Developing Digital Literacy in Early Years Settings: Professional Development Needs for Practitioners

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Introduction

Technological developments over the last 30 years have led to significant changes in young children’s communicative practices. Traditional literacy practices are still prevalent, but now children have access to multiple modes and media in order to convey their messages. In this multimedia world, they read on-screen and communicate with both known and unknown others in online environments. These developments have important implications for the early years curriculum, not only on literacy but also in other learning areas as mathematics (Papadakis, Kalogiannakis & Zaranis, 2016). There is a need to develop children’s skills and knowledge so that they can operate effectively, being able to create and express themselves within a digital environment.

There has been much debate in the early childhood education field with regard to the use of technology in the curriculum, but there is now general consensus that children need some access in order to become familiar with a range of hardware and software (NAEYC, 2012). Nevertheless, there is still a general lack of progress with regard to early years practitioners’ use of technology in the curriculum (Lui, 2016; Thorpe, Hansen, Danby et al., 2015). The reasons for this are complex, but relate to a number of barriers that are presented by technological, personal or other reasons. These barriers are discussed in the next section, before a review of issues relating to the Continuing Professional Development (CPD) needs of early years practitioners are outlined.
There have been few studies that have looked specifically at barriers in relation to digital literacy practice, therefore this review focuses on barriers to the use of technology in early childhood settings, given that this is a closely related topic. Ertmer (1999) identified the barriers to practitioners’ use of technology being of an extrinsic or intrinsic nature. Extrinsic, or first-order barriers, as Ertmer (1999) identifies them, include lack of resources, limited time, lack of technical support, or not having access to appropriate training, whilst intrinsic, second-order barriers are related to the beliefs and value-systems of individuals. Similar extrinsic and intrinsic barriers have been also identified by Blackwell, Lauricella, & Wartella (2014). Plumb and Kautz (2015) undertook a review of research on the barriers to the integration of information technology within early childhood education and care institutions. They drew on Nikolopoulou and Gialamas’s (2013:3) observation that there is no ‘single accepted classification of barriers’ and they, therefore, developed their own set of barriers based on a careful review of 19 articles. The barriers they identified are discussed separately below.

**Educator beliefs and attitudes:** These were one of the most frequently cited barriers in the papers reviewed by Plumb and Kautz (2015). Concerns have been expressed by early years educators about the perceived negative impact of children on learning and social skills (Li, 2006). Some feel that young children are too young to access technologies (Wood et al., 2008). Others draw on traditional theories of early childhood practice, which emphasise non-digital activities, including the need to focus on basic numeracy and literacy (Lindahl and Folkesson, 2012; McDougall,
Research has indicated previously that beliefs and attitudes are two of the strongest internal factors on teachers’ practice (Clandinin, 1986; Nespor, 1987; Pajares, 1992), and this is also the case in relation to their use of technology (Inan and Lowther, 2010). In addition, teachers’ own life-history experiences impact on their practice (Britzman, 1989; Grossman, 1990; Lortie, 1975). Friedrichs-Liesenkötter (2011-2012) theorises the persistence of teachers' beliefs and attitudes through the notion of habitus and uses it to explain that even young future educators with extensive experience with digital media in their daily lives share the same negative attitudes of practising teachers towards the use of digital media in early childhood educational settings. Given that some practitioners may well have had little experience of meaningful use of technology in their own schooling, this could impact on their beliefs and attitudes. Early childhood teacher education programmes can play a crucial role in formulating student teachers’ views and intentions and also in providing pedagogical learning experiences so that future teachers will be able to judge when it is appropriate to integrate ICT in their classes and how (Nikolopoulou & Gialamas, 2009). Teachers can also be encouraged to pedagogically experiment and explore digital practices together with children, with all participants being involved in the process of teaching and learning (Lafton, 2012).

