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Multimodal Lifeworlds: Pedagogies for Play Inquiries and Explorations

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ABSTRACT: In this paper, we advocate a reconceptualisation of early learning in the 21st century in the form of multimodal lifeworlds. We review the research literature on the role of new technologies for young children's learning, both in their homes and in educational contexts. We contend that, in order to make our work accessible, and to describe the ways in which digital artefacts can create new contexts for learning, we should foreground the learning that is possible in contemporary multimodal learning ecologies. We raise complex questions and issues that require consideration as we plan for pedagogies that will encourage, support and transform children's learning. The paper presents an understanding of new and continually evolving technologies as artefacts that inhabit the contemporary child's lifeworld. These resources form part of their suite of learning devices, which impact on children's identities, learning ecologies and how they make meanings of self. Finally, we present a possible conceptualization, which combines these elements that are relevant for pedagogical planning, discussed in the article, to consider how new technologies, as social, cultural and personal artefacts can contribute to children's learning ecologies.

Keywords: *multimodal lifeworlds, early childhood pedagogy, new technologies, digital identity, early childhood education*

Introduction

Contemporary early childhood research focuses a great deal on the ways that we might use new technologies to support young children's early learning experiences in schools, home and community settings (e.g. Arnott, Palaiologou, & Gray, 2019; Johnston, Highfield,

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& Hadley, 2018; Scott & Marsh, 2018; Yelland, 2018; Yelland & Gilbert, 2018; Yelland & Gilbert, In press). Such research is vital because we have moved beyond discussions that create moral panic to usefully focus on what appropriate technological or digital pedagogies (e.g. Fleer, 2017) looks like in early childhood. This approach is valuable, but in such a vastly progressing field, a holistic overview of children's worlds would help position new technologies in practice. By embracing the complexities and multiplicities of children's multimodal 'lifeworlds' - defined as "the intertwining relationship between human beings and their world" (Pálmadóttir & Einarsdóttir, 2015, p. 1481) – we start from an alternative perspective which incorporates a growing array of innovative digital resources to explore new technologies as social and cultural artefacts.

We draw on a wealth of rigorous research to embrace the wholeness of children's digital worlds and offer a contextualised discussion for how to engage and support children with new technologies are part of early childhood practices. Here, drawing from educational as well as sociological and anthropological discussions, we attempt to interrogate the miscellaneous interlinking elements that are apparent in young children's technological learning landscapes by considering the ways in which new technologies connect with contemporary educational practices and modalities. We seek to consider how we can (re)conceptualise identities, position, place and agency in children's increasingly complex multimodal lifeworlds, which incorporate digital materials.

In order to support practitioners, parents and children about how best to utilise new technologies, navigate complex multimodal languages that incorporate the digital and develop agentic multimodal practices, it is first necessary to understand how the nature of children's experiences have been transformed in contemporary times. Some of these concepts have been addressed separately in other research (e.g.Hatzigianni & Kalaitzidis, 2018; Johnston et al., 2018; Marsh et al., 2018; Yelland, 2018; Yelland, 2016) but here, in this largely conceptual paper, we present our interpretation of children's multimodal lifeworlds which combines many of these concepts in a new framing of the basic elements of children's everyday lives. We seek to build on contemporary work which shifts arguments away from a moral panic around time usage of new technologies, most particularly in the discussions around the 'screen time' (See Blum-Ross & Livingstone, 2018; Hiniker, Radesky, Livingstone, & Blum-Ross, 2019 for an overview) and the binary positioning of traditional play materials and new technologies at the opposite end of a continuum. We seek to consider how new technologies, which continue to evolve and emerge, as artefacts of the 21st century can enhance children's learning when used together with three dimensional materials that encompass various and complex explorations and forms of meaning making.

In attempting this, we describe contemporary landscapes that have the potential to enrich children's early learning experiences. We refer to research that builds on and

extends ecological explorations and debates of technologies in the early years (Arnott, 2016; Plowman, 2016). What we present here is an attempt to broaden and deepening our understandings of the ways in which new technologies can transform pedagogies and practices in early childhood education for a new generation of learners. This includes rethinking play and the ways in which new technologies can be included in play-based programs (Yelland, 2011). These elements can then be combined to act as a foundation to assist practitioners about how they might enact pedagogical planning that is relevant for early learning in the 21st century.

Positioning childhoods in the 21st century

Researching new technologies in early childhood remains a popular area, not only in education but also in media studies (e.g. Livingstone, Mascheroni, & Staksrud, 2018; Salomaa & Mertala, 2019), sociology (e.g. Mascheroni, 2018) and computing education (e.g. Manches & Plowman, 2017), to name a few.

