Digital Literacy in Early Childhood Education: What can we learn from innovative practitioners?

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Abstract

We present the main findings of a case study focusing on the digital literacy practices of a Portuguese early childhood teacher known for her innovative pedagogical methods. Data was collected through an in-depth interview centred on the teacher's perceptions about her digital literacy practices and on the professional development underpinning such practices. The thematic content analysis of the data was based on core principles of early childhood pedagogy, multiliteracies and professional development theories. It revealed that, from this teacher's perspective, the application of digital literacy practices has both enhanced and challenged her pedagogy. Moreover, the analysis showed that her innovative practices combine functional professional learning with attitudinal dispositions such as professionalism, professional identity, resilience and commitment. Overall, our research highlights the importance of combining both functional and attitudinal dimensions in professional development initiatives aiming to enhance renewed integration of digital literacy practices in early childhood education.

Keywords: digital literacy practices, early childhood pedagogy, professional development, functional learning, attitudinal dispositions

Introduction

Digital literacy has become an inescapable feature of 21st century communication. It comprises the literacy events and social practices involved in the use of digital technologies in which meanings are made and shared in different modes and formats (Hague and Payton 2010; Sefton-Green, Marsh, Erstad and Flewitt 2016).

Digital literacy is now globally recognised as a key factor in defining curricula, having "moved from the periphery of the curriculum, as part of media education programs and skills in programming software for computers, to the core of the skills agenda addressing twenty-first century challenges" (Erstad and Voogt 2018, 27). This is evident in the recent definition of *Key Competences for lifelong learning* (Council of the European Union 2018), in which 'digital competence' appears among the basic skills *to be learned*, further assuming underlining its instrumental role in *learning* across all twenty-first century competences (Erstad and Voogt 2018). Member states are also challenged to intentionally promote "a variety of learning approaches and environments, including the adequate use of digital technologies, in education, training and learning settings" as instances of "good practices to support the development of the key competences" (Council of the European Union 2018).

Nevertheless, enacting digital literacy has proven to be very challenging for teachers (Erstad and Voogt 2018). In several countries, national policies have been slow to provide clear and specific guidelines (Trültzsch-Wijnen et al. 2019). Yet what appears to be putting the most pressure on teachers in their daily practice is rapid societal change. This is clearly the case among early childhood educators.

In effect, while highlighting the possibilities and potential of promoting digital literacy practices among young children by integrating them in early childhood settings (KontovourkI and Tafa 2019; Lotherington 2019; Wood et al 2019), research has also revealed that the funds of knowledge (Moll et al. 1992) that children construct *vis-a-vis* home digital practices do not often enter early childhood education classrooms (Marsh 2013; Chaudron, Di Gioia and Gemo 2018). Research also suggests that digital practices are frequently applied as an add-on or supplement to classroom practice (Plowman and Stephen 2003) or for its own sake, which "does not take advantage of the potential for IT to contribute to student involvement and deep learning" (van Scoter 2008, 158). Children's digital practices therefore seem to be in advance of many teachers' adaptation

of pedagogical approaches to incorporate digital media. Indeed, children's digital activities are not always valued as having the potential to advance expected competences or connect with curriculum content (Aubrey and Dahl 2015; Edwards 2016; Howard et al. 2012; Marsh, Kontovourki, Tafa, and Salomaa, 2017; Palaiologou 2016). This clearly indicates that early childhood teachers need professional development that supports them in the construction of strong educational responses to the challenges posed by their children's digital practices (European Comission, 2012; Council of European Union 2018; UNESCO 2014).

Our paper thus focuses on this critical issue, aiming to contribute towards understanding what might be involved in the design of professional learning processes that enable early childhood teachers to successfully adopt digital literacy practices. We base our argument on a case study focusing on the digital literacy practices of an early childhood teacher known for her innovative pedagogical methods concerning digital literacy practices in Portugal. The study stems from the following research question: *What can we learn from innovative practitioners about applying digital practices in early childhood?* In the first section, we discuss the theoretical basis for our research. We then introduce our case, specifying the underlying sub-questions, and explaining how data was collected via in-depth interview and interpreted using thematic content analysis. The key findings are then presented, demonstrating pedagogical possibilities and highlighting the demands posed on early years teachers by the factors evidently supporting the application of innovative digital literacy practices. We conclude by tentatively answering our leading research question, while identifying limitations as well as paths for future research.

