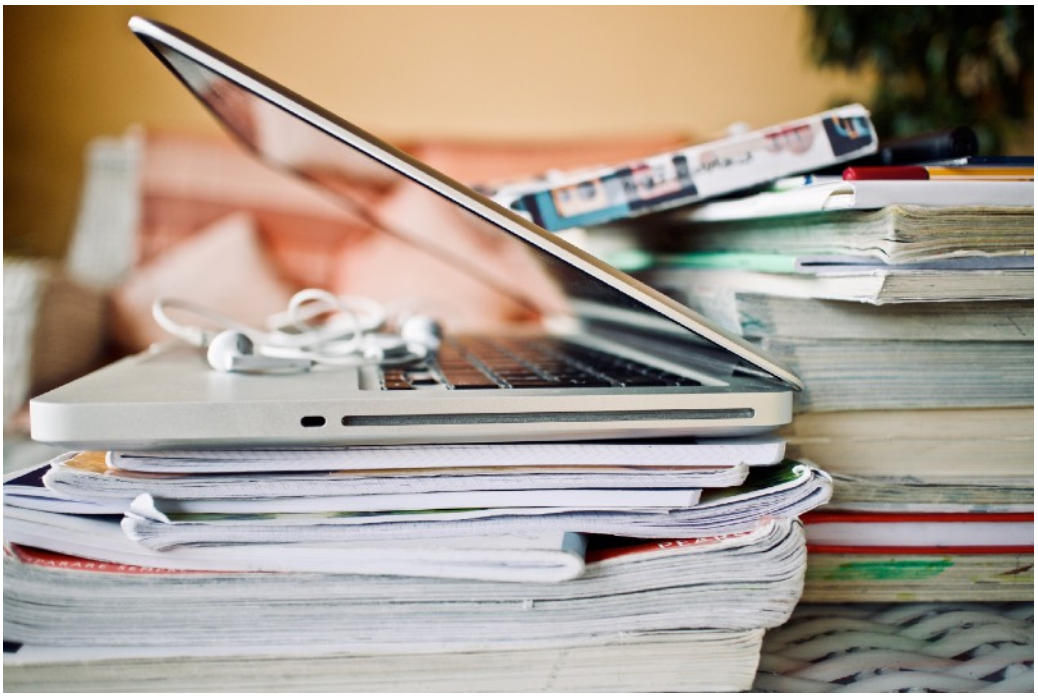
COST Action IS1410

Early Years and Primary Teachers' Digital Literacies in Personal Lives and Professional Practice: A Cross-Country Report



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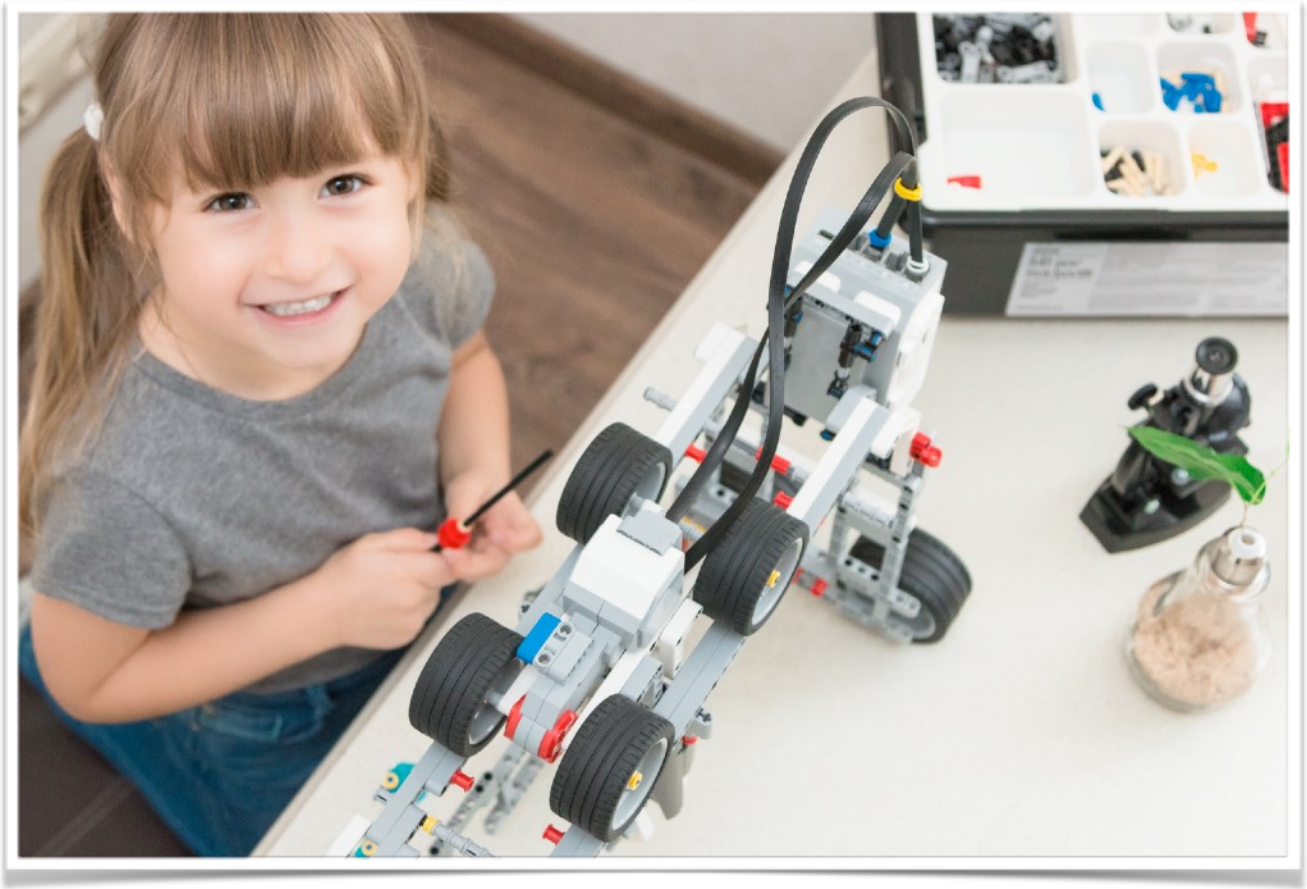
Introduction

The proliferation of digital media and technologies in learning and communication has given rise to different debates concerning the education of young children. The idea that the digital is both risky and inappropriate for young children is countered by arguments that the integration of technologies in literacy classrooms is necessary for bridging the gap between children's out-of-school and in-school literacies (e.g., Edwards, 2016; Palaiologou, 2016), and for enhancing their chances for later participation in an ever-changing world (Forzani & Leu, 2012; Laidlaw & Wong, 2016). Despite the recognition of differences in children's access to and use of digital technologies, it is certain that children's lives are increasingly digitized both in and outside school classrooms (e.g., Danby et al., 2018; Plowman & McPake, 2013; Kucirkova, Littleton, & Kyparissiadis, 2018).

This has implications for teachers' education and professional learning, even though teachers themselves are also part and players of this increasingly digitized landscape. Young teachers, in particular, have been referred to as "digikids" (Graham, 2008, 2012) or "digital natives" (Prensky, 2009), mostly to be debunked as such given that variety and complexity is found to underpin the digital literacy practices in their personal lives and in their transition to educational contexts (Brown & Czerniewicz, 2010). In fact, research on pre- and in-service teachers' practices of digital literacy has suggested that, despite their age, young teachers follow differential trajectories both in accessing and familiarizing themselves with new technologies and in utilizing those in educational settings (Burnett, 2011; Graham, 2008, 2012). More broadly, practitioners, particularly those in early years' settings, have been found to be reluctant to introduce digital technologies in the curriculum (Nikolopoulou & Gialamas, 2015; Thorpe et al., 2015). There are many reasons why this might be the case, including a range of systemic or institutional conditions, the availability of resources, as well as teachers' own skill, knowledge, experience and established understandings of learning and pedagogy (e.g., Gruszczynska, Merchant, & Pountney, 2013; Lindahl & Folkesson, 2012; Mertala, 2019).

Drawing on these understandings, this report presents findings from a qualitative interview study conducted in eight different countries that focused on teachers' digital biographies and digital literacy practices across domains of their lives. This interview inquiry was

grounded in the understanding that the incorporation of digital literacy in early years and primary school settings necessitates not only the expansion of teachers' skills but also a consideration of their digital experiences across different domains of their lives and, potentially, a shift in their understandings of their professional roles. It was thus its goal to identify the role that digital technologies play in early years' and primary teachers' lives and to connect the multiplicity of digital literacy practices to material conditions as well as to discourses circulating in educational settings. In the sections below, the methodology of the interview inquiry is described, and this is followed by reports on findings from each of the contributing countries. The report concludes with a discussion of issues that emerged as significant for understanding teachers' perceptions and practices of digital literacy in the early/primary years. Implications for teacher education and questions for future study are also considered.



The Teacher Interview Inquiry

The interview inquiry presented in this report developed as part of the COST Action IS1410 "The digital literacy and multimodal practices of young children" and in connection to the activities of Working Group 2, which focused on young children's digital literacy and multimodal practices in early years' settings, schools and informal learning spaces. In an attempt to identify current educational practices in early years settings and schools, members of WG2 initiated a project to explore early and primary years' teachers' experiences and perceptions of digital literacies. Particular questions that guided this inquiry were:

- What were teachers' perceptions and uses of digital technologies in their personal lives?
- What were teachers' perceptions and digital literacy practices in educational settings?
- How did their perceptions and practices connect to broader understandings of their professional roles and identities?