The complexity and diversity of discussions has led early childhood researchers to expand the scope of research by going beyond analysing the affordances of technologies for cognitive development to recognising that in an ecological educational context, technological affordances are only one element in a complex culture (Arnott, 2016; Marsh, 2017). Thus, we have just started to understand the extent to which childhoods are impacted by innovative new technological advances and have documented the ways in which children's everyday experiences are changing as a result of the availability of new artefacts and constantly connected lives. In the context of this paper, Yelland (2018), for example, has contended that what is different about learning in the 21st century is that, while learning has always been multimodal - incorporating linguistic, visual spatial, aural, and kinetic dimensions - digital technologies have impacted on these modalities in significant ways. In the main, technologies can be regarded as a new modality in their own right.

Challenges remain in our understandings of childhoods in the 21st century and in integrating new technologies into children's learning cultures. Current ideas about childhoods remain polarised, often causing confusion for those seeking to implement technologies with children. The messages portrayed in research evidence (which move beyond the *why* towards the *how* technologies can be beneficial and skilfully integrated) are not necessarily the messages portrayed in popular and tabloid press. Consequently, practitioners are not necessarily receiving an accurate research narrative. For example, Arnott's current research project (See Arnott, Palaiologou & Gray, 2019) continues to show parental and staff concerns being expressed about how best to use new technologies for children and difficulties with 'justifying' the integration of certain resources into practice because of the perception that digital technology use by young children is problematic. Consequently, we know for example that parents and

practitioners remain anxious about how to integrate technologies into practice and home life (Hatzigianni & Kalaitzidis, 2018, Huber, Highfield, & Kaufman, 2018).

Such unprecedented changes in society and educational artefacts constitute an expansive subject area to conceptualise, which can result in segregated discussions and compartmentalisation of the debate for simplicity, or indeed to bring clarity to one small pocket of a highly complex and dynamic discussion. For example, in education alone, research regarding the use and affordances of technologies in young children's lives and learning is now vast and includes thinking through:

- the pedagogies that enable learning with new technological devices (Fleer, 2017, 2018);
- comparisons between technology use in home versus schools (Edwards, Henderson, Gronn, Scott, & Mirkhil, 2017; Gillen & Kucirkova, 2018; Henderson, 2011)
- what constitutes digital play and how it is implemented (Arnott, 2016; Bird & Edwards, 2015; Danby, Evaldsson, Melander, & Aarsand, 2018; Hatzigianni, Gregoriadis, Karagiorgou, & Chatzigeorgiadou, 2018; Marsh, Plowman, Yamada-Rice, Bishop, & Scott, 2016); and
- the changing nature of literacy in the 21st century to incorporate multiliteracies (Flewitt, Messer, & Kucirkova, 2015; Harrison & McTavish, 2018; Sefton-Green, Marsh, Erstad, & Flewitt, 2016; Yelland, 2018).

Additionally, there are considerations about the use of new technologies by young children in other disciplines, like media studies, cultural studies, human geography and sociology. This has been foregrounded most recently in a consolidation of research about the Internet of Toys, (see Mascheroni & Holloway, 2019), where not only pedagogical interrogations have been conducted, but also research centred on safety and the privacy rights of users, as well as and the potential datafication of childhood is important (Lupton & Williamson, 2017; Mascheroni, 2018).

Across this expansive body of work, there is significant merit in shaping our understanding of the early childhood learning in contemporary times. The totality of experiences, however, may then become absent. For example, there are few holistic conceptualisations of the ways in which new technologies have transformed our perceptions and social constructions about 'childhood', and in doing so altered the fundamental assumptions from which children are learning. Two examples, however do come to mind in the work of Papert (1980; 1987; 1993, 1996) and more recently Craft (2012).

Conceptualising childhoods and multimodal lifeworlds

In 1980 Seymour Papert published his ground-breaking book; *Mindstorms: Children, computers and powerful ideas.* From the beginning, Papert was interested in the way that computers may affect how we think and learn and in designing *Logo*, a programming language that had a simple entry point with a turtle robot, his goal was to promote child -initiated learning; environments in which the child programs the computer. While Papert was lauded by many, there were also many others who dismissed his contentions saying that any learning acquired in the *Logo* environment was not transferred to others, like in school-based tests of competence. This can be contrasted with the large-scale emphasis on coding now being regarded as a new literacy and fundamental to future jobs. In this way Papert's focus was not on the technology but on learning. He was more concerned with the mind than the machine. Papert likened his Logo 'mathland' to learning French in France. He regarded the turtle as an 'object to think with' (p.11) in a learning context where there was an 'intersection of cultural presence, embedded knowledge, and the possibility for personal identification.' (p. 11). He noted that knowledge that was previously abstract and only accessible via formal processes could be encountered with the materiality of the turtle and understood, and in the process of doing this that they were also learning how to learn. Papert recognised that there was a need for a new conceptual framework for understanding ideas in mathematics in light of the use of computers. He did not want mathematics to become 'computerized' (p.184) but rather called for a revolution in our approach to the teaching of mathematical ideas that would be 'valid without a computer' (p.184). He contended that '…the whole process involves a dialectical interaction between new technologies and the new ways of doing physics.' (p.184).