Theoretical framework

Three major fields of research have framed our empirical inquiry, namely early childhood pedagogy, multiliteracies, and professional development.

Principles of early childhood pedagogy

Early childhood education is concerned with maximising human potential in a broad sense, focusing on helping children develop the strategies, dispositions and skills for

lifelong learning. Two major sets of principles underpinning early childhood pedagogy (one concerning children, and the other, their teachers) are relevant to our study.

One set of principles concerns conceptions about *children as learners*, emphasizing action, emotion and communication. In effect, one of its key tenets is the assumption of children as active learners (Dewey 1998; Piaget 1972; Vygotsky 1978). The constructivist understanding of children as curious, competent, and capable of complex thinking from their experiential situations shapes current early childhood pedagogy (Malaguzzi 1998). Agency is a key concept here, considering children to be agents and contributors who negotiate meaning (Forman and Fyfe 1998) and learn ways of being interdependent as members of different social groups (Fleer 2010; Oliveira-Formosinho 2007; Edwards 2005). Play is considered children's natural way of enacting their agency and constructing their learning (Van Oers 2014). Another key tenet of current early childhood pedagogy is the assumption that children's well-being and involvement are essential for deep learning (Laevers 2000). A final core principle concerns communication, in particular the concept of the hundred languages (Malaguzzi 1998; Vecchi 2010) with which children represent their thinking and learning in different media.

Another set of principles underpinning early childhood pedagogy involve *teachers' roles*, in particular intentionality and relational agency. Early childhood teachers are expected to design practice contexts in which children can actively, freely and joyfully explore and represent ideas, interact with others in play and (re)construct their theories. This demands close observation and documentation of children's learning to plan effective practice content. Educational intentionality which involves teachers being deliberate, thoughtful and reflective in their decisions and actions (Epstein 2007), has been identified as essential in assigning meaning to pedagogical action and in ensuring a balance between teacher and child-initiated learning (Cherrington 2018). The 'project approach' (Katz and Chard 1992; Helm & Katz, 2010), which is an inquiry-driven process focusing on subject matter that drives children's curiosity, has gained prominence as a specific pedagogical strategy enabling educators to guide children's learning and development. Additionally, teachers are also expected to scaffold children, challenging them to extend their thinking in contingent ways and building positive and trustful relationships with them (Bruner 1986). Laevers (2000) suggests that the way educators interact with children when encouraging involvement and deep-level learning can be more important than

experiences or materials, an idea that is perhaps best captured by Edwards (2005, 169-170)'s concept of *relational agency*, defined as "a capacity to align one's thought and actions with those of others in order to interpret problems of practice and to respond to those interpretations".

Multiliteracies

'Multiliteracies' has (partially) arisen to designate the digital literacy practices underpinning social complexity in 21st century knowledge society (New London Group 1996; Cope & Kalantzis, 2009; Pahl and Rowsell 2012; Rowsell et al. 2013; Mills 2016; authors, 2019). Multiliteracies emerged as a manifesto for a new literacy pedagogy, developed on the basis that "[t]he world was changing, the communications environment was changing, and (…) literacy teaching and learning would have to change as well" (Cope and Kalantzis, 2009, 165). A major characteristic underpinning multiliteracies is the clear-cut semiotic understanding of meaning making (Kress 1997; 2010), which focuses on multimodal resources for contemporary digital meaning making; another, is the assumption that new education for new practices, modes and media of meaning making is to be achieved through enacting a set of key learning processes, namely situated practice, explicit teaching, critical framing and transformed practice, involving learning by doing and by thinking.