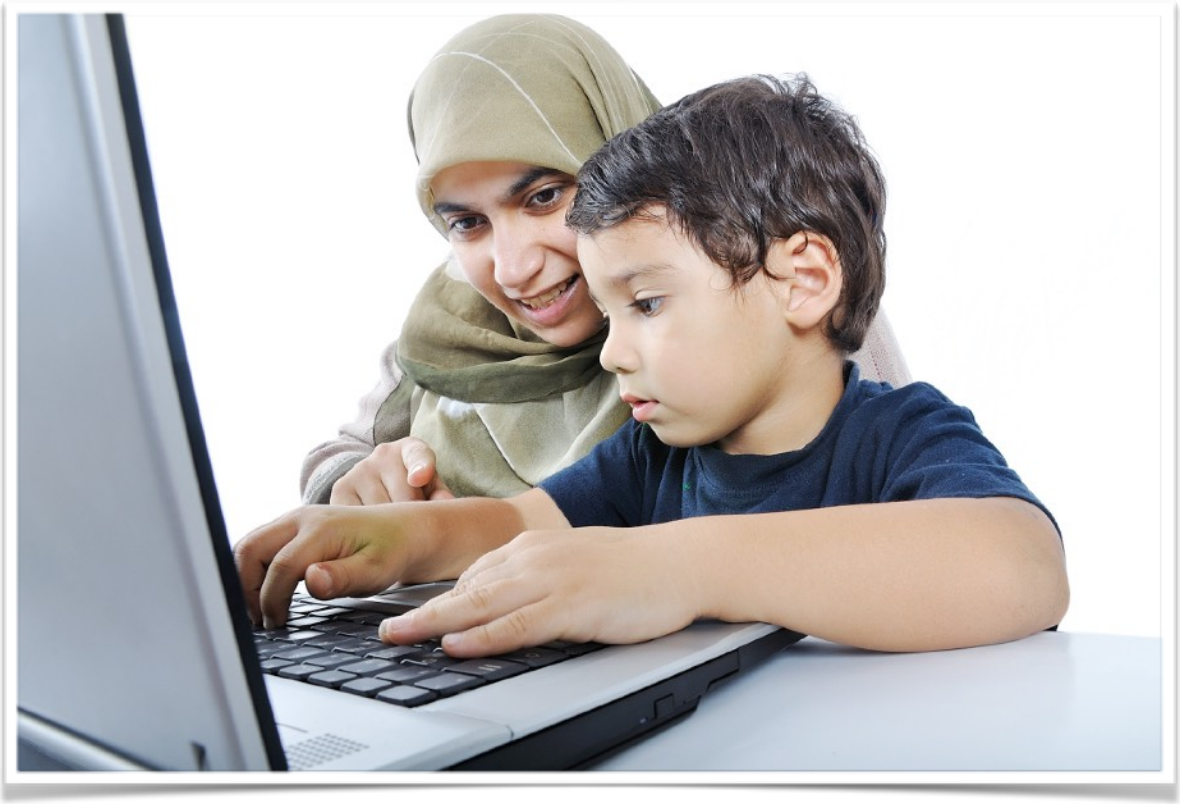
The project relied on semi-structured interviewing and was initiated in April 2016, when pilot interviews were conducted to design a protocol for individual interviews that focused on teachers' uses of digital media and technologies in their personal lives; their uses and perceptions in educational settings; and, their pedagogical role and its connection to technologies. From August 2016 and until October 2017, individual interviews were conducted in 8 participating countries (in alphabetical order): Cyprus, England, Germany, Greece, Poland, Portugal, Romania, and Slovakia. Data collection accumulated a total of 93 interviews with teachers identified through convenient and or purposeful sampling. Participants included both pre-primary (kindergarten) and primary teachers. Teachers' characteristics relating to their mean age, gender and years of teaching experience are presented in Table 1 below.

	No. of particip -ants	Mean age	Gender		Yrs. of teaching experience
			Female	Male	
Cyprus	22	M= 44,4y. (min= 26y. max= 59y.)	22	0	M= 19,1y. (min= 4y. max= 38y.)
England	10	N/A	7	3	M= 13y. (min= 4y. max= 35y.)
Germany	8	M= 53 y. (min= 44y. max= 63y.)	7	1	M= 26,4y. (min= 9y. max= 42y.)
Greece	9	M= y. (min= y. max= y.)	9	0	M=14.9 y. (min=2 y. max=33 y)
Poland	8	M= 36,9y. (min= 28y. max= 54y.)	8	0	M= 13,5y. (min= 5y. max= 30y.)
Portugal	17	M= 46,4y. (min= 31y. max= 60y.)	16	1	M= 23,5y. (min= 6y. max= 38y.)
Romania	9	M= 38,6y. (min= 24y. max= 49y.)	9	0	M= 11,9y. (min= 0y. max= 27y.)
Slovakia	10	M= 41,4 y. (min=29 y. max=56 y.)	10	0	M=19,3 y. (min=7y. max=36y.)

Table 1: Number of participants, their gender, age and years of teaching experience per country

To facilitate the collection of data, the initial interview protocol was translated to respective national languages and adjusted to allow the interviewers' engagement in deep conversation with the participating teachers. Interviews were summarized and or transcribed in the original national languages, and summarized in memos in English to be shared among the research group. Data analysis was a multi-staged process that began with the thematic analysis of country-specific data sets framed by the inquiry's research questions. At a second stage, the research group identified themes that ran across data sets and utilized those as emic codes for the axial coding of cross-country data. In particular, emic codes were identified to include "interpretations of the digital", "materiality of the digital", "digital media in teachers' personal lives", "digital media in teachers' professional lives", "school context", "institutional contexts", "broader sociopolitical

context", as well as teachers' "professional learning", "perceptions of pedagogies", "perceptions of children" and "emotions". Data excerpts from each participating country were translated in English and shared among members of the research group to allow further thematic analysis of the interviews. Notably, this did not constitute a cross-country analysis, given that the goal was not to compare and contrast among countries but rather to showcase multiplicity and complexity in teachers' understandings and experience. In the next section, findings are presented from each of the participating countries as per the main categories of the project: teachers' perceptions and uses of digital literacy in their personal lives; teachers' perceptions and uses of digital literacy in their professional lives; and, connections to broader understandings of teacher role and professional identity.



Country Reports

1. Cyprus

In the Republic of Cyprus, literacy education for young children connects to language learning and to the Greek language arts, which appear as subject areas in distinct curricula for pre-primary and primary education, respectively (Ministry of Education and Culture [MoEC], 2016)[1]. The notions of digital or multimodal literacy appear not as stand-alone terms but in reference to texts and media, which mostly emerge in the description of proposed teaching practices. Despite that, opportunities for digital literacy have increased over the past few years and those are due primarily to the availability of computers and to internet connectivity in schools. Most classrooms are equipped with one computer and a projector, while teachers appointed as ICT counselors regularly consult with schools on the integration of technologies across the curriculum and organize relevant teacher professional development programs (ELINET, 2016)[2]. In early 2019, the Ministry of Education and Culture announced a series of measures to support digital literacy education; yet referring mostly to the introduction of computing and robotics courses particularly for older elementary (Grades 5 and 6) and secondary school students. However, at the time of data collection, no apparent measures were in place to directly promote digital literacy in the early years.

Teachers' perceptions and use of digital literacies in their personal lives

Teachers interviewed for this project reported that they used different digital technologies in their personal lives, mostly for communicating and staying connected with friends and relatives, and for acquiring information on different topics of interest (e.g., medical issues, cooking, reading the news). As one participant reported, "it's mostly the need to communicate and to stay informed. It's a way to get informed on current issues, because now, with the rhythms with which we work and live by, we don't have the time to even watch the news at the time they broadcast". As implied, participants connected digital use

[1] Ministry of Education and Culture (2016). Instructional materials for primary education. Accessible at http://www.schools.ac.cy/klimakio/index.html.

[2] European Literacy Policy Network [ELINET]. (2016). *Literacy in Cyprus: Country report short version.* ELINET.

not only to the advancement of technology but also to a certain type of modern lifestyle that among others includes the digitisation of services. In this sense, the use of digital technologies in their personal lives connected to convenience and need. In a participant's words, "you are forced to use it, yes, to use the computer everywhere".

YouTube, Facebook, Google, Viber, Skype, and "the internet" featured as key media and spaces where digital literacy practices were enacted, while personal computers (PCs) and mobile-smart phones were the dominant devices that teachers reported to use. Across interviews, computers were associated mostly with professional uses (see next section), and smart phones were primarily linked to teachers' digital literacy practices in their personal lives. For instance, a participant reported, "The alarm [goes off] on the smart phone (laughter), first of all, first thing in the morning. Anything, from a message for communication, the internet, all is through the mobile phone, for Facebook, for emailing". Differences were found among younger and older participants, with the latter describing themselves as "not technology people" and mentioning that they would either choose not to use technology or rely on their children, and even grandchildren, to engage in digital literacy practices (like downloading movies or songs) when this was necessary.

Even though participants acknowledged the abundance and necessity of digital technologies, they admitted that they felt overwhelmed or feared addiction, especially when considering their impact on their own children or realising that they were missing out if not being continually connected. Nevertheless, being emerged in digital technologies opened up spaces for them as adults and parents to connect to their students and their own children (e.g., playing "Candy Crash" was a point of connection between a teacher and her older students while being digitally literate was necessary for helping their own children with school and other demands).

Teachers' perceptions and use of digital literacies in educational settings

In participating teachers' descriptions of digital literacy practices in their personal time, there were often references to the utilisation of media and technologies for professional purposes, with many claiming that being a teacher actually necessitated their familiarisation with technologies. This interconnectedness of the personal and the

professional was associated with purpose and practice rather than with physical space and time, given that, in teachers' descriptions of their out-of-school lives, searching for and exchanging teaching materials, communicating with colleagues and their students' parents, and staying informed on issues relating to their professional praxis prevailed as most common practices. Reporting to use the same digital devices and media for personal as well as professional purposes, though with the computer rather than the smart phone dominating professional digital literacy practices, teachers mentioned Facebook, YouTube, Google, Viber, and "the internet" as tools for extending their knowledge and planning potentials.

In fact, identifying, modifying, and preparing teaching materials, and lesson planning were the prevalent ways in which digital media and tools were used for professional reasons. Claiming that "organising my teaching is done completely through technology"; and, also that "I'm continually connected to the internet, to my email, Facebook, different websites where I can find teaching materials for first grade", teachers reinforced the utilisation of digital technologies mostly because of convenience and richness of resources. For some, digital media have even replaced traditional sources of information and material design, be that print books or other printed material (e.g., "I don't use books anymore. I mostly use the internet rather than a book"). Others found this to be both time-consuming and cumbersome because of the breadth of information and the need to assess information before sharing it with children. Implied in this is the hierarchisation of resources (non-digital vs. digital ones) in terms of trustworthiness, but also of appropriateness, especially when considering young children (e.g., teachers reporting that technology should not replace printed books or manipulatives).

Beyond preparation, the majority of teachers – both in pre-primary and primary educational settings – reported to have at least one computer in their classrooms, with many also adding the existence and use of an interactive whiteboard. Interestingly, private kindergartens were reportedly equipped with less digital resources than public ones. In either case, though, parent associations were central for providing such tools and devices. With the scarce existence of official guidelines, the use of digital technologies appeared to be a matter of individual teachers' initiative, especially when collaborating with more tech savvy colleagues. Most times, digital literacy practices included the use of educational software (especially in the case of primary school teachers), and the projection of videos,

songs, and digitised texts. In many kindergarten classrooms, there were also computer centres (1-2 computers) where children played educational games or searched for information during free activities—yet always under the supervision of teachers-adults.
Immediacy, engagement, and motivation were among the reasons cited by participating teachers for integrating technologies in teaching, while there were also references to their potentials for directly addressing children's needs and interests, and simultaneously traversing the boundaries of school time and space. According to one teacher, "I remember some time ago, we talked about houses. And we named different types of houses… and there comes a child and shouts out "skyscraper". I didn't have a picture to show then, so I remember, at that particular moment, I clicked on Google, I found images of skyscrapers and I showed them to children, I showed them what a skyscraper is". Nevertheless, participating teachers often set preconditions for integrating technology in their teaching, including the match between digital use and learning goals, and the appropriateness of technologies for children's developmental and social needs.

Digital technologies and teachers' sense of professional role

Admitting that technology is part of their daily professional lives, participating teachers suggested that technology has transformed their pedagogical role mostly because of its potentials to engage children in a multisensory experience, which was further linked to children's enjoyment and participation. However, this was instantiated in differential ways, as evident in these two contrasting examples: "I believe that with technology, my role becomes a bit more pleasant, it's not just the typical one of my standing in front of them [children] and talking to them without any images or a video, without a song. It helps me much to become more pleasant and creative"; and, "[digital technology] has improved the quality of teaching, I believe it gives more time for … I mean, the lesson is not monotonous [boring], 'I say this and we are done'. And kids will try to play, to engage themselves". Such examples imply the existence of a spectrum across the flossing of more traditional, teacher-led pedagogies and more child-centered ones.