Papert said that 'the technology itself will not draw us forward in any direction…the price of the education community's reactive posture will be education mediocrity and social rigidity. (p.186) Technology has 'catalysed the emergence of ideas' (p.186) but these are only allowed to flourish in contexts that are encouraging of exploration, problem solving, and discovery. Papert (1980) thus advocated for a childhood in which learning by *doing* was the primary way of learning and making new discoveries, technology was an inevitable part of the mix of materials that could support new ways of thinking and learning.

A more contemporary attempt that has been made to conceptualise childhood from a broad sociological perspective, as a result of the availability of the digital technologies is the work of Craft (2012). Craft (2012) proposed that we should view children as agentic beings and attempt to interpret their experiences from the collection of diverse materials and social interactions that they encounter. The work here resembles much of the educational literature, which seeks to position children as active agents in their learning,

from a children's rights perspective. From this, she suggests that discussions about childhood in a digital age are either classified as being passive/ at risk, or empowered. It resembles the polarized debate described above between tabloid press and research. The former suggests that children are at risk from the dangers associated with new technologies and that it is the role of adults to protect children from associated harm. Alternatively, the view that children are empowered by increased easy access to new technologies suggests that new devices are giving children increased opportunities for creative expression (the position advocated in many of the research studies incorporating new technologies in childhood described in the previous section).

For our conceptualisation of multimodal lifeworlds, Craft's 4Ps of Digital Childhoods offers an interesting exploration of childhood in contemporary society by holistically conceptualizing the nature of children's lives. She argues that childhood is underpinned by Plurality of Identities, Possibility Awareness, Playfulness and Participation. She defines these terms as follows:

> *'Plurality of identities (people, places, activities, literacies), possibility awareness (of what might be invented, of access options, of learning by doing and of active engagement), playfulness of engagement (the exploratory drive) and participation (all welcome through democratic, dialogic voice)'* (Craft, 2011, p. 33).

Craft's vision was insightful as her work appeared at time when iPads were just launched, and the body of research, which demonstrates the possibilities for new literacies and creativities was still emerging. In the last decade since this conceptualisation was presented, plurality of identities and participation have become increasingly prevalent in any discussion about childhoods. For example, we see discussion of children managing and exploring offline and online identities (Marsh 2016). Similarly, the ability for children to co-create digital worlds of their own (Marsh et al. 2018; Blum-Ross et al 2019), even for very young children, has become increasingly important.

Despite the possibilities offered by Papert and Craft's theorising, practitioner and parental anxiety about incorporating digital pedagogy in early childhood remains. What is needed is a holistic understanding of multimodal childhoods and an understanding of how this translates to practice. Plowman, (2013), in her inaugural lecture at the University of Edinburgh highlighted parents' (and potentially teachers), tendency to look back on their own childhood as a point of reference for how they support their own children in their upbringing. With technologies, this frame of reference is absent because technologies did not exist when they were at school.

The rapid evolution of new technologies also means that even relatively young adults who are now becoming parents and teachers, and who we might think have grown up with technologies, might still be unfamiliar with new resources. Not least because new artefacts are emerging at unprecedented rates making it impossible for adults or children

alike to assume the role of expert. Rather, we are entering a time where expert knowledge of technological tools is not rooted in age related dimensions and instead parents, practitioners and children are learning together with new technological artefacts (Arnott et al., 2019). What is needed is an understanding of the multiplicity of elements that contribute to multimodal lifeworlds in a digital era, in order to build pedagogical repertoires that embrace these elements.

This paper interrogates three fundamental questions which must be addressed if we are to arrive at that holistic understanding of the place of new technologies as part of pedagogies that plan for multimodal play inquiries and explorations:

1. What are multimodal lifeworlds and how are they applicable to understanding early childhood learning?
2. How are children's learning identities emerging and developing in an era where children have to negotiate both embodied and digital identities? How we can reconceptualise the child's identity, position, place and agency in their increasingly complex digital and multimodal habitus?
3. How can we draw on our theoretical understandings of Multimodal lifeworlds to frame children's pedagogical and ecological early childhood experiences in contemporary times? In what ways can this knowledge help us plan for pedagogies associated with *multimodal play inquiries and explorations*, which consider digital technologies as artefacts bound with social and cultural capital?

