


Digital learning in childhood: Possibilities for pedagogical transformation in South Africa

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Background: Digital technology (DT) has already changed history, and it is transforming childhood as more and more children go online around the world.

Aim: The aim of this article was to critically explore the potential of young children's digital learning (DL), while concurrently assessing the constraints.

Setting: Early Childhood Care and Education (ECCE) stakeholders' environments formed the setting for this study.

Methods: The critical theory of technology emphasizes the need for increased democratic involvement in technical decisions. It also explores the impact of theories on technology users, affecting design, usage, and, consequently, outcomes. This study adopted an interpretative phenomenological approach to discover 10 South African ECCE stakeholders' experiences of DL with young children.

Results: Firstly, findings presented the affordances of DT. Secondly, the threats of connectivity, socio-economic factors, and the availability of inappropriate content were emphasised. Thirdly, there are risks and fears associated with DL, especially with young children. Lastly, the possibilities of DL, where pedagogical transformation can take place, were interrogated.

Conclusion: In the ever-evolving world of DT, the pursuit of improved educational outcomes for young children remains a paramount concern. Proven practices that improve children's learning through DT and effect change at a systemic level should be further interrogated.

Contribution: This research contributes to the ongoing discourse surrounding DT in early childhood education by offering a critical examination of its challenges and opportunities. It provides insights for educators, policymakers and researchers on enhancing DL experiences for young children while considering the associated risks and benefits.

Keywords: digital learning; digital technology; early childhood education; critical theory of technology; pedagogical transformation.

Introduction

The pace, manner and convenience with which humans interact, reflect and learn have all changed as a result of advancing technology (Schwab 2017). In many circumstances, children are involved in digital technology (DT) activities prior to entering formal schooling, and they arrive with a growing set of skills and experiences (Arnott 2017; Dong & Xu 2021; Edwards et al. 2016; Schriever 2018). As the use of DT with young children becomes more ubiquitous, teachers and parents are debating whether, when, and how to use it appropriately to aid their development. Though some findings imply that technology use can harm children's development in various ways (Hooft Graafland 2018; Johnston 2021), other studies suggest that digital learning (DL) also has a favourable impact on early childhood (Nhi et al. 2021; Zomer & Kay 2016). However, it is not as simple as merely providing access to DT for young children and early childhood teachers to make effective use of it. Instead, when planning for and successfully adopting DT with and for young children, there are both barriers to overcome and opportunities to embrace.

This article provides a deeper knowledge of the potential and problems of DL in early childhood which was acquired through engaging with the literature around digital technologies and exploring the lived experiences of early childhood teachers, teacher educators and parents of young children. The article does not merely present views on being for or against DT in the early years, but rather uncovers the possibilities, where pedagogical transformation can take

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place. Therefore, the twofold research question guiding this research was:

1. What are early childhood stakeholders' lived experiences of DL for young children?
2. How do early childhood stakeholders interact with digital technologies to transform practice?

Legislation, policies and white papers on digital technology in early childhood in South Africa

'Improving the quality of education, skills development, and innovation' is among the primary objectives in South Africa's National Development Plan, Vision 2030 (Republic of South Africa 2012:16). The e-Education White Paper of 2004 (Department of Education 2004) aimed for every primary and secondary school learner in South Africa to be information and communication technology (ICT) competent by 2013, and for teachers to use ICT to improve education. This White Paper also guided and informed the implementation of the e-Education strategy (2013–2025) in South Africa. The Guidelines for Teacher Training and Professional Development in ICT (Department of Education, 2007) supported this initiative by outlining a framework for teachers' professional development in ICT and defining key competencies within a developmental context. Subsequently, the Professional Development Framework for Digital Learning (Department of Education, 2018) introduced a novel approach to enhancing the professional development of teachers and all stakeholders through the utilization of digital tools and content resources, aimed at improving learning outcomes and elevating learner attainment in the curriculum. At a similar time, the National Integrated Early Childhood Development Policy (Republic of South Africa 2015) was released which includes, the potential to use ICTs to advance children's rights and empowerment in the information society, and support and provide ICT skills and infrastructure.