**Lack of knowledge and skills:** Plumb and Kautz (2015) identify that many of the studies they reviewed outlined early years practitioners’ lack of IT knowledge and related skills as being a key barrier to enhancing practice (e.g. Ihmeideh, 2010; Plowman and Stephen, 2005). Mishra and Koehler (2006), drawing on Lee Shulman’s work on Pedagogical Content Knowledge (the knowledge required to teach a particular subject), introduced the concept of ‘Technological Pedagogical Content Knowledge’ (TPACK). This refers specifically to the knowledge required to embed the use of technology in subject teaching, or as Kildan and Incikabi (2015) put it, knowledge that centres on the triple intersection of technology, pedagogy and content. It is not sufficient to be able to use technology, practitioners need to be able to understand how technology can be used pedagogically in ways that are appropriate to the subject(s) being taught (Koehler, Mishra, Kereluik, et al., 2014). There is, therefore, an identified need to enhance early years’ practitioners’ TPACK
(Voogt and McKenney, 2016), as well as expand it to include their understanding of the ways particular technology tools are important to young children (Parette, Quesenberry, & Blum, 2010). There is also a need for teachers to be knowledgable about digital media cultures that are important for children (Edwards, 2013; Mertala, 2016). This does not mean that teachers should know everything that children do and use in the digital world, as that would not be possible. Rather, having some familiarity with the landscape is useful, as teachers can then let pupils be the experts about their own digital practices, and inform teachers about these (Parry, 2013).

**Lack of equipment/ resources:** Plumb and Kautz (2015) report that numerous studies identified that early years settings often lacked ICT equipment, and/or access to broadband or wireless (e.g. Fenty and McKendry Anderson 2014; Nikolopoulou and Gialamas 2013). This is particularly important, given that teachers are found to report the availability of resources or lack thereof as the precondition for considering further issues relating to technology integration in teaching (Hesterman, 2011; Thorpe et al., 2015). Alongside having sufficient resources, practitioners should be encouraged to develop such educational understanding that allows them to pedagogically examine digital cultures together with children, drawing from children’s everyday experiences, even without using concrete digital equipment (e.g. Mertala, 2016).

**Lack of training:** Studies reviewed by Plumb and Kautz (2015) indicated that many early years practitioners identified that they had insufficient training on technologies to be able to use them effectively in their settings (Blackwell et al., 2013; Parette et al., 2013). This is a point that holds across practices and sectors in relation to early years practitioners’ development, given that there are studies on both teacher education (e.g., Gruszczynska, Merchant, & Pountney, 2013) and teachers’ in-service training (e.g. Ihmeideh, 2009). Problems included early years settings having insufficient resources to pay for staff to attend training (Ihmeideh, 2009), and training being of questionable quality (Plowman and Stephen, 2005).
Classroom condition constraints: Plumb and Kautz (2015) outline a number of challenges which impact on the use of technology in settings, including large class sizes (Nikolopoulou and Gialamas 2013) and technology being located in places external to the classroom, such as an office (Fenty and McKendry Anderson 2014).

Educator lack of confidence: The studies drawn upon by Plumb and Kautz (2015), such as Blackwell et al. (2014) and Nikolopoulou and Gialamas (2013) point to the way in which early years practitioners sometimes lack confidence in their own abilities to use technologies. Such an attitude has been found to be directly linked to skill and classroom practice, and to be shaped by varied factors, including the practitioners’ number of years teaching (Inan and Lowther, 2010), their role in an educational setting, their home computer access and their training (Chen & Chang, 2006). Research also indicates that early years teachers’ capabilities of using ICT for personal purposes, or their positive attitudes towards personal ICT use, do not automatically transfer into professional confidence or relevant ECE practices (Palailogou, 2016). This implies that it is essential to focus on ECE pedagogical use of ICT in professional training, not only on general ICT competences.

Lack of appropriate educational software: Plumb and Kautz (2015) identify a range of studies that indicate that many teachers feel they do not have sufficient access to appropriate software (e.g. Ihmeideh, 2009).

Lack of support: In a review of the barriers to effective use of ICT, Becta (2004) identified the presence of high-level support as being important in enabling teachers to overcome issues relating to lack of confidence. Blackwell et al. (2014) identify support as key to utilising technology, even in educational settings where technological resources are available. Plumb and Kautz (2015), in their review of literature, point to the way in which a lack of support limits early years’ practitioners’ practice in the use of technology. For example, Nikolopoulou and Gialamas’ (2013) study identified a lack of technical support as a key problem, whilst a lack of support from administrators and parents is also an important barrier to use (Fenty and McKendry Anderson 2014; Li, 2006). Lack of support might also refer to the lack of
follow-up sessions to validate and assess teachers’ efforts to integrate technology in their teaching (Keengwe & Onchwari, 2009).