The paradigm and conceptual frame

For a conceptual piece, such as this, we recognise the need to delineate the catalyst that frames our thinking. We regard two notions as converging in describing the child's lifeworld as holistically as possible. One element is environment – in the broadest sense, and it moves beyond the physical. The second element is the child's lifeworlds. Here we conceptualise the lifeworlds of children as including all aspects of their lived experiences that occur in school, at home and in social/community contexts (Yelland, Cope & Kalantzis, 2008). To address both of these dimensions, we are influenced by ecological perspectives which gives insight into the early learning settings within which our analysis resides (the environment) - and by Bourdieu's (1979) notions of habitus, cultural capital and field to envisage the child's agency within the broader social ecology. Indeed, you can understand the interplay between structure and agency with Bourdieu alone, but the added dimension of ecologies accounts for the complexities in the diversity of the children's digital and multimodal lifeworlds.

Ecologies in the digital and multimodal era

Ecology is a well-established theoretical frame, in which individual, culture, environment and experience are inseparable. For some, it embraces a holistic approach where understanding experience cannot be established devoid of the complexities of context, including the physical and cultural dimensions. In contemporary childhoods and culture, this context is evolving to create new interdependent contexts, that are both physical and virtual which add to the already complex spaces that children inhabit. Understanding the transformation in social ecologies is fundamental to interrogating the notion of digital and multimodal lifeworlds.

In the 1980s and 90s, research on the ecological environments in relation to children's social behaviours was widely available and made close links between the design elements of the environment (the physical planning of the space through pedagogy by children and practitioners) (Read, Sugawara, & Brandt, 1999). The work was grounded in human geography and ecological psychology, which explored the connection between people, their environment and their behaviours (Walmsley & Lewis, 2014). It highlighted the importance of understanding the relationship between the material and social worlds (Thrift, 1996). Such material and social worlds in the early 21st Century have quantitatively changed, in terms of the material hardware available to children. They also changed qualitatively, in relation to children's cultural ways of being, knowing, communicating, living and learning as a result of advances in the design and use of technological artefacts. Revisiting the connections between the material and social worlds of children to arrive at an understanding of digital and multimodal childhoods is timely, and much needed.

Bourdieu: Habitus, cultural capital and field

For Bourdieu, habitus refers to 'a system of durable, transposable dispositions which functions as the generative basis of structured, objectively unified practices' (Bourdieu, 1979, p. vii). Mills (2008) suggested that habitus denotes the recurring patterns of behaviour that often characterise an individual's taken for granted behaviours and everyday practices. Thus, habitus disposes people to specific actions and behaviours without having consciously having to think about them. For young children, their habitus naturally includes new technologies and their ways of being and doing are a complex amalgam of traditional and new media, which impact on their meaning making and understandings about their world. This also impacts on their cultural capital as new technologies become more affordable and thus ubiquitous in their everyday lives across the social spectrum and give them access to the ways of being that they might have once been excluded from.

Cultural capital is an integral part of identity building in our world. Bourdieu (1984) postulated that schools play a critical and increasingly pervasive role in perpetuating the advantage gained from possessing specific knowledge and skills that are valued by society across generations. Accordingly, children who have such knowledge and skills before they begin school are in a favourable position, which they maintain as those literacies and proficiencies are continually reinforced throughout the children's educational careers. This is referred to as cultural capital. Mills (2008) noted that for Bourdieu (1988) schools are "…an institution for the reproduction of legitimate culture through the hidden linkages between scholastic aptitude and cultural heritage.' (p.83). Further, she thinks that "… by broadening the types of cultural capital that are valued in the classroom, teachers can act as agents of transformation rather than reproduction. (p.84)

Additionally, Mills reminds us that while the idea of habitus enabled Bourdieu to reflect on the generative principles underlying practices, he recognised that people act in specific social contexts and settings. In this way, particular practices should not be regarded as being simply a reflection of habitus, but as 'the product of the relation between the habitus, on the one hand, and the specific social contexts or "fields" within which individuals act, on the other' (Thompson 1991, 13–14; as cited by Mills, 2008, p. 85). Here we are concerned with young children who are active in educational contexts, homes and communities (social contexts) which locate their actions and reflect the types of behaviours that they reveal in the particular settings.

Bourdieu's concepts thus enable us to explore the potential of new technologies to impact on learning, school and out of school, identity formation, and how the use of the digital, as artefacts of the 21st century, have re-shaped how young learners think and make meaning in this new era. It creates a useful link to the child's lifeworld as the interlinking relationship between human and their world.