The role of DT becomes more apparent in the NDP 2030 (Republic of South Africa 2015). Although not explicitly stated, DT for and with children emerges in the agenda which is devoted to: (1) dedicated resources and state provisioning, (2) a comprehensive package of services, (3) the training of early childhood practitioners in digital pedagogies, and (4) finding innovative ways to deliver DL early childhood services. Väättäjä and Ruokamo (2021) examined digital pedagogy based on recent literature and observed that pedagogical orientation frequently leans toward socio-constructivism and student-centred approaches, involving collaborative practices and social knowledge construction, along with the effective integration of digital technologies. In this context, pedagogical implementation is synonymous with DL, encompassing the practical application of digital pedagogy, which involves the integration of the above principles into specific teaching strategies and the adept use of digital technologies to transform the educational process. All the policies and plans mentioned exist on paper and more so, in the schooling sector, but there is a void of a clear plan,

if any, for DL in early childhood. The South African early childhood context is fragmented not only by policy exclusions but in provisioning and access to basic requirements and children's educational needs.

Digital technology and digital learning

In the context of early childhood and this study, DT is a broad term that defines (mostly) the electronic tools that are available to young children, teachers and parents, and are incorporated into daily teaching and learning processes (Ghavifekr & Rosdy 2015). Online games and applications, multimedia, learning management systems, cloud computing, interoperable systems, and 'smart' devices in various forms are all examples of DT. On the other hand, Murcia, Campbell and Aranda (2018) explain that any sort of learning that is supported by ICT or by instructional practice that makes efficient use of technology is referred to as *digital learning*. In a study on technology-based teaching and learning, Hannaway and Steyn (2016) explained that it is critical to assess both the format and purpose of technology along with developmentally appropriate pedagogy to determine if this mode of delivery will be most beneficial to young children.

In 2017, The State of the World's Children (UNICEF 2017:6) called for more immediate action, targeted investment, and collaboration to safeguard children from the dangers of a more connected world while also maximising the benefits of the digital age for all children. Furthermore, Zabatiero et al. (2018) reported on a survey that was conducted with the early childhood sector in Australia regarding adult perceptions on young children and DT. The findings reveal a range of multifaceted viewpoints, including respect of the technological opportunities as well as reservations about children's wellbeing and readiness to acquire digital citizenship. The concerns centred on young children using technology excessively, how it replaces traditional play and physical activity time, and how it encourages sedentary behaviour. In addition, few families and teachers were aware of how to promote Internet safety and rights of young children.

Similarly, Schriever (2018) examined teachers' beliefs of DT, children, and childhood, as well as how these views influence their pedagogical choices. Early childhood teachers were troubled by children's desire to play with DT, prioritised conventional early childhood pedagogy, and considered of play as being exclusive of digital tools, according to the findings. In a small-scale South African study, Van der Westhuizen and Hannaway (2021) found that teachers are unclear how to adapt their pedagogy to be responsive to the digital world and its associated developments in early childhood education.

Digital learning is not synonymous with DT and often, the focus is on the latter. For example, Edwards et al. (2016) found that the perceptions around DT are often related to the

notions of time, place, and role. Edwards et al. (2016) used socio-contextual perspectives to understand the settings in which children's DL takes place. Firstly, time as a setting influences technological decisions, such as the time of day and the duration and regularity with which the technology will be used. Secondly, place as a concept for determining technology use is often seen against an area such as the ECCE setting for social and physical activity, and facilitating play-based learning, which opposes a digital activity that is considered to fail to meet those functions. Lastly, role is significant in both teachers' and parents' decisions of technology use where dominance is placed on the supervising of access and use of technology with young children. Digital learning viewed critically, affirms what Oliveira-Formosinho and Araújo (2011) believe:

[T]hat the learning experiences of diversity, or education for diversity, should be experienced in context, through direct experiences with pedagogical spaces and materials, pedagogical times [*daily routines*], in adult-child interactions, in activities and projects, in observation and planning, in documentation, and family involvement. (p. 231)

Digital learning is learning in a different, effective way using the digital tools within the perspectives defined above. The way education is practised has undergone a transformation, particularly in terms of who is taught by whom, where, when, and for what and whose benefit (Dwivedi et al. 2020).