While not initially developed with early childhood education in mind, Multiliteracies has opened the way to conceptualising literacies in early childhood pedagogy as essentially multimodal, thus reaffirming the idea of children's hundred languages (Malaguzzi 1998), and enabling digital forms of communication to be applied in early childhood education (Yelland *et al.* 2008; Yelland 2011; Flewitt 2013; Lotherington 2017). Moreover, the notion of situated practice acknowledges the importance of developing digital practices situated in children's funds of knowledge (Moll et. al 1992), including those involving the use of computers, tablets or smartphones to communicate and make multimodal meanings long before entering school (Rowsell et al. 2013).

Professional development

According to Day (1999,4), professional development is

> the process by which, alone or with others, teachers review, renew and extend
> their commitment as change agents to the moral purposes of teaching; and by

> which they acquire and develop critically the knowledge, skills, planning and practice with children, young people and colleagues.

Day thus considers teachers' core growth needs to be "their sense of moral purpose, professionalism, professional identity, commitment and capacities for resilience" (Day 2017, 173). For him professionalism is fundamentally linked to the specific knowledge base for teaching (Shulman 1987) and to the disposition to look for it as well as the assertion of professional responsibility and competence in the classroom. As such, professionalism is concerned with what teachers know and do well. Professional identity involves the teacher's self, specifically with a strong sense of self-efficacy, "the enduring belief that [she] can make a difference in students' learning (…) by pursuing the goals that [she values], taking account of, but not being dictated to, by circumstance" (Day 2017,36). Professional identity thus involves teachers' self-perception as professionals. Commitment means

> a strong sense and enduring desire in teachers to make a positive difference to the motivation to learn, academic progress and the personal and social well-being of all pupils, whatever the circumstances, in the belief that this will, in the longer term, also contribute to the 'good' of society (Day 2017, 47).

As such, commitment relates to the reasons and aims of their action, while resilient teachers are those who "restore the balance between demands and capabilities not only by coping with the challenges, but also by managing the challenges actively and proactively, thus overcoming them and moving forward" (Day 2017,66). Resilience is therefore concerned with how teachers proceed to achieve their goals.

Day considers that effective professional development combines a focus on functional and attitudinal learning. Functional learning, which is clearly related to professionalism, concerns the upgrading of pedagogical content knowledge (cf. Shulman 1986), whereas attitudinal learning concerns "a focus on building, revisiting and renewing teachers' commitment, positive sense of professional identity, and capacities for emotional resilience" (86), a focus that Day thinks "needs to form a core part of all PLD planning" (86). However, he subscribes to the core role played by the attitudinal dimension of professional learning by stating that it is a critical factor in teacher's professional

transformation. Day further considers leadership and trust to play a fundamental role in enacting effective PD initiatives.

The study

Our research aimed to answer the following question: *What can we learn from an innovative practitioner about applying digital practices in early childhood*? We conducted an intrinsic case study (Stake 1995; 2000) of an early years teacher known for her pedagogical innovation in digital literacy in Portugal. Holding an MA and a PhD in educational technology, she has over 20 years of teaching experience working with 3- to 5-year-old children. We first heard of her work when she became an MA student in ICT at the teacher training institution where two of the authors work. The impression given of her from colleagues' accounts was of an avant-garde practitioner, actively anticipating the above-mentioned challenge launched by the Council of the European Union (2018) regarding application of digital literacy practices. We therefore considered that she might be a relevant source of data for our purposes.

We subdivided our leading question into two sub-questions, focusing on what she thinks about her practices and professional development:

a. What are the views of this innovative practitioner regarding the application of digital literacy practices?

b. What are the views of this innovative practitioner regarding the professional development path underpinning her current digital practices?

Data was collected through a semi-structured in-depth interview, divided into two main topics, namely i) children's educative experiences building on and using digital skills and engaging in multimodal communication; ii) the teacher's beliefs, motivations and knowledge concerning her digital literacy practices and their impact on children's learning.

Ethical approval was secured before the study commenced. The interviewed teacher was informed that her responses would be confidential and would remain anonymous, and then fully debriefed and thanked for her time. The teacher's participation was voluntary and involved no reward. She received the manuscript for her approval before it was submitted.