The radical destabilisation of more conventional teacher roles was often neither evident nor desirable in teachers' narrations, as many stated that despite the merits of technology, the teacher was the one to coordinate learning and that technology remained a teaching tool

rather than a key pedagogical player. As in the case of teaching and learning practices, the centrality of the teacher role was often linked to the appropriateness of practice vis-à-vis children's age. By extent, teachers referred to the moral purpose of education, especially of young children, where children's learning through movement and direct contact with "materials" was prioritised over the use of technologies in enhancing their social and cognitive development.

2. England

According to the statutory curriculum for children aged 0-5 in England (DfE, 2017)[3], the Early years foundation stage statutory framework (EYFS), children must be provided with experiences to observe and find out about technology. The Early Learning Goals (ELGs) signify the level of proficiency children are expected to have attained by the end of the EYFS. The Early Learning Goal (ELG) most closely related to children's use of digital technology states that 'Children recognise that a range of technology is used in places such as homes and schools. They select and use technology for particular purposes' (EYFS, 2018: 12). The concept of multimodality is most closely related to the ELG for Expressive Arts and Design, which foregrounds exploration and imagination and where children are expected to explore materials, tools and techniques and experiment with 'colour, design, texture, form and function in order to represent their own ideas, thoughts and feelings through design and technology, art, music dance, role play and stories'.

The National Curriculum for England (DfE, 2013)[4] details the statutory curriculum for primary aged children aged 5 to 11, and from 11 to 16. The programmes of study for the subject of ' English' do not make any specific reference to digital literacies. Reference to technology is located in the subject guidance for Computing. The Computing curriculum

[3] Department for Education (DFE) (2017) Statutory Framework for the Early Years Foundation Stage. https://www.foundationyears.org.uk/files/2017/03/EYFS_STATUTORY_FRAMEWORK_2017.pdf. Accessed 2nd April 2019.

[4] Department for Education (DFE) (2013). The National Curriculum in England: primary curriculum. https://www.gov.uk/government/publications/national-curriculum-in-england-primary-curriculum. Accessed 2nd April 2019.

places emphasis on the technical skills of programming, using technologies as a tool to analytically solve problems, and to understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. As users of technology, pupils are supported in becoming: 'responsible, competent, confident and creative users of information and communication technology' (DfE, 2014). While references to digital technologies can be found within the Early Years and Primary statutory curriculum, these are not explicit. However, digital technology is integrated into many Early Years and Primary school settings and common devices include Interactive Whiteboards, iPads, digital cameras and PCs, hence facilitating internet connectivity in schools.

Teachers' perceptions and use of digital literacies in their personal lives

All of the teachers interviewed spoke of the ways in which digital technologies were embedded within their everyday lives, largely via their mobile phone through which they accessed social media (such as Facebook, Twitter, Whatsapp), email, the internet and a range of other apps. One for example commented: 'everything is on my mobile phone, from alarm clock, sat nav, music, plus telephone calls, messages, things like that'. They spoke of such uses as entwined within everyday activities, linked to hobbies and interests (such as football), central to organizing and administering their family and social lives, and providing a sense of enjoyment and community. Participants spoke of frequently checking phones and one participant stated that when her mobile was out of action for a day she felt 'lost'. Very few spoke of using digital media for creative or playful purposes: only one described using programs for music composition and photo production and only one described being a gamer in her youth. Some reflected on how technologies had changed during their lifetimes, noting the shift from large static equipment such as PCs through to small hand-held devices. Others reflected on how their uses of digital media had changed as their personal and professional lives had changed: one for example spoke of giving up gaming and later Facebook as they absorbed too much time.

Those participants who were parents had an ambiguous relationship with their own children's technology use: one for example gave her baby and toddler her mobile phone and iPad to play with while getting dressed in the morning, but was also concerned about

the impact of this, in terms of eyesight, safeguarding and possible addiction. Meanwhile several spoke in amazement about the technical capabilities of their children (their own children and the children they taught): one for example described how her baby had posted a video to Facebook without her noticing.

Teachers' perceptions and use of digital literacies in educational settings

Teachers described a number of ways in which they used digital technologies at school. The use of these technologies varied considerably: whiteboards for example were used for phonics teaching, showing news items from a BBC news app, accessing number songs via Youtube, and using whiteboard flipcharts for direct teaching; and iPads were used for teachers to take photos and videos, which were sometimes played back to children or used for peer feedback. Sometimes children used iPads to read e-books. It was noticeable however that when participants spoke about home practices, they referred primarily to use of digital media (Facebook, gaming, email and so on), whereas examples from the classroom referred primarily to devices (to iPads, whiteboards, Beebots, etc.). As with their descriptions of their personal lives, however, there were no references to gaming or creative media production (although video was used in some classrooms for children to record what they were doing or by teachers for assessment purposes).

The range and amount of equipment to which participants had access varied. However all suggested that they did not have enough resources and all spoke of the inconvenience caused when devices broke down, ran out of batteries or memories filled up. School firewalls also meant that it was difficult to access some online resources that participants felt would benefit children's learning.

During the interview, two participants positioned themselves as experts who were a source of knowledge and guidance for their colleagues. Others however foregrounded their own sense of inexpertise, often following up descriptions of activities they had initiated in class with comments that distanced themselves from what had been achieved: e.g. 'It's very clever- I don't know how it works'. Just as some participants commented on the rapid evolution of technologies in their own lives, some presented technology in school as a constantly moving target: 'even I feel like I'm already behind on all the latest technology,

especially all the applications and things.' Keeping up with new possibilities, it seemed, represented a major challenge.

In describing use of digital technologies, it was commonplace for teachers to speak of classroom use in terms of appropriateness: for example one stated, 'The technology or the digital media would have to be the right thing for what I was going to teach.' Unsurprisingly appropriateness was presented in different ways. One participant, for example, spoke of how technologies were enabling for some children who found school difficult as they were able to draw on what they had learned at home while in school, or find alternate ways to communicate their ideas. However several participants expressed concerns about technology use by children in school that paralleled those they expressed in relation to their own children, or more broadly about 'children today'. They stated, for example, that they did not want children to have 'too much' access to technology at too early an age. Concerns expressed related to: health (linked to eyesight and obesity); a perceived displacement by technology of other activities (as computer use may mean less time in active play, particularly outside); risks associated with going online; exposure and access to adult content (e.g. through gaming or inappropriate advertising); lack of socialisation; and a general need to balance what they saw as extensive technology use at home by other kinds of activities at school.

It appeared that in contrast to the mobile dynamic use of digital technology in everyday life, digital technology use at school was more bounded. Indeed due to recent changes in safeguarding expectations, many schools had banned teachers' mobile phone use completely. While two teachers spoke of using the internet to bring the outside world into the classroom (e.g. through links to news sites or videos of current events), digital technologies were largely used in ways that worked to sustain classrooms as closed spaces separated from the outside world, rather than mediating the more permeable on/offline spaces that many were familiar with in their personal lives. Technologies were also used by teachers extensively for the purposes of administration and classroom management: used to tally rewards for behaviour or achievement for example, to mark the daily register, to record and share planning, or to keep track of safeguarding issues.

The main exception to this trend was with respect to teachers' communication with parents and carers. Several participants described occasions when digital technologies

had been used to give parents insights into the children's experiences at school: one for example had set up a blog when the class had gone on a school trip so that parents could keep track of what the children were doing while they were away. One participant noted that her school had laid down ground-rules for this communication, stating that teachers could not be expected to respond to emails more than once a week. Several participants however noted how they were in frequent contact with parents by email and felt a duty to respond to emails even while at home and late at night. The perception here was that there was an expectation nowadays of instant response.

Digital technologies and teachers' sense of professional role

As participants discussed technology use at school, it became apparent that their attitudes to technology use, and by implication, their application in the classroom, intersected in diverse ways with personal philosophies, professional identities and different discourses of childhood, technology and literacy.

Many stated that the curriculum expectations for technology, particularly for the early years, did little to stretch children and that for most children these expectations were met at home in any case. With little available guidance or opportunity for formal professional development, it was unsurprising that participants found different ways of integrating digital technologies within their practice, and that technology use intersected in different ways with various kinds of teaching identities. One, for example, noted that her role in supporting children with using digital technologies was very much as a facilitator, while others noted shifts in teacher/pupil relationships when children were more competent and confident than they were. Others spoke of how colleagues seemed to use digital technologies in ways that aligned with teacher-led approaches. One for example contrasted the playful, creative ways in which she saw children using digital media (e.g. their use of Minecraft) with lessons in which teachers used technology to support explication or to stimulate sequences of activities, e.g. showing videos, playing phonics games to practise a particular skill, or used to 'evidence' learning (through videoing children's activity or photographing what they produced).

The links that participants made between digital technologies and literacy were, in general, rather unclear. This is unsurprising in England, as the current literacy curriculum for over 5s and expectations for literacy for the under-5s at the time of the interviews contained no references to uses of digital technology at all. (This situation has now worsened as the early learning curriculum now contains no explicit expectation for children to develop their use of digital devices in any area of learning.) When asked to define 'digital literacy', participants referred mainly to generic digital skills, although one defined it in relation to appropriate use of digital environments (e.g. using Facebook in a professional way), and another in terms of locating information. One defined digital literacy in relation to meaning making, stating that, 'literacy is children engaging with text and media in new and meaningful ways'. This participant was the only one who was confident in defining 'multimodality.' It appears therefore that the value of digital literacy in young children's learning is hard for teachers to articulate given the current policy context.

3. Germany

Education in Germany is a federal responsibility so that in detail 16 different state orders would have to be considered. The pre k-4 sector from kindergarten up to the 4th class in school in German education system is the responsibility of different institutions through which children progress over the years. From 0-3 years, children can attend a public daycare center, if their parents wish and if there is a place available. The expansion of childcare spaces has risen sharply over the past ten years but is still inadequate in many rural regions and large cities (cf. Federal Education Report 2018)[5]. From the age of 3, children are legally entitled to a place in a kindergarten. In the area of pre-school education, the training of teachers is heterogeneous - it ranges from training as nurses in technical schools in the field of social pedagogy to bachelor's and master's degrees in various social or teaching profession-oriented courses of study. Approximately 90% of pre-school workers have pedagogical training, but only about 5% have an academic degree. These degrees are always associated with different salary levels, which are below

[5] Autorengruppe Bildungsberichterstattung (2018). Bildung in Deutschland 2018. Kompletter Bildungsbericht mit Texten und Tabellen Bildung in Deutschland 2018. Ein indikatorengestützter Bericht mit einer Analyse zu Wirkungen und Erträgen von Bildung. Bielefeld: wbv Media. Retrieved 05-04-2019 from https://www.bildungsbericht.de/de/bildungsberichte-seit-2006/bildungsbericht-2018/pdf-bildungsbericht-2018/bildungsbericht-2018.pdf

teachers' salaries in public schools. The primary school teaches children from 6-10 years in four school years. The teachers employed there are required to complete a university course with - nowadays - a Master's degree. The orientation of the degrees is not comparable in terms of content. In the final analysis, it remains a matter of interpretation for individual review boards when drawing up study regulations which competencies are taught and reviewed in detail. Primary school teachers are paid less than secondary school teachers.