(Dis)connect of digital learning in early childhood care and education

Disconnect reasoning is present in arguments to justify the growing use of technology for educating young children and is still debated in terms of its function, benefits and detriments (Edwards et al. 2016). Anxieties and perceptions of uncertainty associated with young children's DL create a larger issue that inhibits pedagogical development.

According to various studies (Al-Hileh & Ibrahim 2018; Brito & Dias 2018; Hooft Graafland 2018), technology may not be beneficial to children as it: (1) promotes passive and low-energy behaviours (sedentarism) like sitting or lying, (2) impairs a young child's emotional, intellectual, and social development, (3) replaces real life friends with virtual ones, (4) favours online instead of being outside to play, (5) impoverishes sensory development, and (6) can promote compulsive engagement with adverse consequences.

Another argument that is presented is that the use of DT and media among young children is a danger to meaningful communication and other fundamental traditional pedagogies, like play-based learning (Dong & Xu 2021). Furthermore, Owen and Davies (2020) cited evidence that young children require hands-on experiences in the actual world to learn and come to express complex emotions. Digital technologies cannot cater for concrete experiences, which could hinder a child's holistic development, especially the ability to think clearly and separate actuality from imagination (Owen & Davies 2020).

Many early childhood educators continue to face challenges in harnessing the potential of digital technologies, especially when it comes to aligning them with the distinctive development, interests and emerging capabilities of young children, all the while ensuring the protection of their exposure and rights (Hooft Graafland 2018). On the flip side to the negative perceptions and reasons to exclude DL in early childhood, there are numerous strengths that it affords. As children develop, digitalisation's ability to impact their lives expands, providing almost infinite chances to learn and connect, to be seen and understood (UNICEF 2017:8). In a review of young children's use of technology, Dong and Xu (2021) claim that numerous experts have presented substantial and credible studies in support of ICT potential in the aspects of communication and collaboration, creativity, mathematical thinking and problem-solving, interaction, and language and computer literacy.

The possible scenarios for improving and expanding not only children's play, learning and interactions, but also the adult's role in early childhood are countless. Opportunities exist when early childhood stakeholders set themselves the objective of developing their own competency with digital technologies, accept themselves as a learner and co-structor with children, and truly start to appreciate the positionality of digital technologies within ECCE (Schriever 2018). Similarly, Ntuli (2015) claimed that teachers require techniques for adapting pedagogies to become virtual frameworks to support the technology used, the topic, and the age of the child. This finding is based on the premise that the use of technology resulting from the Fourth Industrial Revolution (4IR) and COVID-19 has disrupted the learning environment, and that some of the traditional pedagogies that fostered active learning are no longer functional given technological developments (Ntuli 2015).

Ineptness of digital learning

In a review of the use of DT with preschool children, Brito and Dias (2018) identified a gap that impedes DL. The authors found that well-considered instructional environments settings do not resemble the more prevalent ones found in preschools, where ICT is neglected and underrated, and is frequently used to replicate traditional activities. Therefore, there is a disconnect between what ICT can do, the conducive set-up of DT environments, and what happens when it is made accessible in most under-resourced early childhood classrooms. In addition, Dong and Xu (2021) report on early childhood teachers' attitudes and intentions towards young children's DT use and reveal that teachers do not understand the role of technologies and furthermore, have limited knowledge of theories and policies to support their pedagogy.

In many ways, challenges and resistance to DT in early childhood reflect a larger systemic debate and public interest with multiple stakeholders arguing the role of technology in the lives of young children (Sharkins et al. 2015). This is echoed by Sullivan and Sullivan's (2019) sentiment that technology developments and the resultant transformations

within society and education have not occurred in isolation. 'They [technology] do not simply exchange information but change the expectations and opportunities for human beings' (Sullivan & Sullivan 2019:21). Teacher educators, teachers and parents in early childhood educational settings are often averse to encourage young children's use of DT, and do not adopt appropriate pedagogies to support DL.