After transcribing the interview, we inductively identified content categories and later aggregated them into themes, allowing us to develop an interpretative analysis based on the presented theoretical framework (Bardin 2016; Miles and Huberman 1994; Stake 2000).

Most significant findings

Analysis enabled us to identify two major themes. The first concerns *the potentialities and challenges of digital literacy practices for the enactment of early years pedagogy*, arising in response to our first sub-question; The second refers to *the complexity of the professional development underpinning the teacher's innovative practice*. Together with the first theme, we found the latter to be relevant in response to the second research question, focusing on the *professional development path underpinning the teacher's current digital practices*.

1. *Potentialities and challenges of digital literacy practices for the enactment of early years pedagogy*

Regarding this theme*,* two distinct – though related – categories arose from our analysis. One, clearly more pervasive throughout the interview, captures the teacher's view that *digital practices support the enactment of the core tenets of early years pedagogy*, whereas the other highlights *the challenges posed by applying such practices with regard to the teacher's roles.* On the whole, both themes show that digital literacy practices reassure and expand the fundamental tenets supporting early childhood education. Our somewhat extensive data analysis evidences the teacher's practical innovativeness.

1.1 Digital practices supporting the enactment of the core tenets of early years pedagogy.

Teachers' intentionality and project work

The enactment of digital literacy practices is not an add-on to the teacher's pedagogy. She stated that "digital technology offers many possibilities to enrich any given activity or

make it even more consistent", adding that "children can freely explore digital devices, especially for games, and they also use them in intentional activities".

In fact, her conscious design and application of digital literacy practices is intended as a means to provide the learning contexts that best *situate* the construction of the expected curricular learning, and not as a way of promoting technology *per se*: "When I use technology, I guide its use to more pedagogical work in order to benefit from the advantages of the tools. When I plan, I first think about the content and the methodology". The instrumental use of digital practices in the intentional promotion of children's learning was well evidenced in the teacher's references to project work, when she referred to the thinking involved in children's planning of a podcast through which they shared the results of their inquiry about the river in their village: "Children had to think about what they would say: *What are we going to say and how are we going to say it?* They structured their thinking this way so that the message could be recorded".

However, she also integrates digital literacy practices into her teaching to construct a powerful contingent pedagogy:

> [Though I usually plan what I do] an unexpected situation that involves the use of technology may arise, and, at that moment, a certain tool may come directly to mind that I think is advantageous to work with… and I use it. For example, once a girl's tooth fell out, and then someone mentioned that a little light lights up in each country when a child's tooth falls out. At that moment, I asked myself *How could we visualise this idea that there's a little light in each country?* They already knew Google Earth, so we ended up using it for them to realize how many countries there are, to know the notion of country, ocean, border. (…) This tool [Google Earth] came up in a perfectly natural way.

Digital practices supporting children's agency, involvement and multimodal communication and learning

Repeated instances illustrated the teacher's application of digital literacy practices to support the development of children's agency, involvement and multimodal communication:

> Children *uncomplicate* things and quickly take action. They try *et voilà*! They are intuitive, they connect very naturally with machines! They make mistakes, try again and this is how you build up expertise in this logic of the new world! And they even find out things that don't appear in the game's instructions! And it is in this interactivity, in this exploration, which gives them pleasure while playing, that communication, knowledge and learning takes place.

She clearly considers that children's agency is facilitated by the interactivity, intuitiveness and convergent affordances of tablets. In the next excerpt, she refers to the app *Bookcreator*:

> With tablets, children can film, they can file images and the tool allows them to select some and incorporate them all in their productions. These apps are already prepared so that children know that *On that slide I will put the movie*; *On the other slide I can record my voice* ... They know that there is the play icon and the pause icon, they immediately identify them. [...] That's all sequential. They can then incorporate everything and create the final output. Their own narrative.