**IT technical problems:** Plumb and Kautz (2015) note that outdated equipment is a key barrier to extending use of technology in early years settings (Fenty and McKendry Anderson’s, 2014). In addition, breakdowns of equipment frustrate practitioners and children alike (Blackwell et al., 2013).

**Lack of funding:** In Plumb and Kautz’s (2015:6) review, they note that a number of studies ‘explicitly identified funding or budget limitations as a barrier to IT integration in ECEC organisations’, such as Ihmeideh’s (2009) study of Jordanian pre-schools. This, of course, links to the previous points with regards to the barriers created by lack of access to equipment and software. Goktas, Gedik and Baydas (2013) argue that the provision of funding should ameliorate this problem, but their study was conducted in Turkey, which points to the uneven distribution of technology-related funding in schools across Europe.

**Physical environment constraints:** Plumb and Kautz (2015) identify studies that have reported such issues as a lack of physical space (Ihmeideh 2009) and too few electrical sockets (Wood et al. 2008), which prevented some practitioners using technology. However, physical barriers were only reported in some countries (e.g. Greece and Turkey), and not others.

**Lack of time:** Time is recurrent trope in the literature on the barriers to the use of technology in education, as eductators report a lack of time to develop their own expertise, or a lack of time available in the curriculum (Goktas et al., 2013; Hew and Brush, 2006). As Plumb and Kautz (2015: 7) point out, early childhood educators have additional responsibilities such as ‘toileting and assisting at meal times, supervising play-time, liaising with parents, and undertaking administrative duties’, and these time constrains have been found to mitigate against the use of technology (Li, 2006; Wood et al., 2008).
Early childhood curriculum and guidelines: Plumb and Kautz (2015) suggest that whilst some countries do recognise the place of technology in their early years curriculum, others do not, which offers a key barrier to progress in this area. As the DigiLitEY report by Kontovourki and Tafa (2015) suggests, whilst many countries in Europe do attend to issues related to the use of technology, there is less consistency with regard to references to digital literacy in early years curricula. Edwards (2013) also points out that regardless of the importance of digital play in children’s lives, curricula tend to neglect digital technologies when attending to play and playful learning.

Nature of the early childhood educational sector: The final barrier identified by Plumb and Kautz (2015) relates to the cultural issues. There is a lack of a tradition of research and development in relation to new literacies, particular within early years settings, with an emphasis on natural, first-hand experiential learning, which sometimes creates attitudinal barriers (Parette et al., 2013). This is also implied in early years practitioners’ concerns about their competing responsibilities and their technology integration efforts (Keengwe & Onchwari, 2009). Such assertions reveal the conceptualisation of early years pedagogy as distinct from technology use; or, conversely, of technology as irrelevant to what would be considered as early childhood education. Research indicates that whilst early years teachers value promoting children’s socio-emotional skills more than academic skills, they also consider ICT as a tool for learning academic skills, not socio-emotional skills (Mertala, 2017). Strategies need to be developed that will enable educators to address some of the challenges faced in this area. In training, it could be beneficial to highlight the pedagogical implications of ICT for developing children’s social skills, participation, creativity (e.g. Leinonen & Sintonen, 2015, Onnismaa, Rintakorpi & Rusanen, 2014) and other aspects valued within the early childhood education sector at the same time as it develops early literacy, thus helping practitioners to meaningfully include digital media in early years pedagogies. This way ICT pedagogical competence becomes an extension of educators’ existing proficiency rather than being a new and peripheral area of expertise (Mertala, 2017).
The enablers that promote the use of technology are directly related to the barriers, in that addressing some of the issues above ensures that they no longer prevent technology integration, but foster it. So, for example, Gotkas, Yildirim and Yildirim (2009) identify the following as enablers: (i) having clear plans and policies; (ii) having access to training; (iii) finance; (iv) support; (v) providing educators with time (vi) having appropriate curricula.