Ethics and digital technology

Digital technology is not neutral and instead reflects a particular worldview and drives major societal, economic, and even anthropological developments (De Broglie 2016). Therefore, the morality of how these instruments are made and used must be considered. Transformative pedagogy helps teachers and children establish their identities with relationships based on interdependence and moral principles (Farren 2016). When viewed as praxis, it aims at establishing links between teaching, learning and living, and is committed morally and socially to fostering individual and societal transformations (Farren 2016). Therefore, the transformative nature of digital pedagogy should be critically analysed in ECCE since there are choices related to dignity, fairness, and the common good around the technology that is created and relied upon (Green 2020). Technology undoubtedly carries some significant risks when looked at through an ethical lens. In addition, given the situatedness of DT in early childhood, Tangwa (2011) advocates for systematic reflection on how traditional African cultural values – especially ethical ones – can be preserved and incorporated into a modern educational system.

Theoretical framing

In terms of the magnitude of impact on human potential, the prospective impact of technology in general, and the information transfer through computers and internet access within educational technology have been termed transformative. Many education scholars think that technology access and utilisation will be the cornerstones of the next 'golden era' of civilisations (Sullivan & Sullivan 2019:20). Therefore, this study was framed by a critical theory of technology which seeks to understand the values that are brought to the design of technology. As opined by Feenberg (1991; 2005), it begins with an investigation of how theories affect the actors themselves, influencing development and use, rather than a premise about the nature of DT, that prioritises control or communication, humanism or post-humanist values. Furthermore, '... each of these technologies also have deeply political implications because they play a role in shaping social processes' (Spicer 2003:378). Feenberg (2005) explains that the actors [children using DT] interact with the digital technologies in the context of the technological lifeworld. Digital technologies are not just pre-defined; rather, they acquire meaning through processes of interpretation (Feenberg 2005). This gives ECCE stakeholders the power to act as co-constructors in meaning making through DL with children in ECCE.

The potential of technology is built into the structure of technological activity, which establishes a particular type of relationship. There is a power relation between the teacher and the children or the teacher educator and the teacher. In addition, teacher learning is embedded within institutional, historical and cultural contexts, it is a place of conflict over strategies, discourses, resources and identities. To provide educational opportunity, access and equity for all children, teachers are seen as teacher-researchers who:

[I]n inquiry communities to examine their own assumptions, develop local knowledge, by posing questions and gathering data, and work for social justice by using inquiry to ensure educational opportunity, access, and equity for all students. (Farren 2016:195)

With the rapid pace of technological advancement, Douglas Engelbart was afraid that the balance between technical and non-technical abilities, that had co-evolved over the course of humanity's history, might be disrupted. Engelbart's (1962) framework focusses on the nature of the user's system, as well as the tools, concepts and approaches that complement his basic abilities to his circumstances. His vision of early technological systems was to 'augment human intellect' as further explained:

Instead of reliance on technology for specific uses, he foresaw a future where the human aspects of intellect – thoughtful guesses, insight, intuition – would co-exist with tools allowing enhanced understanding of difficult concepts or problem-solving methods. He also believed that technology should be of 'significant' benefit to humans, but that it was the interaction between humans and technology tools that provided the most promise for making progress in solving problems. (Sullivan & Sullivan 2019:22)

In my study, the focus was on the users of technology, being the teachers, teacher educators, and parents in early childhood, to see what significant benefit they bring to using DT. All stakeholders in early childhood should understand the value that they bring to, as well as what they think is important in DT in the early years. If this is understood, then the thinking around DT as either good or bad can shift to thinking about what matters to our children with and for DL.

In a study on the transformative aspects of pedagogy in early childhood education, Ebrahim et al. (2021) claim that to establish a mature democracy with equal opportunities for equity of outcomes, any pedagogical activity in South Africa must be situated in an equity and social justice framework. This is in accordance with the Pedagogy-in-Participation perspective that has a democratic philosophy as its primary foundation. The recognition of the learning environment, as a second teacher leads to an examination of some of the principles employed to organise this framing, as well as the unfolding of the pedagogic components that make up the learning context (Formosinho & Formosinho 2016).