The curricula of the primary school are country-specific. However, the Standing Conference of all Ministers of Education of the German Länder (KMK) coordinates framework guidelines for curricula. That also applies to media education in schools, where the notion of the digital appears. In the meantime, the teaching of media competence is part of all country curricula. In pre-school education in day-care centres, the orientation frameworks are even more heterogeneous than the school curricula. Unlike performance at school, their pedagogical output is not subject to mandatory evaluation. Especially the requirements for media education are very different. In concrete terms, it already becomes clear what will continue later along the educational chain: there is a clear difference whether media education is limited primarily to technology use and at best addresses the critical handling of media as such or encompasses a more comprehensive understanding of media aesthetics and content, media production and reception. Even today, digital media education, in particular, is not seen as a binding task of day-care centres. The centres' sponsors - often social sponsors such as "Caritas" or Arbeiterwohlfahrt alongside churches and municipalities - position themselves differently and exert different influences across centres. In primary school, digital media education is taken seriously as an issue. In addition to the specialist curricula of the ministries of education, more and more media curricula of the social, cultural or family ministries, which are responsible for all-day care, are also gaining binding influence. In the federal state of North Rhine-Westphalia, where our study is based, this is the NRW Media Competence Framework, which will come into force in 2019.

In primary schools, technological equipment also varies greatly. For all school types, the ratio of pupil to digital devices is 1:11,5. Although the use of digital media is already institutionally demanded in the primary school sector of all parts in Germany, the daily practice does not correspond to these demands. That raises the question of why it is such

a small number of teachers that perceived the potential of digital media. The Youth Media Protection Index 2018 shows that 81% of the interviewees regard media education only as a secondary task of their institution (cf. Youth Media Protection Index 2018, p. 98[6]). Besides, respondents indicated that children and young people would have a particular need for support regarding risks on the Internet. 74% saw a need for support in dealing with search engines and 60% in dealing with programs and apps.

The IEA ICILS Study 2013[7] provides more detailed data. This international survey shows that although German teachers perceive the potential of digital media for the organisation and presentation of information, they do not recognise any opportunities for individual promotion, participatory work and sustainability of work.

Teachers' perceptions and use of digital literacy in their personal lives

Within private media use, most of the teachers surveyed exhibit a very similar media habitus. All eight teachers use their smartphones and their associated multifunctionality daily. Online shopping, online banking, the use of streaming and messaging services as well as social media are part of everyday life for all teachers. All teachers continue to have a wide range of media equipment, including computers, laptops, and digital TV.

Teachers' perceptions and use of digital literacies in educational setting

In everyday school life, all of the eight teachers from our survey use digital media to prepare and follow up lessons, for example, to create worksheets or save grades. Out of a total of eight respondents, only two said they used digital media to promote reading literacy. These two teachers also see the potential for individual promotion in digital media.

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[6] Gebel, C., Brüggen, N., Hasebrink, U., Lauber, A., Dreyer, S., Drosselmeier, M., & Rechlitz, M. (2018). *Jugendmedienschutzindex: Der Umgang mit onlinebezogenen Risiken. Ergebnisse der Befragung von Lehrkräften und pädagogischen Fachkräften*. Berlin, Hamburg, Munich: FSM – Freiwillige Selbstkontrolle Multimedia-Diensteanbieter e.V. Retrieved 05-04-2019 from https://www.fsm.de/sites/default/files/FSM_Jugendmedienschutzindex_2018.pdf

[7] Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Gebhardt, E. (2014). Preparing for Life in a Digital Age. The IEA International Computer and Information Literacy Study. International Report. Cham: Springer International Publishing. Retrieved 05-04-2019 from https://www.springer.com/de/book/9783319142210

Besides, a total of three teachers emphasise the use of educational software on the computer, which corresponds to purely receptive use, and three teachers explicitly describe the use of digital media to create media products such as digital books, films or comics.

Overall, digital media are primarily used to plan to teach and promote receptive skills. Few teachers use digital media to promote productive skills.

Digital technologies and teachers' sense of professional role

If one now compares the results of private and professional media use, it becomes apparent that dispositions and ideas (beliefs) are not always congruent. In five out of eight cases there is a congruence. These teachers show themselves as either wholly convinced of and engaged in the use of digital media or strictly in opposition to the use of digital media. One recognises statements as – "I'm convinced that in the next few years it will probably increase vastly. Just, hopefully, so around the school. We all hope so." Alternatively: „We work with the media curriculum of NRW." Examples for a somewhat critical attitude are: „I could easily manage without them." "It is increasingly a dread to me how far smartphones and laptops determine life" or "On a typical school day, media don't play a part."

Also, it was possible to identify three teachers with incongruent ideas and dispositions. "The target planning takes centre stage, and the media are just a means to an end."However, two of the eight teachers are in favour of digital media. They had participated in three-year teacher education on the job, providing a lot of further theoretical and meta-cognitive knowledge. They are highly reflective and able not only to see their advantage but that of the learners: "My experience is that you can get especially unmotivated, underachieving students excited about digital media" or "With a document camera, it is much more vivid fort he children, that means I am moving more and more out oft he focus so that the learning content becomes the focus."

The results show that internal factors in particular, such as the attitude of the teachers, influence the resulting action. Although teachers criticised the resource situation in some

interviews, the evaluation shows, that their attitude is of greater importance. Since all teachers surveyed have access to digital media in schools, decisions not to use it are due to the attitude of the teachers.

Thus, the study suggests that familiarisation is needed to recognise the potential of digital media in the classroom. Teachers can change their attitudes only when they are aware of them and their effects. Accordingly, the promotion of reflective skills should already be an integral part of teacher training and to be continued in further training courses. The use of concrete models, such as the Digital Competence Framework for Educators DigCompEdu[8] or, in Northrine-Westphalia, the Media Literacy Framework NRW[9], can help to concretise professional competencies and to promote and reflect upon them in training and further education.

Teachers who have used digital media in the sense of a broad concept of media competence have exclusively gained positive experience and have therefore also felt self-efficacy, which is ultimately decisive for the development of positive attitudes. Only when teachers develop a professional competence to act, on the one hand, and the competence to reflect their attitudes, on the other hand, is it possible for them to deal adequately with the current social challenges and to train the pupils for a life in a society of the 21st century.

4. Greece

According to the Greek National Cross-Thematic Curriculum Framework (2003)[10], children should be given plenty of opportunities to discuss about the utility of the provided

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[8] Redecker, C. (2017). *European Framework for the Digital Competence of Educators. DigCompEdu.* Luxembourg: Publications Office of the European Union. Retrieved 05-04-2019 from http://publications.jrc.ec.europa.eu/repository/bitstream/JRC107466/pdf_digcomedu_a4_final.pdf

[9] North Rhine-Westphalia Ministry of School and Education. *Medienkompetenzrahmen NRW*. Retrieved 05-04-2019 from https://www.schulministerium.nrw.de/docs/bp/Ministerium/Schulverwaltung/Schulmail/Archiv-2018/180626/Kontext/2018_Medienkompetenzrahmen_NRW.pdf

[10] Ministerial Decision G 2/21072b (FEK. 304/13-3-2003/t.B΄, p. 593-597 Diathematiko Enieo Plesio Programmaton Spoudon [Compound Thematic Curriculum Framework]

Information and Communication Technology (ICT) and its use in daily school activities. In addition, in the new pilot curriculum New School (The School of 21st century) for pre-primary and primary education there is a separate chapter for ICT describing the goals, aims and examples for activities in the classroom and gives emphasis in the computer use as a didactic tool and as a mean which can help children discover new things and express themselves in the daily activities. According to the ESSIE study (European Schoolnet and University of Liege, 2012[11]), the ratio of computers to students at Grade 4 was 16:1, compared to an EU average of 7:1. There were 50 students per laptop computer connected to the Internet, compared with 20:1 on average across EU countries. At Grade 4, more computers tended to be located in computer rooms than in classrooms. Teachers had low levels of experience with ICTs. These data highlight the challenges that Greece face in integrating ICTs into teaching and learning (ELINET, 2016[12]).

Teachers' perceptions and use of digital literacy in their personal lives

All participating teachers reported that digital technology had a significant role in their personal lives and that they used digital devices such as laptops, desktops, and smartphones. In addition, they reported to use Google, YouTube, Internet, Facebook, Instagram, and Viber. As they said, "It makes easier our communication"; "it helps me to attract children's attention in the class"; "with technology I communicate with my relatives, friends, colleagues. Laptops and projectors are necessary for my work"; "in my personal life I communicate with people abroad by emails. In my professional life I collect information about the topic I am working on"; "Generally speaking, Facebook has managed to link my professional with personal life". Teachers seem to consider digital devices as integral part of their lives and to be familiar with them. Further, teachers appeared to use different applications to communicate with colleagues and relatives, to manage every day necessities and to find information online.

[11] European Schoolnet. 2012. *Survey of Schools: ICT in education. Country profile: Greece*. Available at: https://ec.europa.eu/digital-agenda/sites/digital-agenda/files/Greece%20country%20profile.pdf Accessed October 2014

[12] ELINET Country Report (2016). Literacy in Greece Country Report Children and Adolescents. Retrieved on 2-4-2019 from http://www.eli-net.eu/fileadmin/ELINET/Redaktion/user_upload/Greece_Long_Report.pdf

Teachers' perceptions and use of digital literacies in educational setting

All teachers said that, in their classrooms, they used digital devices such as laptops and desktops but some of them also used tablets. They claimed that, although they acknowledged the significant role of these devices, knowing how to use them in classroom was restricted. This was particularly the case for older ones: [older teachers] "my generation has not been informed on technology and digital media"; "sometimes I feel embarrassed as I do not have enough knowledge to do it"; [younger teachers] "I use only those applications which I can handle". However, they said that at least one or two times per week they used videos, powerpoint presentations and films for teaching in almost all subjects/topics but mostly in language, mathematics and physics. As they said: "Technology is an instrument for better teaching. The use of it is selected according to my knowledge"; "I bring my laptop in the class since with technology the lesson is more interesting for children". Only one teacher said: "It is easier for pupils to find information on history, religion and classics topics than physics and mathematics. I cannot use it in mathematics, I do not know how technology will help me in teaching mathematics". On the other hand, all teachers underlined that digital technology should have a supporting role in the teaching process and not replace the teacher. Moreover, they argued that they needed professional development seminars and official guidelines by the Ministry of Education, and asked for more relevant information to be included in the curriculum. They said: "Ten years ago, we had a seminar on digital media then nothing"; "They do appear in the curriculum, however is not clear what we have to do", "Very few seminars took place over the last ten years", "If I had official guidelines my knowledge would be better", "Due to my initiatives I got an ECDL [degree] only".

Digital technologies and teachers' sense of professional role

As far as their sense of their professional role, teachers claimed that technology helped them to upgrade their work. They argued that the more they were familiar with the use of technologies, the more they were in a position to incorporate their experience in their classroom teaching. They said: "I believe that during my professional years I have been better acquainted with technology"; "Technology is an integral part of our curriculum. Education without technology cannot exist"; "Most of my colleagues position themselves

positively in regards to technology. A small minority of older teachers cannot use technology"; "Students react positively and their parents do support their children in using technology"; "I do believe that in the period of [financial] crisis it is easier to give your child a tablet or a laptop to work with it than to getting him/her to the cinema, the theater or to Luna Park".

Summing up, findings from the interviews show that Greek teachers use digital media in their personal lives. They consider digital technology very important because it provides them with information and facilitates communication. In addition, teachers use digital media and devices in their classroom and believe that these facilitate teaching and help children in learning. However, there is a lack of training to better educate and update their knowledge; therefore, teachers ask for in-service training so that they are able to use digital media effectively in their classroom.