She holds a positive opinion about the advantages of using tablets in project work ("when using tablets, children are autonomous. They do everything ... they begin with planning, research and editing") and in expanding the physical space for inquiry ("because of its size and portability, we can do fieldwork, go outside, paint, shoot and film with the tablet"). Additionally, she mentions that tablets offer the possibility of developing "collaborative working. The fact that one tablet is for two is advantageous for the sake of sharing; they learn to share and to wait".

This teacher is not only well aware of digital affordances and apps but, crucially, is also sensitive to children's funds of knowledge and interests regarding digital technology, affirming that she integrates them into her practice. Moreover, in these excerpts the teacher shows herself to be fully aware of the multimodal nature of children's digital meaning making processes and of how multimodality is beneficial for children's communication and learning: "Sound, movement, colours, multimodality … all that helps them to understand". In this and in many other instances, she clearly perceives such digitally-mediated, active multimodal meaning making practices also to be emotionally

involving for children. For example, she reported the case of a boy who was very inhibited about (analogical) recounting but whose attitude changed

> when we started doing the digital storytelling training because he knew we were going to record and because his voice was about to appear. He gradually began to free himself as he recorded himself. This was an incentive for him to be able to participate.

1.2. Digital practices challenging the teacher's roles

The teacher twice mentioned instances of two new challenges to her role posed by applying digital literacy practices. On one occasion she claims that

> the use of these tools doesn't change anything from the child's point of view. It doesn't imply changes in the educational routine, doesn't change the organization of groups… What changes is the *planning* and my *mediation*, which have become more demanding to me. (emphasis added)

From her experience, this teacher has recognised that applying digital literacy practices poses two challenges, one concerning the intentionality of her work and the other, the enactment of relational agency. Despite reporting a 'natural' ability to integrate the use of digital technology to construct pedagogy on the spot, the teacher said that she spends hours planning her digital literacy practices, acknowledging that it has transformed her pedagogy. Additionally, she greatly emphasised the new demands that she now faces in managing her children's concentration and deep thinking, which she clearly also attributes to the interactivity afforded by digital devices:

> the digital rhythm is much faster, because everything invites you to click again and then once more because everything is moving. Children's natural tendency is to click and move forward, to find out if there's something else they want to see further on. It's more demanding for me to manage children's attention.

2. The complexity of the professional development underpinning the teacher's innovative practice

The analysis has revealed that the teacher was able to enact these innovative possibilities in consequence of a complex form of professional development interweaving functional and attitudinal dimensions.

2.1 Robust professionalism

The analysis allowed us to acknowledge the teacher's professionalism and to relate this attitude to her application of innovative digital practices. In effect, we take the former findings as indicating the richness of this teacher's specific knowledge base for teaching as well as her professional responsibility and competence in the classroom. The teacher asserted that "All the tools are integrated in my head", suggesting that this allows her to truly connect a vast knowledge of technology with a deep understanding of the tenets underpinning early childhood pedagogy. The interview allowed us to understand that knowledge built to apply in the autonomous and responsible application of innovative digital literacy practices results from a self-directed disposition to look for it:

> I've always been curious about technologies. The desire to innovate is attested by my desire to know. I've always looked for more [beyond the curricular guidelines]. I look for bibliographies, systematic reviews, best articles, best practices, OECD documents. When I hear about a positive experience, I try to find out more. I've often happened to discover new relevant books when attending a conference.

We have also learned that this intellectual curiosity was the major driving force in her decision to take up and complete her MA and PhD. She shows clear confidence in the role of her knowledge in the construction of her digital practice and is deeply committed to its continuous construction.

2.2. A strong professional identity, a committed teacher and resilient individual

The analysis of data has further revealed that the construction of such pedagogical knowledge and active professionalism regarding digital practices is closely related to the teacher's very positive and stable professional identity:

> Many people look at me as if I were the woman of technology and tools. But I keep saying I don't collect tools. I don't chase after what is new. Some tools I use come from my past; they're quite old now. People now tend to think they need to

> know the newest tools… I don't think like that. I think of tools that have been effective in the past and have had an impact on children and that I can actually use in a given context. All those tools are now integrated into my head.