Multimodal lifeworlds: Conceptualizing life and learning

Children's learning experiences have evolved in line with societal developments. We use the word 'evolve' to denote incremental growth, rather than using 'change', because 'changed' could signify a comparison with the past which considers a degree of romanticising (Plowman, Stephen, & McPake, 2010) rather than inevitable progression. We do not suggest that children's experiences are better or worse than previous generation, rather that children are adapting to a changing and rapidly evolving culture, within which connectivity and more fluid ways of operating often make use of technological advancements. In the following sections, we will highlight what we see as

the underlying trends, which are contributing to the evolution of childhood learning and experience:

1) that children live and learn as part of their multimodal lifeworlds, within which technological artefacts offer social and cultural capital;
2) children must now manoeuvre and navigate plural identities which, with the advancement of technologies, has led to embodied and digital selves; and
3) pedagogies in early childhood need to take account of children's tendencies to engage in *multimodal play inquiries and explorations.*

Conceptualising childhood and learning by the artefacts they employ is problematic – as in the case of phrases like 'digital natives' (Prensky, 2001) – not least because definitions of technologies provided in academic literature, government policy and practice guidance, are limited by the fast-paced evolution of these technologies. This often means that by the time research findings in publications become available, definitions are outdated. Hence the nomenclature 'new technologies' to denote the rapid transformation of this sector. Simultaneously, public schools are unable to maintain the momentum to keep up with technological innovations due to limited financial resources. To overcome this, we proposal a broader conceptualisation which is not limited to children but rather pertains to the factors related to society, learning and knowledge building as a whole, while maintaining the complexities of understanding learning as dynamic and multifaceted. We proposed that a conceptualisation of multimodal lifeworlds allows us to interrogate play, learning and knowledge building more effectively in contemporary times.

Multimodal lifeworld and new technologies

Multimodal lifeworlds is a phrase that encompasses plurality of identities; both embodied and digital, and can provide a more holistic perception of children's learning experience. It involves reflecting on the place of new technologies within children's lifeworlds, and moves beyond defining the affordances of the artefacts themselves. Multimodality, recognise that children are immersed with new technologies in natural ways, and that there is fluid progression between their digital and non-digital lifeworlds that spans the linguistic, visual, auditory and spatial dimensions (Kalantzis & Cope, 2012; Kress & Jewitt, 2003; Yelland, 2016). It distinguishes new technologies as part of everyday experiences that impacts on the ways in which learners see, think and make meaning about their world, and in doing so, re-shapes their understandings about self and the ideas and experiences inherent to their lifeworlds.

This is exemplified in Arnott's project (An Ecological Exploration of the Internet of Toys in Early Childhood Everyday Life) where children used digital devices (in this case a digital and wireless microscope that connects to a tablet/iPad) to enable new ways of

viewing natural phenomena. The images shown below (Figure 1) were taken by 3 and 4 year-old children as they explored their nursery world and they demonstrate a unique modality in which children can explore real life contexts. The resources were loaned to the nursery so that they could be integrated into their pedagogy in ways appropriate to the learning context. Practitioners and children made decisions about when and how to use the devices. The portability of the device meant that children were able to explore their surrounding in fluid, yet connected ways, which seamlessly move between digital and physical modalities. Children were able to hold the digital microscope over an object to view it in such focussed detail that was displayed instantly on their iPad. They could take pictures to share their discoveries, which could then be printed, or shared with parents and families via email, and included in pedagogical documentation. The children also shared their images with the researchers, and they are labelled here by us, only to provide contextual understanding for the reader. They were not named in this way by children.

FIGURE 1 Exploring the world though a digitally enhanced modality

Defining multimodal lifeworlds in this way raises questions around the ways that new technologies can be integrated into early years pedagogies. We continue to view technologies as unique and distinct resources, rather than as part of a suite of resources available to learners. What is required is the recognition that technologies are one modality with which children can explore a construct. New technologies not only impact on existing modalities, but are one also a unique modality with which children can explore any construct. We therefore advocate a focus in the curriculum on multimodal learning that incorporates new technologies. In the past, we mapped technologies onto

existing curriculum rather than reconceptualising curriculum for the 21st century. While recognising that new technologies are an essential part of the habitus, that bring with them cultural capital that extends beyond schools, we need to go beyond their token use in education to a recognition of their impact on multimodal learning and our understandings about everyday concepts and lives.

Digital and embodied learning identities

We reflect on the digital family culture and research on contemporary home life to understand the ways that technologies have become common place in many young children's lifeworlds. There was a misconception that new technologies are eroding other traditional experiences and displacing non-digital activities (Plowman & McPake, 2013). Yet contemporary studies enable us to reflect on what children's lifeworlds actually look like in the 21st Century. Most recently new smart toys and the range of items that constitute the Internet of toys (IoToys) are beginning to permeate the lifeworlds of children, though probably not to the extent portrayed in tabloid media (Brito, Dias, & Oliveira, 2018). Studies in the UK have revealed a fluid and integrated use of new technologies by young children, using them as required and not using them when they decide other materials, activities or approaches are more effective (Arnott et al., 2019; Plowman & McPake, 2013). In this way, digital resources contribute to shaping childhoods, and compliment other materials to create learning ecologies that engage children in multimodal learning.

The fluidity with which children can navigate between on- and offline worlds, digital and non-digital resources, necessitates that young children negotiate and adapt their identities in both embodied and digital contexts from birth. As online communities strengthen intergenerational communication and relationships, reduce geographical barriers between family relationships and allow individuals to 'belong' as members of online communities, now more than ever children create and participate in multiple realities, realms and platforms.