5. Poland

Both literacy and digital literacy are terms listed in core curricula, that is official documents relating to the system of education in Poland. In the current curriculum framework for primary schools, issued in 2017, it is stated that digital literacy acquisition is one of the fundamental goals of school and ought to be promoted from early primary education. In this document, it is emphasised that children should gain "knowledge and skills needed in problem solving, using methods and techniques derived from information technology, including logical and algorithmic thinking, programming, using computer applications, searching and using information from various sources, using a computer and other basic digital devices as well as applying the above abilities in various areas of education, e.g. while working with a text, doing calculations, processing information and presenting it in different ways" (Minister of National Education, 2017[13]). In the curriculum framework for pre-school education, the requirements concerning the process of digital literacy acquisition by children were not covered. Only the last three words in one of the achievements to be demonstrated by children upon finishing preschool - "Initiates his/ her

[13] Regulation of the Minister of National Education issued on 14 February 2017: Appendix 2 to general education core curriculum, http://www.dziennikustaw.gov.pl/DU/2017/356, appendix no. 2, p. 13, accessed: 30.03.2017

own cognitive activity, e.g. book browsing, filling the space with own constructions, using new technologies" - refer to modern digital tools (Minister of National Education, 2017[14]).

Access to modern media in Polish schools is gradually improving. Over the past two decades, numerous initiatives have been undertaken to accelerate the process of digitisation of Polish schools. These actions have had a different range - national, regional or local. An example of the action carried out on the national level is the "Governmental program for developing students' and teachers' competences in the use of ICT - Digital school[15]". The program was launched in 2012 and is supervised by the Ministry of National Education, the Ministry of Administration and Digitisation, the Center for Education Development, and the Institute for Educational Research. The program has covered four areas: e-school, e-learner, e-teacher and e-textbook. One of the goals of the e-school was to equip schools with access to the internet as well as digital media, such as laptops, notebooks, netbooks, tablets, interactive whiteboards, projectors, visualisers, printers and other digital devices. The "Active board"[16] is another example of ministerial program for developing school infrastructure as well as both teachers' and students' digital competences. The 2-year project will be terminated in 2019. Within this program, participating primary schools will be equipped with interactive whiteboards, projectors, loudspeakers and interactive touch monitors. According to the Ministry of National Education, the access to modern tools, interactive whiteboards in particular, and more developed digital competences displayed by teachers will contribute significantly to the change of the ways of teaching and learning as well as the multimodal reshaping of Polish school.

It should be emphasised that the use of technology is linked to teachers' professional development. There are four professional promotion steps for Polish teachers. Educational

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[14] Regulation of the Minister of National Education issued on 14 February 2017: Appendix 1 to general education core curriculum, http://www.dziennikustaw.gov.pl/DU/2017/356, appendix no. 1, p.7, accessed: 30.03.2017

[15] Ministry of National Education in cooperation with the Ministry of Administration and Digitization. Sprawozdanie z realizacji Rządowego programu rozwijania kompetencji uczniów i nauczycieli w zakresie stosowania technologii informacyjno-komunikacyjnych „Cyfrowa szkoła" [A Report on the Implementation of Governmental Program for Developing Students' and Teachers' Competences in the Use of ICT- „Digital School"], https://archiwum.men.gov.pl/wp-content/uploads/2014/02/sprawozdaniecyfrowaszkola-przyjeteprzezrm25_02_2014.pdf, accessed: 04.04.2019

[16] Aktywna Tablica, http://www.aktywnatablica.org/o-programie/, accessed: 04.04.2019

practitioners can be promoted to the next professional position after fulfilling required conditions. The use of ICT in the taught subject is a mandatory requirement for promotion to the highest grades, namely appointed teacher and chartered teacher[17].

Teachers' perceptions and use of digital literacy in their personal lives

Regardless of age or place of work, the teachers interviewed for this study stated that they used technology outside educational settings. Among the devices used on a daily basis were smartphones, laptops, or tablet computers. These tools were used for various purposes. Communication, entertainment, work and professional development were the most often enumerated areas. The teachers listed particular activities associated with the use of their digital devices. Checking emails, Facebook accounts, bus timetables and the weather forecast, taking photos, buying various items online, booking tickets, paying bills, keeping in touch with family members or friends who live in other cities or abroad, searching for information, watching films, listening to music, preparing materials for the lessons and gaining knowledge were included among examples of such use.

The teachers referred to a variety of applications that were integral in their daily lives. However, YouTube, Wikipedia, Skype, Pinterest, Google maps, Google Keep, Microsoft Office, Learning Apps, Messenger and Media Player Classic appeared more often than other examples of applications.

Technology was perceived by the teachers as a significant part of their personal lives, being present in various spheres of action, emphasising a positive impact of such presence on their lives: "Technology is part and parcel of my life. It makes my life easier, pleasant and more productive". It should be noted that despite various technology-related benefits, the teachers clearly stated that contrary to contemporary children, modern media did not dominate in their life and were used only when needed.

[17] cf. *Conditions of Service for Teachers Working in Early Childhood and School Education,* https://eacea.ec.europa.eu/national-policies/eurydice/content/conditions-service-teachers-working-early-childhood-and-school-education-55_en, accessed: 10.03.2019

Further, participating teachers highlighted the existing connection between their out-of-school time and their professional lives, given that technology was often used during teachers' free time to do job-related tasks (e.g. adding pieces of information to a digital register, preparing materials for classes, searching for educational resources, or carrying out international projects with the learners). However, apart from fulfilling work duties in private time (which was perceived as a rather negative phenomenon), positive influence, such as professional development, was also noted: "Technologies allow me to develop professionally and collaborate with other teachers, using e.g. google docs or google presentations".

Teachers' perceptions and use of digital literacies in educational settings

Teachers' responses during the interviews clearly indicated that they used technology in educational settings. The reasons for using it differed. However, the main purpose, expressed by the teachers, was to achieve teaching objectives in various subject-areas of the school curriculum (e.g. Polish, maths, nature, art, English). It should be noted that other reasons were enumerated as well. The teachers declared using technology to meet the digital needs of contemporary children and to prepare the learners to function effectively in a digital society. Other teachers stressed the need to incorporate technology in their teaching to enhance the learning process. To achieve this goal the teachers used digital textbooks, designed their own interactive activities for the IWB, or utilised various applications available on the internet. The majority of the participating teachers stressed the fact that they used technology together with traditional teaching methods, referring to this as using technology in a wise way. Some teachers pointed to the need for training in the area of educational use of technology. Limited access to training for in-service teachers and the fact that students-learners were more proficient users of technology than teachers themselves were perceived as slightly demotivating factors. Respondents also pointed to the lack of easy access to digital devices. The desire to have access to one of what they perceived as the most modern digital devices, namely IWB in the classroom, was expressed in the following quotation:

> *"Technology is mainly used during computer classes, so once a week. I am prepared to teach computer classes, but only at the first level of education, that is grades 1-3.*

Such lessons are taught in an IT laboratory and children work in pairs in front of one computer. During such classes the pupils learn how to use MS Word, Paint and PPt. Children also do activities from e-textbooks, but sometimes access to the internet is problematic at school. Three years ago my class and I took part in a project in which we used an IWB every day. It's a pity that it lasted for one year only. I was supposed to test activities designed for interactive whiteboards. Initially I was a bit afraid of using an electronic board but after a few lessons I really liked it and my class adored those lessons".

As for the reasons teachers cited for starting using technology, these were twofold: a personal choice or/and an external obligation, such as requirements stated in the core curriculum or school policy, e.g. necessity to use digital registers.

Digital technologies and teachers' sense of professional role

Responses concerning teachers' role as professionals often contained the word "guide", supporting children in their development, whose job was not limited to the walls of the classroom. Priority was also given to the use of technology for educational purposes: "The role of the teacher changes from a traditional knowledge provider rather into a facilitator, guiding the students' learning processes and engaging in joint problem-solving with the students. I think nowadays the most important actions of the teachers are located across spaces"; "A primary teacher should be a guide, a helper, a supporter and a friend. My most important actions are in the classroom. But I can also influence, to some extent, children's development outside the school, e.g. through homework activities, trips we have once a month to different places and institutions in the city, visits to the theatre, museums, etc.". Participating teachers stated that technology ought to be added to the teaching process but should not dominate the lesson, considering that keeping a balance "is the key to success". Participants also expressed their concerns over potential threats relating to the use of technology in education. Nevertheless, educational benefits of technologies were highlighted: "Learners should have opportunities to use ICT in various educational areas at school and should learn about the educational benefits of technologies. Young learners use technology in a "shallow" way – only to communicate with their peers, to share photos. They are often not aware of the fact that technologies are a source of

knowledge, cooperation and development in the whole life". Multisensory learning, constant development of communication and linguistic skills, learning through play were among indicated by teachers as opportunities available for children in a digital environment.

6. Portugal

After a period of strong investment regarding ICT infrastructure and equipment (2007-2010), Portugal faced an economic and financial crisis, which led to a considerable setback in terms of the frequency and variety of ICT use at school (OECD, 2015)[18]. Data from 2016 reported a student-computer ratio of 11.4 in the 1st Cycle (1st to 4th grades) in 2007/08 and of 6.4 in 2014/15 (DGEEC, 2016)[19]. Additional data indicate that the use of technologies in the classroom, both for teaching and learning was not frequent (Pereira, Pereira & Melro, 2015[20]) and training was lacking (Miguel, 2014[21]). On the contrary, the use of technologies outside school by families, teachers and children evolved exponentially and is now becoming more common at earlier ages. In Portugal, 22% of 3 to 5-year-olds and 63% of 6 to 8-year-olds access the Internet, mainly through mobile devices, half of them using their own tablets (Ponte, Simões, Batista, Castro & Jorge, 2017[22]).

Acknowledging the importance of ICT for the national curriculum, the past few years have been productive in terms of policy documents. The Media Education Curriculum has been approved in 2014 and, more recently, in 2017/18, the Autonomy and Curricula Flexibility

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[18] OECD (2015). *Students, Computers and Learning. Making the Connection*. Paris: OECD. Retrieved March 21, 2019 from http://dx.doi.org/10.1787/9789264239555-en

[19] DGEEC. (2016). Modernização Tecnológica das Escolas 2014/2015 [Technological Modernization of Schools 2014/2015]. Lisboa: Direção Geral de Estatísticas da Educação e Ciência.

[20] Pereira, S., Pereira, L. & Melro, A. (2015). The Portuguese programme one laptop per child: Political, educational and social impact. In S. Pereira (Ed.), *Digital Literacy, Technology and Social Inclusion – Making sense of one-to-one computer programmes around the world* (pp. 29-100). Vila Nova de Famalicão: Edições Húmus.

[21] Miguel, J. (2014). Avaliação do impacto do portátil Magalhães no 1.º Ciclo do EB no Conselho de Matosinhos: fatores de (des)motivação dos agentes educativos [Impact evaluation of the magellan laptop in 1st cycle schools in Matosinhos: Educational agents' (de)motivation] (Doctoral thesis). University Portucalense Infante Dom Henrique, Portugal.