She is therefore very self-confident, having been reassured by her own effective practical experience regarding digital literacy practices. Her professional identity has been clearly reinforced by her practices. This became particularly evident when she talked about initiatives that the school community developed to include a group of Roma students and the role played by her own digital learning context, which motivated them to make up all kinds of excuses to be placed in her room:

> Since there was technology in my room and not in the other, those children misbehaved or said they had a bellyache or simply ran from their classroom into mine because they knew they could use the tablets and the computers.

She added that these children were captivated by her because they saw her

> as a different person, as the teacher who has computers, who has tablets, who has mobile phones; they saw me as the teacher who had what they really wanted, which was technology. When I arrived at school, they all came to hug me. Their affection was very evident.

She trusts herself and is optimistic about her own capacities and practices, which are also acknowledged by students, the community beyond the school, including families, parents' associations and local agents as well as the university staff, who, for instance, have "invited me to give other teachers a presentation about using Scratch".

The data has also allowed us to relate her enthusiasm for digital innovation to her professional commitment, revealing her assumptions about the ethical dimension of her work – and not her commitment to technology per se: "I have always wanted to innovate practice through the use of technology". Yet, her emotional and intellectual commitment also appears to be the answer to her deep knowledge of her children and their interests and funds of knowledge:

> The various digital supports, whether tablets or computers, are present in children's daily lives (…) children are like fish in the technological waters. We are captivated by children; they are full of cultural baggage, and yearnings, and

> we have to respond to their expectations. (…) An in-depth knowledge of students and families in this context is necessary so that the educational project is designed according to its actors.

The teacher therefore acknowledges the need to innovate practice by using digital technology and her willingness to make a difference in the children's educative experiences through such innovation. She is a deeply committed professional.

Last but not least, this teacher's resilience was a theme that frequently came up when explaining how she edified her innovative digital practices. Such "strong and enduring emotional and intellectual energy" seems indeed to have been "the fuel" (Day, 2017: 80) that has sustained the teacher's commitment, professionalism, and, ultimately, her positive identity over the years when it comes to innovative digital practices. This was evidenced when she talked about her efforts to bring technology into her practices, as a reaction to the Ministry of Education's lack of investment:

> In 1993 there was no technology in my classroom. So, what did I do? I knew that *Sonae* [Portuguese corporation] simply discarded old computers … I went there and asked for some and brought them to my classroom. But that's me; I autonomously made that investment.

Her agency was also clear when she took her "own tablets and cameras to school", "asked for local community support to install the Internet", "requested parents' association help in buying tablets" or families directly for their collaboration so she could overcome challenges and construct her practice.

In the case of this teacher, resilience and commitment stand up as strong determining factors in her pedagogical innovation. She is aware that her agency and proactivity is not the norm among all early childhood teachers, as they seem resigned to the lack of conditions. By comparing herself to other teachers, the contrast that she identifies ends up enhancing her own professional identity: "Many teachers complain about this [lack of media]. They attend professional development courses but then do nothing because they lack conditions. Of course, one needs good will to overcome this and try to find solutions". This was clearly her case.

Discussion

As mentioned in this paper's introduction, there is a common conception that current early years education rarely meets the expected digitalization of pedagogical experience, early year teachers failing to understand how to bridge curriculum content with the development of literacy practices (Aubrey and Dahl 2015; Edwards 2016; Howard et al 2012, Palaiologou 2016, Marsh et al. 2016; Formby, 2014; Keengwe & Onchwari, 2009). Therefore, appeals have been made for urgent professional development for early years teachers:

> early childhood educators require more professional development and support to enact developmentally-appropriate and intentional uses of technology in the classroom. There is also a strong need for more professional development and support specifically aligned to helping educators use technology for student centered practices and across the curricula in new and innovate ways. With continued increased access to newer devices, it is essential that training and professional programs be aligned to meet the needs of educators and support them in not only understanding how to use technology, but in how to effectively integrate it into the classroom and create quality technology-supported learning environments for all children. (NAEYC 2015, 13)

Our findings provide a valuable contribution towards understanding what might be involved in the design of professional learning curricula to enable early childhood teachers to successfully apply the requested innovative digital literacy practices (Marsh, Kontovourki, Tafa and Salomaa, 2017).