Anna Craft spoke about pluralities as being one of the four Ps of digital childhoods (the others being playfulness, possibilities and participation):

> *Pluralities. The virtual dimension to children's lives offers opportunities to engage and experiment with places to play, socialise and create, people to engage with and activities to participate in. Extended literacies (for example, with a greater focus on the visual) which are both possible and demanded in a digital medium enable exploration of other and multiple personal identities. Each of these pluralities inherent in the digital context of children's lives, invites the posing of 'what if?' questions and also engagement in 'as if' behaviours. As Wegerif (2007) points out, digital space offers a dialogic medium for playing and learning which as Frasca (2003) notes, produce complex, reflective understandings in a*

> *community not often found offline. These pluralities are, then, dynamic. The dynamics exhibited in digital virtual spaces are characterised by Molesworth and J. Denegri-Knott. (2005) as 'liminal'. Offering indeterminate, open, ambiguous opportunities, they enable transition between states or existential planes, and as such they argue that digital spaces provide arenas for shifts in culture*. (Craft 2012, p. 180).

We believe that pluralities extend to the sense of self and identity. Within contemporary Western culture, parents and children have evolving multiple identities (Grieshaber & Cannella, 2001). In this paper, we consider their embodied identities (physical, spatial and temporal) and their digital / virtual identities. For the youngest children, parents create contexts to establish children's digital identity via devices and activities that are independent of their physical existence in the world, such as for babies who are too young to physically control or create the online profile. They might do this by posting pictures of their children on Facebook, for example, and including a running commentary on their lives. The notion of 'Sharenting', with the associated privacy concerns, are now widely considered in research (Blum-Ross & Livingstone, 2017; Choi & Lewallen, 2018). As communication technologies provide a mechanism for parents to welcome their unborn babies into virtual communities, parents may act as proxies to create children's presence online. Subsequently it will be necessary for children to make the transition from passive to active participants in, and owners of, their own social networking experience.

The concerns around 'Sharenting', however, relate predominantly to risk and the ethics of creating a digital footprint without the child's consent; an action which may have negative consequences later in life. What is less understood is the impact this process has on the child's lifeworld, their sense of being and how they develop and grow within the context of plural identities. As they are developing their learning identities and their own learning journeys, in both embodied and digital contexts it impacts on the ways we conceptualise learning and play. It leads us to question: Are new sets of skills required to be able to grow up, learn and live in contemporary times?

The interplay between children, their family and digital communities all contribute to the development of children's multimodal lifeworlds from a young age. We need to understand how children progress from being passive participants of online communities (as parents act as gatekeepers or proxy footprint developers for their children) to becoming active owners of their digital and non-digital lives. This then will contribute to the discourse around aspects of children's and young people's psycho-social development, and involves, but is not limited to, the formation and replication of offline and digital identities, transferability of social norms, online vs. offline friendships, and how these develop during the transition from passive to active online participation. Furthermore, from an ecological perspective we need to explore the wider factors, which operate, often independently of the child, to shape their digital identities, potentially without their consent. This is particularly important, not only for the children but also

for digital designers and it is timely in light of concerns for online safety (Edwards et al., 2018), datafication of childhood (Lupton & Williamson, 2017; Mascheroni, 2018) and, information and data sharing as well as privacy (Acquisti & Gross, 2006), particularly in the realm of Sharenting.

The presence of new technologies in all aspects of our lives can be linked to changes in how we construct and share knowledge, what counts as learning, as well as what counts as play (Danby et al., 2018; Burke, & Marsh, 2013; Marsh et al., 2015). The most prominent transformation is the shift towards young children as co-creators of digital media and their instant and easy access to a world outside their immediate physical and embodied space at younger ages (Mustola, Koivula, Turja, & Laakso, 2018). These should incorporate experiences that are plentiful in the home culture, and which replicate the playful learning experiences we strive for in early childhood education. Yet, these experiences are usually far more structured and constrained in early childhood education settings. This is often because there are overarching concerns for safety, security and privacy when new technologies are concerned. A paradox exists. On the one hand, sociological and educational perspectives seek to give children a voice in life, learning and society; while on the one hand, the regulation of children's use of online social spaces and new technologies by relevant legislation, parental control and product development limits their opportunities for "testing boundaries, socializing and for taking risks in safe way" (Bers, 2012, p. 3). Educators therefore might feel constrained, unable to find a balance between support of self-expression and exploration with digital artefacts, while simultaneously addressing safety concerns. This calls for discussions about how we can plan for pedagogies, which focus on multimodal play inquiries and explorations.