One of the key ways in which early years practitioners’ greater use of digital literacy in early years classrooms might be promoted is through the use of effective continuing development professional development (CPD), as in point (ii) of Gotkas, et al.’s recommendations. As Blackwell et al. (2013) noted in a study of 1329 teachers of 0-4 year olds, the level of frequency of engagement in CPD predicted increased use of computers and tablet computers. In the next section, the key aspects of CPD that need to be considered in the development of any such programme are considered.
As noted above, one of the key barriers to furthering practice is early years practitioners’ knowledge, specifically, TPACK. In a systematic review of interventions aimed at developing teachers’ knowledge in this area, Evens, Elen and Depaepe (2015) identified that there were certain elements of programmes that were important, if they were to be effective. The first is reflection; reflection that fosters higher-order thinking in particular is essential. There should also be opportunities for practitioners to try out approaches that they have been introduced to through an intervention (Van Driel and Berry, 2012), and to have opportunities to reflect critically on these experiences. This kind of risk-taking and experimentation is important, and needs to take place in a supportive environment. Second, the development of relevant knowledge is also key, but it is important to link content knowledge to pedagogical knowledge. That is, understanding what digital literacies are and how they develop is important, but practitioners need also to be introduced to how those concepts and processes can be embedded in classroom practice (Gruszczynska, Merchant, & Pountney, 2013). Third, practitioners should be introduced to the TPACK model at the beginning of any programme, so that they are clear about its nature and how the programme addresses their related needs. Finally, having contact with other educators in the programme, so they can learn together, is important. This point relates to literature that emphasises the need to develop communities of practice (CoP) in CPD programmes.

The CoP concept was developed by Lave and Wenger (1991) to describe the process of learning that operates within groups. Lave and Wenger originally
developed the term to refer to the learning that operates between members of a particular profession, or people who share a craft. In this context, people who are experienced and have long-established knowledge of the craft or profession share their knowledge and experience with others. They suggest that the process of ‘legitimate peripheral participation’ occurs, in which apprentices learn from the edges of a professional space by observing and learning from the more experienced members of the group at the centre of the practice. Through a process of learning from being involved in this participatory action, situated learning takes place. Wenger (1998) developed the concept further in his later publications. He suggested that a CoP involved three inter-related aspects: mutual engagement, joint enterprise and shared repertoire (Wenger, 1998 pp72-3). When members of the community are mutually engaged in an activity, strong relationships amongst members of the group are formed. The members of the group are mutually engaged in a joint enterprise, which binds the group together. This aspect of learning appears to be important in relation to educators’ CPD (Evens, Elen and Depaepe, 2015).

Having the opportunity to engage in action research is also a significant factor in successful CPD programmes (Grace, Reitdijk, Garrett and Griffiths, 2015). Action research can enable practitioners to learn from looking at their practice carefully and helps them to relate theory to practice (Cordingley, 2015). It can impact on affect, enabling practitioners to feel proud and excited about their work and enhance their sense of agency (Leat, Reid and Lofthouse, 2015). In terms of agency, opportunities to co-design professional development programmes is important, so that they meet the needs of individuals (Greany and Brown, 2015). Whilst individual research is valuable, it is also helpful to offer opportunities for collaborative research. Kennedy (2014) developed a whole-school collaborative approach to practitioner researcher in which teachers in a single school worked together to identify key challenges and evaluate approaches to addressing these. Her work provides a powerful model of collaborative practice in relation to research.

From a head teachers’ perspective, Bates and Watt suggest that effective CPD should include seven strategies, as follows: (i) offering CPD for all staff, not just those
involved in teaching (ii) ensuring CPD is linked to school priorities; (iii) staff mentoring and peer-coaching; (iv) the development of inter-school networks and partnerships (which links to the concept of CoP); (v) team-teaching; (vi) peer-review (viii) ongoing assessment of the impact of CPD. Other factors have also been identified as important in relation to effective CPD. Duration is important – more successful CPD is sustained and long-term, and programmes should also be coherent in relation to educators’ beliefs and practices (Desimone, 2009). Chen and Chang’s (2006) also summarise the following three issues as having key implications for early childhood teacher training: the support for teachers to make classroom implementation a priority; the provision of training that expands beyond the length of one week; and, the need for training to match teachers’ varying degrees of confidence, skill and practice. The possibility to personalise content is also key, and it is also crucial to be able to localise programmes, which is of particular interest when considering a cross-European approach (Lipowski, Jorde, Prenze and Seidel, 2014).