[22] Ponte, C., Simões, J. A., Batista, S., Castro, T. S., & Jorge, A. (2017). Crescendo entre ecrãs: uso de meios eletrónicos por crianças (3-8 anos) [Growing up between screens: the use of electronic means by children (3-8 years old)]. Lisboa: Entidade Reguladora para a Comunicação Social.

Project has been implemented, following the publication of the Student's Profile for the 21st century. In all documents, the use of technologies to support teaching and learning situations that foster the development of young children's digital literacy is both a target and a priority.

Teachers' perceptions and use of digital literacies in their personal lives

In general, teachers interviewed reported the use of different digital technologies in their personal lives for socialising (e.g. sharing pictures and videos), communicating (e.g. with friends and family), searching for information (e.g. a recipe, a piece of news, the weather report) and entertainment (e.g. watching Netflix or listening to podcasts). One participant explained that "Digital technology is an integral part of my life. I check my emails first thing in the morning, carry a tablet all the time and communication apps such as Skype and Facebook Messenger are always on". Another teacher stated that "my daily routine includes technology in the morning, afternoon and evening... (laughs)". In general, teachers also found that the use of digital technologies in their personal lives was much intertwined with their professional lives. As one teacher put it, "sometimes I find relevant resources for my professional activity during personal and leisurely activities", while another adds: "quite often I am searching for ideas related with personal interests during my free time and I find and save some for work purposes".

Even though the majority of teachers acknowledged the importance and constant presence of digital technologies in their personal lives, there were teachers who did not. For instance, one admitted that, "I am a bit clumsy when it comes to using technologies. I don't feel a great appeal or that I can't go without them". Another one mentioned that "I don't like to use technologies. I use a cell phone, because I have to" and still another stated that "I am not [a fan], because I do not take great pleasure in technologies. I only use them if I need to". Differences regarding opinions and uses may be related to age, as teachers reporting little use of or interest in digital technologies were over 50 years-old.

Teachers' perceptions and use of digital literacies in educational settings

The respondents shared some reflections about their role as educators in early childhood learning spaces. One teacher clearly said that "the most important role of the teacher is to teach the student to be a good person, sometimes that has nothing to do with having an A". Another teacher stated that "the teacher is not the holder of all knowledge. I do not know everything, do not dominate everything, but when I'm looking for something I show them how I do it, so that they are also able to do it. And when we are able to get off the teacher's pedestal, it does not matter what is in the handbook, and we show that there is something so vast that goes beyond anything we all gain from it".

Depending on their conceptions and the control/autonomy that they wished to achieve in the classroom, as well as the resources they had, they fit the digital technologies into their pedagogies. Most teachers recognised the potentials of using digital media to assist in their pedagogies, even if in a superficial form. "Most of the times, the smart board is working as projector" as the teacher "explores the pedagogic contents through images, PowerPoint presentations that are already available, I use the materials available at 'Escola Virtual' that we use a lot as motivation. I also project the class textbook". Another teacher also used technology "to project resources, for students to solve tasks (play with sound, colors, animation)". Mostly, they reported using digital media to search for contents: "[for] Portuguese, I use texts, stories, poems; [for] Mathematics, I use Cusenaire's bars very often, to see the decomposition of numbers; and at the level of the Study of the Environment, to give explanations of something". Digital technology was also used to "record students reading and then listening to them, visualising didactic resources, which helps understand a concept or topic better". Teachers said that projecting a manual, for instance, "is much more appealing [than paper book]. If we try and count how many little minds get distracted while reading, in the book and on the screen, it's completely different. The motivation is there, absolutely sure".

However, some teachers appeared to resist technology use in their classrooms. A kindergarten teacher said: "I think technologies would be a distraction. Here they are learning through playing, with each other, I think that is more important. I am not in favour that they use a lot of technology at this age". Another teacher stated that she didn't "allow tablets and stuff, I feel I need to balance things because then they have the devices and

they go old and want a new want, and get it. They don't get to explore and take advantage of it, with some adapted games…". Others still played the role of convincing parents of the educational capacities of technology, because the latter associated them with playing.

It was an exception to find someone who said that there were particular benefits from the integration of digital technologies in early childhood classrooms, as well as having the resources to use them particularly towards digital literacy pedagogies: "I train fine motor skills, simply with an IPad. I also pick up other materials, but to train writing, I can use an IPad. Those games that show a little dummy and they have to click on the top. This visual perception and speed of response, I can work it with an IPad".

Digital technologies and teachers' sense of professional role

As far as their sense of their professional role is concerned, teachers claimed that technology helped them to upgrade their work, as this teacher said: "I think there is growing acceptance from the teachers to use technology in the classroom, because they have seen the benefits. There used to be resistance, also because there weren't available materials and things were expensive and often for us to use we have to spend from our pockets, and that constraints things, of course". However, claims emerged regarding teachers' professional development in ICT as more dependent upon self-directed activities than official guidance and training: "in terms of official guidelines or policies (what it means and is expected to be achieved inside the classroom) orientations are unclear and not a priority: they depend on the teacher's initiative"; "I know there are some guidelines regarding technology in education. (…) I think the Goals don't mention anything specific, there are just guidelines and suggestions (…), but not compulsory. They might have sent, but they send so much stuff you get... (laughs)"; and, "the focus on technology has increased since the National Technological Plan for Education (NTPE), but they are unclear for preschool".

Again, age appeared to influence the role digital technologies played on teachers' sense of their profession: "Some of them [my colleagues] find it difficult even with the most simple things, it depends. They understand this is the way forward, but I don't know if some will

make it, they are in the end of their careers. It's not a question of generation, because I have a 55-year-old colleague who is way ahead of me and is teaching me. It's about motivation, but probably also generation".

Besides dealing with the lack of adequate training, equipment and technical support, teachers were willing to use ICT in their classrooms, and they mentioned continuous progresses. The investment in technology in Portugal had several phases: one of greater bet, for example with the "Magalhães project" during the NTPE: "We lost that resource [Magalhães laptop]. It was a big investment. These kids now can't do half of what those in the previous cycle did". Nowadays, the "equipment is outdated", which makes the work in the classroom difficult and demands that teachers use their own personal equipment: "in primary schools that function outside school centres, it is complicated to implement some guidelines, because students don't have access to equipment"; "We have limited access to computers and we need to use our own resources. They don't pressure us from the outside because they can't give us the tools. There is no pressure. They are happy if we do it and then ask us to help others…"; "Usually I take my computer to the school, because I have only one computer in the room. I like to show real images instead of only drawings. These are important opportunities for these kids, that don't have access to this at home". The training they had on technology in the classroom was not enough, or was not the most appropriate for their needs: "I had training, because I chose to, I didn't actually feel the need (…). [It] was useful, about 'Surfing and Internet'".

In short, findings from the interviews show that Portuguese teachers use digital media in their personal lives and in the school according to their professional needs. They claim for more training for all technologies in the classroom, but mainly for new equipment. They consider digital technology very important, because it provides information, facilitates communication, and improves students' learning because these feel more motivated.

7. Romania

At the policy level, in Romania, the National Education Law (NEL, 2011[23]) states the aim of digitalisation of the school but nothing is specified in the curriculum for kindergarten and primary school teachers. Despite this, almost all of the teachers we interviewed mentioned that the use of digital technology is well regarded by assessment commissions or that it would bring them some extra points when they apply for a merit-based premium. In 2014, the new handbooks, in line with the NEL, were issued. With the paper version, a digital version was available online, and also an interactive CD attached at the end of the paper copy children received. Nevertheless, some teachers from our interviews complained about the small amount of interactivity of these digital versions.

After successive national or local projects for digitalisation of schools and connecting them to the Internet, all the Romanian school are officially connected to the internet. Yet, as interviews have highlighted, the situation is very uneven, with some schools having old and technically outdated equipment, whereas others are more lucky.

Teachers' perceptions and use of digital literacies in their personal lives

Without being too much on the digital side of living, all the interviewed teachers were connected to the internet and did use digital technology. Thus, all of them reported having a smartphone and a laptop; only few of them mentioned tablets and none of them mentioned wearables or other kinds of smart technologies (as SmartTVs or home assistant). Regarding the applications they used, they mentioned primarily the email (mainly for work-related purposes), and Facebook and Youtube for entertainment. In two cases, although the teachers used Facebook, they eagerly denied their private use of this SNS, stating instead that they used other persons' (close relatives') Facebook accounts and only for professional purposes; hence reinforcing their negative attitudes toward the sharing practices that are specific to Facebook. Only two teachers mentioned explicitly the use of the internet for information. Except for one teacher, who had a blog, the others did not

[23] MNESR (2011), "Legea educaţiei naţionale" [Law of National Education, Ministry of National Education and Scientific Research, Bucharest.

mentioned engaging in any creative activities via digital technologies, or any form of coding or advanced digital skills.

For teachers who were also parents, the influence of that in their media repertoire was visible, either in the devices they used (as being handed down from their children) or about the applications they used ("My children who told me, "you know what, you're not on FB, you don't exist!"). Another teacher mentioned the way in which she used the technology with her niece as being a model for how she planned to use the technology in class, with her future pupils (same age as her niece, 6 years old).

With the exception of a teacher, who declared herself as "pretty addicted to technology" – but who in fact was using the internet and the computer mainly for her other professional interest, as a researcher in history – all other teachers claimed that they used technology moderately. Objectively, this moderation was in their cases due to the lack of available time. Nevertheless, explicitly or implicitly, teachers claimed to be in control of the time they spent with digital technologies. Whereas one of the teacher manifested a totally negative attitude toward technology – "I don't know, I guess it's something of the sorts of a world conspiracy to put barriers between people. (...)They should really keep children out", the others tended to perceive it rather positively, for themselves and for young children.

Teachers' perceptions and use of digital literacies in educational settings

The availability of equipment varied wildly, from classrooms that had smart interactive boards and, sometimes, even tablets for children to those in which there were no computers or internet connection. The most equipped schools were both private ethnic schools – a Jewish and a Hungarian one – and in both situations, teachers were very committed themselves to using digital technology.

In other cases, determined teachers adopted all sorts of strategies to overcome the shortage in digital technologies. Thus, some of them brought their own devices from home and gathered children around a laptop screen, paid regular visits to the school library where this technology was available, or used the ICT laboratory of the school as often as possible. Although the last case would be the most desirable for allowing children to

interact themselves with technology, this was the rarest of cases, as these ICT laboratories were reported to have high occupancy.

The most common use of digital technology in class was, as one teacher put it, “for conveying information, such as showing pictures from the internet or sounds, like bird tweets, or downloading songs”. Almost all teachers mentioned that they used technology in art classes and in science classes (illustratively). Teachers from ethnic minorities found digital technology especially useful for teaching languages (e.g. Romanian language for Hungarian-origin children); the same was the case for the teacher who taught in English.

In some areas, where poverty levels were higher and schools lacked the basic educational materials such as dictionaries, one teacher used the internet to enhance children’s vocabulary in their mother tongue: “Children around here are very poor. They don’t have things; they don’t buy books, because books are expensive, the school’s library is beyond use (it has few and old books-nAV). And those that have access to the internet don’t know how to use it. And so, I taught them how to search. Including images, dexonline (online thesaurus)”.One teacher, after attending a training course about the platforms on which one could develop tests, mentioned using them in class, highlighting their benefits: ‘... you can see in real time what is the class situation, the statistics and the grades. I enter a platform beforehand, choose the subject and write 10 questions and provide the type of answer. And the child checks the answer. And they’re very good (the tests); the results come fast. And they’re really interesting for the children”.