Pedagogies for multi-modal play inquiries and explorations

Recent research studies with young children take a broader perspective on the use of new technologies by young children and consider the ways in which they complement traditional resources and experiences (e.g. Arnott 2017). We are beginning to explore the ways in which digital play practices extends traditional conceptualisations, typologies and taxonomies of play (Bird & Edwards, 2015; Marsh et al., 2016; Yelland, 2018). Simultaneously, literacy practices have progressed beyond being defined by traditional print literacy, to incorporate digital literacies, and online applications (Dunn & Sweeney, 2018; Ihmeideh, 2014; Kucirkova, Littleton, & Cremin, 2017). We also know that children are communicating inter-generationally with distant family members virtually (Kelly, 2015); and that early programming languages are becoming more accessible with the development of affordable tactile toys (Bers, 2008). The most cutting-edge literature in this field, demonstrates the ways in which children's interactions with new technologies have moved beyond the once dominated market of edutainment games, towards much more exploratory and creative play inquiries with digital artefacts.

Contemporary research also reveals a transition in children's digital technology *use* towards children's involvement in digital pedagogical documentation, where children are creators of their own narratives via stop animation (Brownell, 2019) and the use of non-working digital technologies for role play and imagination (Bird, 2017; Savage, 2011), to name but a few research projects in this area. In this way, children are using technologies for multimodal play inquiries and explorations, and for reflections about their own learning. In other words, learning *how* to learn.

The following extract from data demonstrates children's awareness of the digital cultures that they see in their lifeworlds. Children use what they see in the adult world to inform their playworld (Bruce, 2018):

> *Ammar[1] is holding a silver calculator to his ear as if it were a phone as he sat next to Hadem. Ammar is chatting away to himself as he holds the calculator to his ear. The calculator is a small compact silver calculator about the size of an adult PDA or phablet so it could clearly be mistaken for a phone by a child…Ammar puts the calculator down on the table beside him. A boy tries to steal the calculator from the table and Ammar runs after him to retrieve the calculator and then returns to the table next to Hadem with calculator in hand. He places it down on the table again…Ammar then tries to put the calculator in his pocket but it doesn't fit so he puts it on the table instead with his hand resting over it and chats to Hadem. Eventually Ammar moves away and he takes the calculator with him. (Data set LA 3: Ph2150908).*

Here, we can see Ammar replicating the regular behaviour of an adult in contemporary western society, using mobile devices to facilitate conversations. Yet, the scenario also reveals the sense that mobile devices are personal artefacts, which should be protected and carried with us as we move through our daily lives. This type of play is not new, of course, as modelling of parental lives through imaginary play has long been discussed as being commonplace. Bruce (2018) for example, talks about play as rehearsal for adult life. What is revealed in this scenario, however, is a salient example of the ways in which society and culture are evolving. It elucidates some of the ways in which artefacts can hold social and cultural capital that is reproduced through generations, and, in this case, the role of digital technologies as being an integral part of everyday practices.

Children need space, confidence and security in order to make meaning about socially and culturally significant artefacts; what they mean to them in their lifeworlds as they grow. Similarly, pedagogues (practitioners, teachers, parents) need to find ways to provide opportunities to facilitate children's lines of enquiry and explorations in relation

[1] Pseudonym

to their digital worlds. We do this using play as the medium for such inquiries and this offers unique opportunities for meaning making. We contend that there is a need to embrace digital artefacts in children's play because children should have opportunities to explore the significance of these artefacts for learning, meaning making and being in their lifeworlds. It does not mean that all children should be utilising new technologies in all aspects of their learning journeys; rather that children's lifeworlds are multimodal and as such their play should be too. It is through play that children construct meanings and if we want children to confidently and safely arrive at conclusions about the role of new technologies in their lives, we need to allow for play, which resembles contemporary cultures.

Conclusions

In this paper, we have presented a reconceptualisation of children's digital learning ecologies that are multimodal. We believe this perspective can act as a mechanism to support the framing of early childhood digital practices that goes beyond just a consideration of the materials or artefacts. Given the increased agentic possibilities for young children facilitated by connectivity and more user friendly devices that enable children's creativity, we suggest children's multimodal lifeworlds can balance a range conceptual interpretations of digital or multimodal lifeworlds, since they are fluid and will shift as children inhabit varying learning ecologies. We think there is a need to recognise that the child's technological landscape is highly complex and moves beyond the availability of new resources. Indeed, the social dynamics of this space transcend time and space (Danby 2018).

Instead, we are beginning to understand how children's social and cultural capital can be transformed, allowing children to connect to learning spaces beyond their physical surroundings, or not, if they so choose, by the availability of these artefacts and their connective capabilities. Busch (2018) for example talks about the social dynamics of intergenerational relationships possible when Skype is used in family communications. Fleer (2018) also presents an understanding of how technologies become an integral part of a child's social system. Understanding the components of children's multimodal lifeworlds will enable us to become more effective in our designs for learning for children in the 21st century.

