Schooling." *He Kupu*. 2 (5): 33–44.