Only few teachers mentioned that they taught children about internet safety issues and this was rather limited to some informal occasions or was prompted by a moral public panic incidence generated by “The Blue Whale”. Specific classes for ICT for children under 8 years old were to be found only in private schools. Almost all of the teachers found digital technologies being useful for attracting children, engaging them – when possible through interactivity, otherwise by video, image, audio (‘shiny tech-tricks’) – and presenting information in a more intuitive way.

Nevertheless, some of them were more critical when it came to its pedagogical value, claiming that children could be distracted by technology and have a wow-approach to the information that would not stick with them as the information taught in a traditional way. A

teacher was rather critical about the easiness of digital technology, that subverted children's perseverance: "The disadvantage is that it hinders children's willpower or their perseverance. They give up easily, they try something new instead of making an effort". Finally, others were critical of technologies because children, being used to coloured and moving images, would respond rather poorly at traditional black and white images or to text-only-based information. The main challenge about which the teachers complained was the lack of equipment and the fact that the preparation of courses was time consuming, both, before the class and in class for setting up the equipment: "Preparing the projector takes at least 10 minutes, which should be taken from teaching time, so I do not use it often".

Finally, some teachers mentioned that they used Facebook or WhatsApp for communication and collaboration with local colleagues and less often in extended professional groups. Most of the time this happened for sharing utility information in relation to school or, not so often, for sharing educational materials. Although more of the teachers are looking for inspiration from the materials posted by other unknown teachers, with two exceptions, they are not keen in sharing their materials or their experience online.

Digital technologies and teachers' sense of professional role

In some cases teachers got nervous when asked if they considered that new technologies would change their role: "Do you mean to say that we should get replaced by robots or something like that?' asked one of the teachers". However, most of them reckoned that nowadays there should be a complementary relationship between traditional and new technology-based pedagogies: "I am not against traditional methods, I would rather combine the two [traditional and modern methods], and not making [education] completely technology based. I think children should develop their own basic skills, and meanwhile to get in touch with new technologies, too".

Also, the majority of them (but not all) considered that the traditional role of teachers as holders of information and of children as passive receivers of it was challenged by the spread of new technologies in educational settings from the earlier age. "The teacher and the students are equal at that moment. There is the same excitement from my part when I

found a material as it is from their part when they can play with it. We move from that formal part in which the teacher is the depository of the knowledge or information, to a new role, in which the teacher is part of the playing activities. (...) It makes teachers equal with kids. I learn, they learn, that means that this is how it should be. And many times, kids are those who teach me." This signifies a shift in the pedagogical roles of all involved in educational practice.

8. Slovakia

Utilising digital technologies in the process of education is a challenging process for early childhood teachers in Slovakia. In generally, teachers are repeatedly encouraged by state school policy institutions to implement digital technologies in classrooms, but without any clear guidelines about how to do that. Insufficient focus on exploring the digital literacy development and digital learning / teaching was recently discussed as an issue in the latest national strategy for the development of education, Learning Slovakia, approved in 2017[24]. Up to the point of the publication of this report, the official strategy of implementing digital technologies for the facilitation of learning in the classroom was not released. Consequently, teachers depend on specialised training programs offered to them by private companies selling different digital devices and programs. These training programs help them to explore the different affordances of a particular device that the training program is targeting, but the specific effects of using these affordances on learning are not elaborated sufficiently in the program. To fill this gap, teachers search for inspiration in specialised websites (Planet of Knowledge, e-Schoolbag) or social networks where they share their teaching plans or ideas for educational activities.

Teachers' perceptions and use of digital literacies in their personal lives

Participants of the study were casual users of technologies in their everyday lives, mostly utilizing technologies as a means for communication and for the identification of

[24] Burjan, V., et al. (2017). Učiace sa Slovensko [Learning Slovakia]. Bratislava: MŠVVaŠ SR. Accessible at https://www.minedu.sk/data/files/6987_uciace_sa_slovensko.pdf

information. As a means for communication, the cell phone, the computer/laptop, and the Internet (as enabling access to social media and different tools of communication as WhatsApp, Skype) were mentioned. Even though teachers used technologies to gain information for their personal lives too (for instance, recommendations for leisure time activities, hiking trips, cooking recipes), they appreciated the affordances of technologies as useful tools for preparing for classroom activities, too. This included searching for ideas and ready-to-use materials for teaching on the Internet and in specialised groups of teachers at social networks, using technologies to prepare materials for classroom activities (e.g., preparing ppt. presentations, printing out worksheets for children, etc.). The utilisation of technologies in different domains of their lives (both covering their personal sphere and their professional activities present in home environment) appeared to be a source of their positive attitudes toward digital technologies.

Teachers' perceptions and use of digital literacies in educational settings

Describing the role of digital technologies, teachers mostly mentioned digital technologies that enabled them to display diverse materials used for teaching (as were pictures, scanned pages from books, etc.) and implement diverse educational software for interactive smartboard and computer / notebook, especially appreciating it if they were provided access to the Internet. Among the digital toys they were mostly familiar with a BeeBot that was also recommended to be used in the classroom by the national curriculum. Also, teachers often spoke about using a CD or DVD player, as it was—from their point of view—a tool that enabled them to facilitate the diversity of inputs in the classroom and thus actively involve children in a task.

In explaining the role of digital technologies in the classroom, teachers distinguished between the perspective of the teacher and the perspective of a child. Implementing digital technologies in the classroom was perceived as the necessity enhanced by the technological innovations in society, on the one hand, and the evidence that a teacher was actively involved in her professional development. For teachers, besides using digital technologies as an easy way to access diverse materials for teaching and display them in the classroom, digital technologies served as important means for outreach. Teachers often complained that parents were reluctant to appreciate their impact on children´s

learning as they “think we're just playing with them”. Teachers attributed this to the low status they had in society and appreciated digital media as means enabling them to present their activities on the website of the preschool so that parents could “see from the photos on the wall or on the school website what everything is being done here with the kids”. Considering the perspective of a child, teachers reported that they experienced positive responses by the children when they used digital technologies in the classroom. The motivational effect of digital technologies implemented in the classroom was repeatedly expressed by teachers, portraying these as means enabling them to “make learning more attractive”, repeatedly experiencing that “the overall educational process is attractive, non-traditional and children are active and like to be involved in such activities where we use digital technologies”.

Digital technologies also found their place in the classroom as devices helpful to maintain the flow of activities, efficiently substituting the role of the teacher in the classroom. Digital technologies appeared to help facilitate learning by providing variable options for practicing skills, optionally also respecting preferences and the learning potentials of a child. The immediate feedback from the educational software was appreciated as facilitating a child’s awareness about a given learning task.

In planning educational activities that involved the implementation of digital technologies, teachers did not seek to take advantage of unique experiences children had outside school settings. As they argued, there was a clear distinction between in-school learning and the unsystematic and incidental exploration of digital technologies outside school environment. Diversity of these practices included home implementation of digital tools targeting play and getting used to technologies (mostly playing diverse computer games) and systematic implementation of educational software enabling systematic development of skills and competencies and knowledge focused on school readiness in case of inside school context. Setting the clear distinction between outside-school and inside-school practices helps to improve the self-awareness of teachers as professionals and communicate it towards the parents and thus express the need to strengthen their status in society. As parents were mostly uninterested in what was happening in the classroom (although some teachers may had different responses from parents regarding the implementation of digital technologies in the classroom, including both negative and

positive attitudes), teachers did not feel the pressure to accommodate their classroom practices towards their expectations.

On the other hand, teachers who got familiar with digital technologies later in their life, mostly because their preschools and classrooms were provided with digital technologies, or experiencing the success of their younger colleagues in implementing digital technologies, felt less comfortable implementing digital technologies in the classroom by themselves. The gap between their skills to handle digital technologies and the skills of children developed through everyday use of digital technologies made them uncertain of how to target the further exploration of a given digital device by children. They had experienced that in exploring digital technologies "children are even more skilled than teachers" in terms of skills developed and of their boldness to learn how to use the device. Although, teachers who participated in the study tended to have positive attitudes towards using digital technologies in the classroom, some of them preferred offline activities in the classroom to balance the amount of time children spent outside preschool "playing video games". The problem of constrained attention and children´s obesity as the consequence of a growing time spent with activities on digital technologies was also raised by one of the study participants. This suggested that the issue of the negative impact of digital technologies on children was not critically discussed by teachers yet.

Digital technologies and teachers' sense of professional role

In general, the planning of classroom practices primarily included the selection of an educational target from the national curriculum, the identification of the experiences of children with digital technologies or their age and the determination of the role of digital technologies in the flow of educational activities. Mentioning primarily the subject areas of "Language and Communication" and "Math and Information" as targeting the implementation of digital technologies, participating teachers referred to the explicit presence of educational targets focusing on exploring the use of digital technologies in the national curriculum. Interestingly, some of the teachers referred to all subject areas, explaining that "when a teacher can properly connect digital resources with other resources, they can be used really everywhere, in each area". Consequently, exemplifying these options yielded educational areas such as "Music" and "Physical Education" where

the use of digital technologies was least expected. This tendency was consistent with their effort to show their creativity and professionalism that is considered as the core of their professional identity.

Interestingly, teachers wove complaints about their low status in society (especially experiencing the attitudes of parents on preschool education) into their perceptions of digital technologies in their classroom settings. They did so by accentuating their professional approach to implementing digital technologies in the classroom that focused on particular learning tasks (not incidentally exploring how to handle technologies or playing digital games considered by them as typical for out-of-school settings); and, by also appreciating the role of digital technologies in increasing the visibility of their activities for parents and the public, especially through the websites of the preschools where they taught.

Cross-Country Findings: Emerging Issues and Implications for Policy and Teacher Education

In this final section of the report, themes and issues that emerged from the cross-country analysis of the data are discussed with reference to key implications for policy and teacher education. Given the nature of this project and the diversity of contexts in which interviews were conducted, these final thoughts should be read more as indications of rather than concrete conclusions on teachers' digital literacies, experiences, and professional practice. Teachers' digital literacies and related professional practice are notably situated in local institutional contexts with varied understandings of the digital and differential levels of support to early years' and primary school teachers. Across participating countries, the "digital" is rarely defined directly, while it is mostly connected to computing and Internet and Communication Technologies (ICTs), to media use, and to access to digital tools and the internet. The emphasis lies on the development of technical skills and the utilisation of digital technologies as tools for content-specific learning (as in the case of ICT or computing courses) or as means for the development of cross-curricular competences (of, e.g., problem solving, computation, and so on). Notions of digital literacy are less connected to production, critical engagement, or locally situated meaning-making with both digital and non-digital recourses, even in the case of countries where digital literacy as a term is explicitly included in official policy discourse.

Across countries, there appears to be a differential approach to the digital for different age groups, with less references or more restricted views thereof (as, e.g., the utilisation of digital tools) in official documents that frame the educational experiences of younger children. In addition, gaps appear in terms of the ways in which policy guidelines or curricular content should be implemented in everyday practice, as well as inform teacher preparation and education programs. Despite this vagueness, most countries report (a) the gradual increase of attempts to address digital literacy as part of the core school curriculum; and (b) the existence and availability of digital tools and devices, with differential experiences of availability both within and across contexts due primarily to socio-economic circumstances.