Through the teacher's voice, we have learned that innovative digital literacy practices enhance the essential tenets underpinning early childhood pedagogy. This innovative teacher used digital literacy practices to intentionally support children's active learning, emotional involvement and multimodal communication, making digital practices "an extension of educators' existing proficiency (…), rather than being a new and peripheral area of teachers' expertise" (Mertala 2017). Yet she also revealed the existence of new demands in the orchestration of such new practices, namely in planning and relational agency. Our findings therefore suggest the importance, when designing appropriate professional learning initiatives, of specifically scaffolding teachers to learn how to appreciate digital literacy practices with close reference to the pedagogical framework for

early years education. This equates, we think, with what Day (2017) has called functional learning. Yet our study has shown that this functional learning might not be enough to help early years teachers to transform their practice.

In effect, our researched 'best practices' suggest that required functional learning needs to be sustained by a set of strong attitudes. Our inquiry showed that functional learning and innovation were related to a sense of professionalism, strong professional identity, commitment and resilience. The unequivocal personal, though not necessarily individualistic, nature of those factors underlying professional growth was suggested when the teacher preferred not to answer when asked about the support of institutional leaders in her innovative practices.

Though suggesting that this teacher might have acted without specific support of "strong institutional leadership and trust" (Day 2017) regarding application of digital literacy practices, our results support Day's (2017) idea that no functional development may occur if the attitudinal dimensions of teachers' learning, which fuel functional learning and action, are not nurtured as well. Our results also agree with studies pointing to the general role of teachers' knowledge and attitudes in enacting the necessary professional development for digitalizing pedagogy (McDougall, Türkoglu and Kanizaj 2017). This is, for instance, the case of Katz (2018), who states:

> Research over the years has clearly indicated that teachers characterized by the positive teacher change, teacher knowledge, and pedagogical beliefs about IT use in the classroom as well teachers and students typified by affective constructs such as creativity, flexibility, motivation, and self-efficacy (that includes technological self-confidence) have a special ability to maximize the use of IT in their teaching in their quest to enhance student learning and all-round performance. (304)

Our findings are also in line with Ottenbreit-Leftwich, Kopcha, & Ertmer (2018), who extensively discuss self-efficacy, attitudes (towards the benefit of using ICT), pedagogical beliefs and openness to change as the four major dispositions associated with teachers' use of ICT. Unlike these studies, however, the specificity of ours lies in its focus on early years teachers and in our argument that teachers' attitudes should be promoted in professional initiatives aiming to support these teachers' digital pedagogical innovation.

Conclusions

Our research has focused on how to conceive professional development for applying digital literacy practices in early childhood education. We argue that early childhood educators should be supported in applying digital literacy practices currently demanded from them through professional learning initiatives that help them both understand that such practices may (i) support the essential tenets underpinning early years pedagogy (ii) nurture commitment to the ethical purposes of the profession, facilitating their understanding that digital literacies are among the skills demanded by the digital society, and their development clearly implies responding to the funds of knowledge developed by children. Our findings also suggest that teachers should be further supported in strengthening their professional identity through applying digital literacy practices as well as their resilience to overcome difficulties posed by enacting their renewed ethical compromises.

While our paper aims to highlight the apparent importance of these aspects of teachers' learning, the question of how to promote them emerges as an area for future research. Driven to know more about the *uniqueness of our case*, we nevertheless acknowledge how the non-generalizable nature of our findings affords a limited perspective. We believe, however, that national and international research into outstanding practices is vital to overcome the undeniable limitations involved in researching one practitioner's views and build the necessary knowledge. Ethnographic descriptions of innovative practices and action research would certainly be important ways of extending such research (Plumb and Kautz, 2015, apud Marsh, Kontovourki, Tafa and Salomaa, 2017). A further critical issue would then be to assure the transferability of findings from studying what appear to be *atypical* practitioners.

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