The notion of agency in children's experiences with new technologies and knowledge construction as being inherently personal, institutional and societal in digital times, is also explored extensively in a book edited by Danby et al. (2018b). The editors present four guiding principles for digital childhoods and state that 'rather than a deterministic perspective, the authors of the various chapters show how children contribute to, and

shape, the contexts in which they interact digitally' (Danby et al., 2018b, p.11). They argue for a recognition of the complexity in the learning process, and the recognition of the non-linear way in which knowledge is created. This brings us full circle back to the work of Papert (e.g. Papert, 1980) where the technology is not central, but learning is. Children need freedom to explore and investigate any resources in their play.

To build on this understanding of the interplay between child, society and culture, we present our ideas as key considerations, which are important when planning for children's multimodal play, inquiries and explorations in early childhood. Figure 2 highlights the key elements that we believe contribute to multimodal lifeworlds and which impact on the ways that children learn, to varying degrees. They offer a starting point for bringing together the complexities of context and the myriad of elements that must be considered by researchers, parents, practitioners and children when supporting innovative and high quality lines of inquiry in contemporary times. They underpin pedagogy across modalities. They are represented as a jigsaw to denote how they fit together to complete a whole 'picture' of multimodal lifeworlds. Yet, we recognize that life is context specific and for others the pieces may shift, change and be replaced.

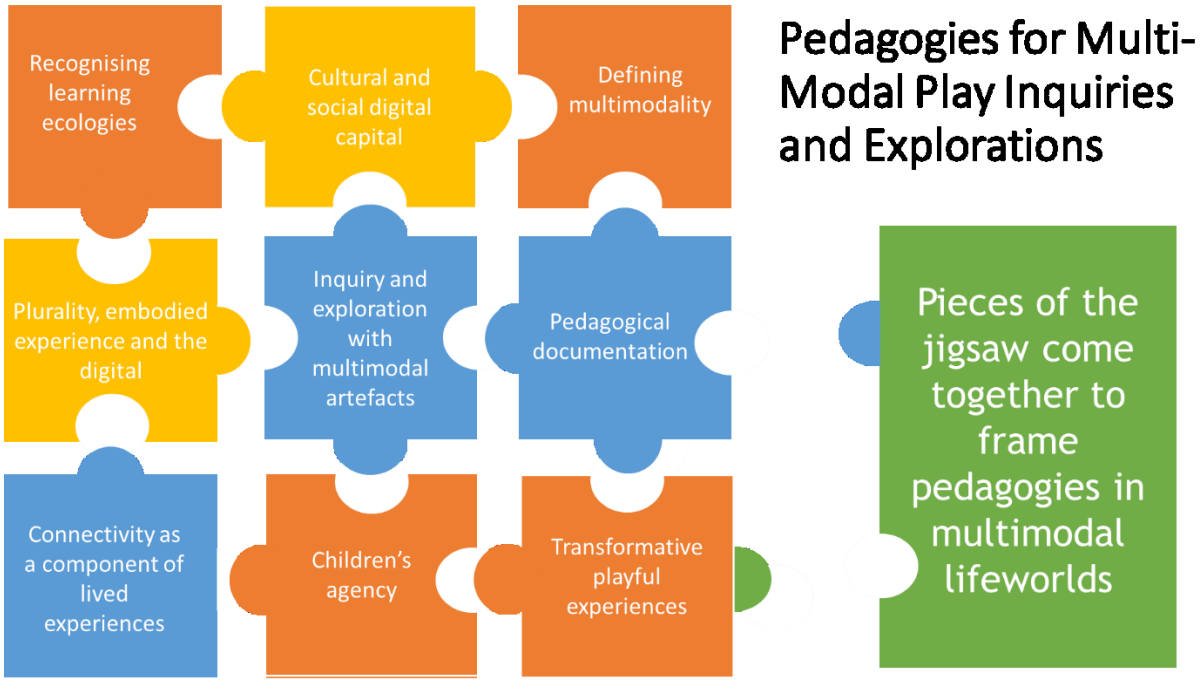

FIGURE 2 Digital Practices Framework

Such a conceptualisation is needed in practice, because research continues to demonstrate that practitioners and parents are still anxious about how best to support and frame children's learning with new technologies (e.g. Palaiologou, 2016). Many of the

components have been addressed *separately* in other research, but here we have proposed an approach which combines them in a coherent way in order to consider how new technologies, as social, cultural and personal artefacts might contribute to, and enhance, children's learning ecologies. We present an understanding of new technologies as artefacts for learning, which not only change existing modalities but also acts as an additional modality. The experience of schooling and knowing how to access knowledge, resources and being an effective communicator, offer social and cultural capital and educators can successfully support children incorporate them in their investigations while recognising all the new contexts that they encounter. This holistic analysis offers a much needed praxeological resource to bridge theory and practice.

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