In regards to teachers' digital practices in their personal lives, it was found that digital technologies were an integral part of their everyday lives across contexts. Particular

devices like teachers' smartphones, laptops, and tablets were used for socialisation, communication, and information. There were significantly less references to the utilisation of digital technologies for entertainment or creative production, rendering teachers consumers rather than producers of digital media and tools. Participating teachers positioned themselves differently as adult users of digital technologies, with many being positive, but also noticing intergenerational differences between themselves and younger people (be those colleagues or children), as well as between their own and contemporary childhoods. While those were connected to feelings of anxiety and ambiguity in regards to risks and precautions, expressed much by those who were also parents of young children, participating teachers also acknowledged children's relevant expertise.

Among the most prevalent themes across contexts was the interconnection of teachers' digital literacy practices across personal and educational settings. Describing the use of digital tools and technologies in their personal lives, most participating teachers admitted to be utilising personal time for practices linked to their professional practices, with lesson planning and preparation being the most prevalent ones. While they were most likely to use a laptop or personal computer rather than their mobile phones, teachers across contexts reported to use technologies to identify and modify instructional materials, yet with only a few utilising online platforms or other spaces to share their own materials. In addition to preparation, in-school practices varied according to the availability of resources, with teachers from different countries making comparisons across schools and school types, and reporting on the difficulties that emerged from the limited resources within classroom spaces, the inadequacy of available devices, the placing of digital tools in labs that were shared among large student populations, or even the existence of institutional constraints in terms of internet accessibility and use.

Nevertheless, teachers were positive about the use of technologies for teaching, suggesting that they motivated children, offered additional channels of communication both within the classroom and with parents and carers, and increased the possibilities of immediately addressing children's needs and interests. To achieve these goals, teachers utilised different digital tools and devices, including the interactive whiteboard and classroom computers, with fewer references to mobile devices or other media for creative production by children or themselves. Acknowledging that young children needed to best develop as learners in the digital age, many teachers reported that they had to rely on

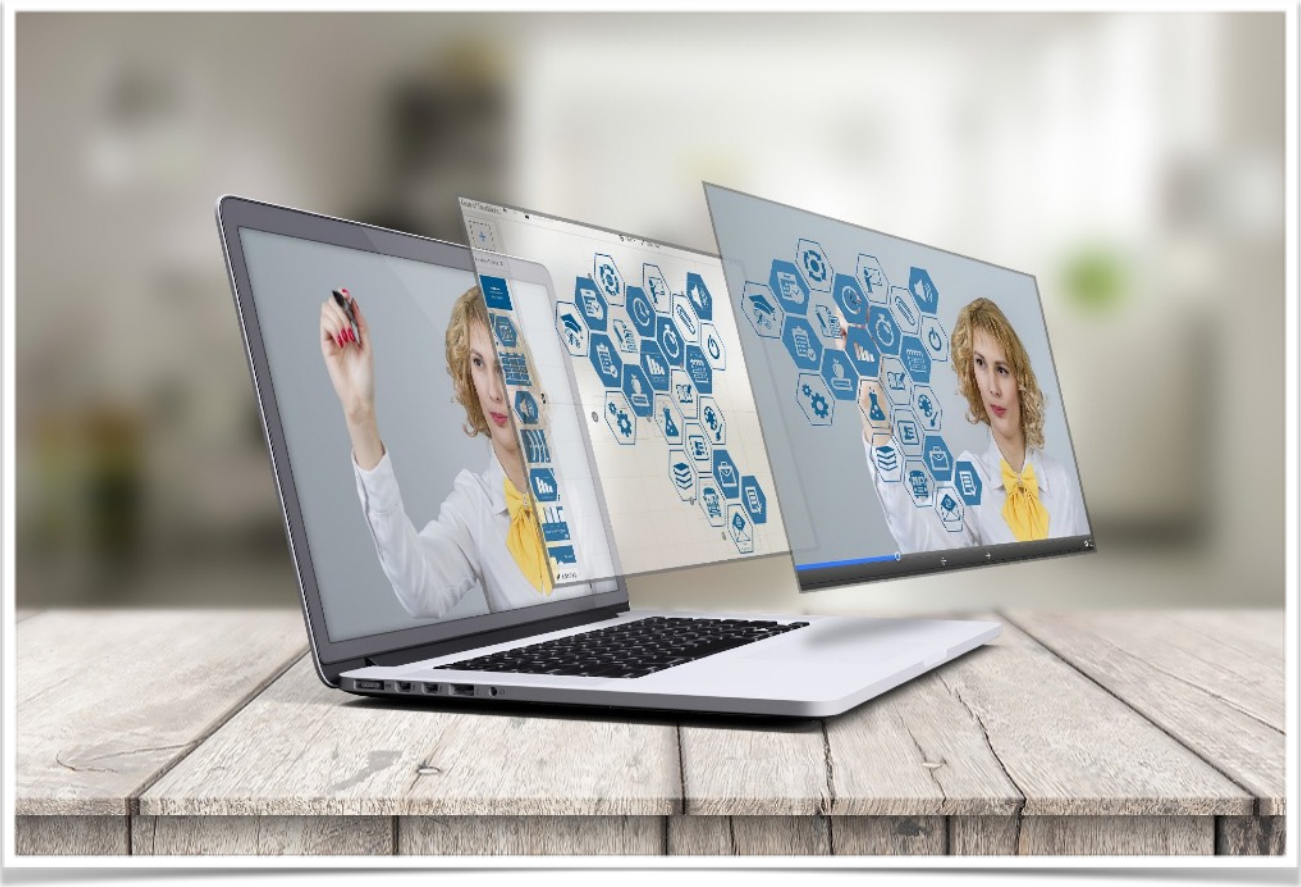
personal initiative to overcome difficulties relating to the integration of digital technologies in their classroom practice. They further implied that they were not adequately equipped to teach toward this end, suggesting that they needed more support in terms of their preparation and in-service learning. They were also more eager to integrate digital technologies in their teaching if they were convinced of the pedagogical value thereof, which they linked to notions of "appropriateness" for young children.

This latter point suggests that, despite openness to the integration of digital technologies in early years and primary school settings, the majority of interviewed teachers reported using technologies to rather reinforce and perhaps expand rather than reconfigure their central role in the classroom. It was thus not uncommon to refer to the interactive whiteboard or the classroom computer and projector as key devices in everyday classroom practice. Teachers claimed that digital technologies and media helped them upgrade their work or even showcase it to external audiences (e.g., to officials and or parents where their social status was perceived as low). However, they concurrently asserted that technologies should not overthrow them or dominate classroom practice, especially in the case of younger children. Indeed, young children's education was linked to pedagogical visions of educating the whole child through naturalistic processes that included the manipulation of tangible materials and the direct contact with people and the social world. Interestingly, the digital did not appear to be part of that.

These emerging themes and findings have implications for education policy and teacher education, particularly in regards to the early and primary years. At the policy level, early and primary education need to be expanded to incorporate both a broader range of tools and materials and a broadening notion of literacy that incorporates digital literacy not only as a set of technical skills but also as part and parcel of children's and adult's repertoires for making meaning in a digitised era. Policy makers should also acknowledge the differential meanings and experience of such digitisation, and thus offer a variety of tools and scaffolds to foster learning that best makes sense at each particular case. This means not only providing more specific guidelines to teachers, but also ensuring equitable access of schools, adults, and children to adequate and relevant resources.

In terms of teacher education, findings from this inquiry suggest that teachers' professional digital practice is informed by their long-held assumptions about the pedagogical potential

of digital technologies in early years' and primary classrooms. These assumptions are often shaped by their own experiences as users of technologies in their personal lives. However, those are not linearly transferred into classroom practice, but are rather traversed by the teachers' established understandings of early years' education, pedagogy, and children. Pre-service and in-service teacher education thus needs to address such complexity, by providing ample opportunities to teachers to experience the differential benefits of digital devices both as users and as designers of curricula for the early years. However, these learning opportunities should move beyond the training of teachers on latest technological innovations to the in-depth examination of and critical reflection upon the possibility that long-held pedagogical beliefs may be reframed by a view of the digital as a space, means, and context for children's (and adults') meaning-making through creation, experimentation, collaboration, and social interaction.



Cited Work

Brown, C., & Czerniewicz, L. (2010). Debunking the 'digital native': Beyond digital apartheid, towards digital democracy. *Journal of Computer Assisted Learning* 26(5), 357–369.

Burnett, C. (2011). Pre-service teachers' digital literacy practices: exploring contingency in identity and digital literacy in and out of educational contexts. *Language and Education,* 25(5), 433-449, DOI: 10.1080/09500782.2011.584347.

Danby, S. J., Fleer, M., Davidson, C., & Hatzigianni, M. (2018). Digital childhoods across contexts and countries. In S. J. Danby, M. Fleer, C. Davidson & M. Hatzigianni (Eds.), *Digital childhoods: Technologies and children's everyday lives* (pp. 1-14). Singapore: Springer.

Edwards, S. (2016) New concepts of play and the problem of technology, digital media and popular-culture integration with play-based learning in early childhood education. *Technology, Pedagogy and Education*, 25(4), 513-532. DOI: 10.1080/1475939X.2015.1108929.

Forzani, E., & Leu, D. J. (2012). New literacies for new learners: The need for digital technologies in primary classrooms. *The Educational Forum*, 76(4), 421-424.

Graham, L. (2008). Teachers are digikids too: The digital histories and digital lives of young teachers in English primary schools. *Literacy,* 42(1), 10-18.

Graham, L. (2012). Unfolding lives in digital worlds: Digikid teacher revisited. *Literacy,* 46(3), 133-139.

Gruszczynska, A., Merchant, G., & Pountney, R. (2013). "Digital futures in teacher education": Exploring open approaches towards digital literacy. *Electronic Journal of E-Learning*, 11(3), 193-206.

Kucirkova, N., Littleton, K., & Kyparissiadis, A. (2018). The influence of children's gender and age on children's use of digital media at home. *British Journal of Educational Technology*, 49(3), 545-559. doi:10.1111/bjet.12543

Laidlaw, L., & Wong, S. (2016). Literacy and complexity: On using technology within emergent learning structures with young learners. *Complicity: An International Journal of Complexity and Education,* 13(1), 30-42.

Lindahl, M.G., & Folkesson, A.-M. (2012) Can we let computers change practice? Educators' interpretations of preschool tradition, *Computers in Human Behavior,* 28(5), 1728-1737.

Mertala, P. (2019). Wonder children and victimizing parents – preservice early childhood teachers' beliefs about children and technology at home. *Early Child Development and Care*, 189(3), 392-404. DOI: 10.1080/03004430.2017.1324434.

Palaiologou, I. (2016). Children under five and digital technologies: Implications for early years pedagogy. *European Early Childhood Education Research Journal*, 24(1), 5-24, DOI: 10.1080/1350293X.2014.929876.

Plowman, L., & JMcPake, J. (2013). Seven myths about young children and technology. *Childhood Education*, 89(1), 27-33. DOI: 10.1080/00094056.2013.757490.

Prensky, M. (2009). H. sapiens digital: from digital immigrants and digital natives to digital wisdom. *Journal of Online Education*, 5(3), 1-9.

Thorpe, K., Hansen, J., Danby, S., Zaki, F. M., Grant, S., Houen, S., ... & Given, L. M. (2015). Digital access to knowledge in the preschool classroom: Reports from Australia. *Early Childhood Research Quarterly,* 32(3), 174-182.