Finally, in considering the needs of any CPD programme that focuses on digital literacy, Rosaen and Terpstra (2012) argue that practitioners should have opportunities to engage in reflecting on epistemological perspectives on literacy, so that they can consider how literacy is changing due to technological developments. In this way, changes in beliefs and values can influence practice. In addition, they promote the need to engage practitioners in hands-on design activities in which they themselves are creating digital, multimodal texts. The teachers involved in their intervention did this and Rosaen and Terpstra argue that, as a result:

…the teacher candidates seemed to gain knowledge, skill, and understanding of their new technology by designing a product for a real audience (their peers) and blogging about their learning processes. As they learned about their new literacy, they had to make strategic decisions about how to represent ideas about topics such as visual or environmental literacy, and try to take advantage of the affordances of that technology as a medium of communication.

Rosaen and Terpstra (2012: 46)
In addition, some CPD programmes enable practitioners to collaboratively design curriculum materials, which has a positive impact on outcomes (Landerholm, Gehrie, & Hao, 2004; Voogt, Laferrière, Breuleux, et al., 2015).

Therefore, a review of the literature indicates that a successful approach to the CPD of early years practitioners with regard to furthering their understanding of, and practice in, the teaching and learning of digital literacy, should contain the elements outlined in Table 1.
Table 1: Elements to be embedded in a digital literacy CPD programme

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practitioners have input into the design of the programme</td>
<td></td>
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<tr>
<td>Programme sustained over time</td>
<td></td>
</tr>
<tr>
<td>Practitioners are clear about the aims and objectives of the programme</td>
<td>from the beginning, the programme has coherence, and it is clearly contributing to comprehensive goals of early education</td>
</tr>
<tr>
<td>Programme embeds opportunities for critical reflection</td>
<td></td>
</tr>
<tr>
<td>Programme embeds opportunities to explore the different epistemological</td>
<td>understandings of literacy, and consider how literacy is being transformed through technological developments</td>
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<tr>
<td>Risk-taking and experimentation are embedded</td>
<td></td>
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<tr>
<td>Designing and disseminating digital/ multimodal texts and artefacts are</td>
<td>enabled</td>
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<tr>
<td>Technical, content, and pedagogical knowledge are developed in tandem</td>
<td></td>
</tr>
<tr>
<td>Practitioners are encouraged to observe, discuss and pedagogically</td>
<td>utilise those children’s media cultural interests that integrate both digital and non-digital practices</td>
</tr>
<tr>
<td>Practitioners are able to personalise content, also create content</td>
<td>together with children</td>
</tr>
<tr>
<td>Practitioners are able to localise content</td>
<td></td>
</tr>
<tr>
<td>Programme promotes the construction and maintenance of communities of</td>
<td>practice/ networks</td>
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<tr>
<td>There are opportunities to relate theory to practice throughout the</td>
<td>programme</td>
</tr>
<tr>
<td>Programme embeds opportunities to undertake (independent and/ or</td>
<td>collaborative) action research</td>
</tr>
<tr>
<td>Opportunities for coaching, peer-mentoring and team teaching are</td>
<td>embedded</td>
</tr>
<tr>
<td>Practitioners are encouraged to assess the impact of the programme on</td>
<td>a continuous basis, to feed into its development</td>
</tr>
</tbody>
</table>
Conclusion

There is sustained evidence that there is a lack of opportunity for early years practitioners to engage in professional development in relation to digital literacy to any meaningful extent, as outlined in this report. A range of barriers exists in relation to the furthering of practice (Plumb and Kautz, 2015). A number of barriers relate to the early years practitioners themselves, such as their beliefs and attitudes, their level of confidence in using technologies and their level of technological and pedagogical content knowledge. Research reviewed in this report suggests that many of these barriers emerge from or connect to teachers’ established understandings of the early childhood sector and the curriculum therein. Two binaries may identified there as key in shaping teachers’ practices and beliefs: the binary between “conventional” and new early childhood literacies, and the binary between teachers’ own use and integration of technology in the classroom. To deconstruct such binaries, one needs to consider how CPD may offer early years practitioners opportunities to engage with their own and others’ epistemological understandings of literacy, as well as realisations of new literacies in (children’s and their own) everyday lives. This would ultimately necessitate and link to a shift in practitioners’ professional identities.

There is also a recognised lack of training and support, therefore the development of a CPD programme that might impact positively on these elements is important. It is of course not in itself sufficient – there also needs to be a focus on other barriers to progress, such as a lack of resources and effective policies at a national level. Nevertheless, the development of a CPD programme that embeds the effective elements of such activities, as outlined in Table 1, is required if young children are to be offered early years education that is appropriate for twenty-first century demands.
References