The above framings pull together children, their families, and stakeholders in the co-construction of educational practices and outcomes. The critical theory of technology pushes for increased democratic participation in technical decisions, the Pedagogy-in-Participation framing considers the technological and pedagogical context in which DL takes place, and Engelbart's framing stresses the relational characteristics between the stakeholders and the DT.

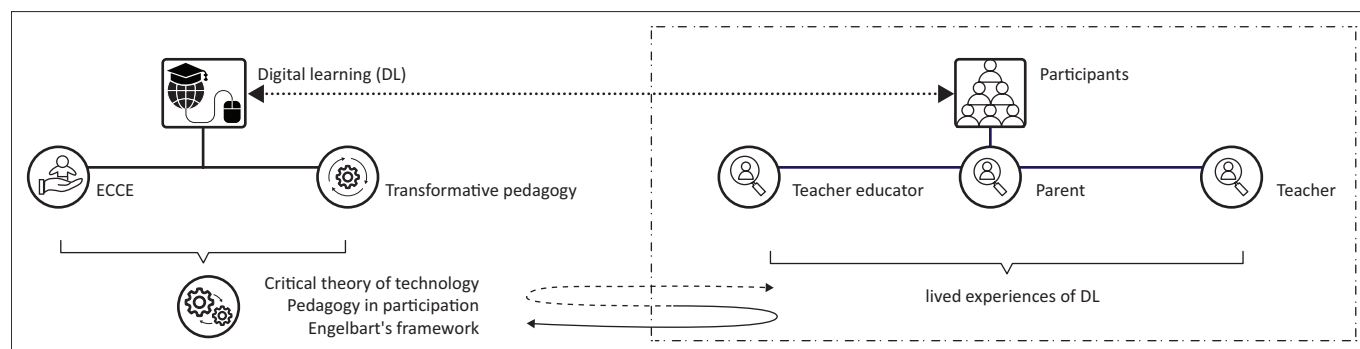
Methods

A qualitative interpretive phenomenological approach (IPA) was used in this study. Interpretive phenomenological approach has an 'idiographic focus', meaning coming to appreciate the insights of a participant's lived experiences, which is explored in a given context, which gives more clarity on a given phenomenon (Smith 2007). For this inquiry, it means exploring ECCE stakeholders' interpretations of stakeholders' lived experiences and the meaning they attach to using DL when educating young children. The empirical study focussed on early childhood stakeholders' support or opposition to DT, and how interactions with DT transform practice.

Understanding the use of DL in the early years was substantiated with existing knowledge and practice using IPA. Data collection was an iterative process of qualitative questionnaires and in-depth semi-structured interviews. The questionnaire explored topics such as: (1) delineating the

strengths and weaknesses of DL in early childhood and (2) the ways in which DL is seen as either opportunities or threats, which offered a basis for utilising in-depth interviews for dialogue through prompts and asking clarifying questions. In addition to the latter, to illuminate a researcher from making his or her own assumptions and interpretations, reflexive and hermeneutic analysis was implemented ensuring that IPA data sets are co-constructed and constantly 'compared and contrasted through a dialectical interchange' (Guba & Lincoln 1994:111). There was back-and-forth movement between produced and isolated sets of data until no new key meanings (data saturation) emerged from the IPA data sets.

The sample of the study consisted of 10 ECCE stakeholders from the Gauteng province in South Africa. Four teachers, four university-based teacher educators, and two parents were purposively selected to participate in the study. The inclusion criteria for selecting these participants were diversity in age, experience and role, and that they have gathered valuable lived-experiences on DL by being confronted with it in everyday practice in early childhood. This study was meticulously designed to examine the complex relationship between technological advancements and educational practices, with a specific focus on transformation in educational practice. Further information on the details of participants and data generation is outlined in Figure 1 and Table 1.



ECCE, early childhood care and education.

FIGURE 1: Data generation opportunities.

TABLE 1: Biographical coding of participants.

Abbreviation	Race, gender and age	Qualification and teaching and learning experience	Qualification and age of child(ren)
ECE teacher educators positioned within the Department of Early Childhood Education at an institution for higher education			
ETE1	±40 year old Black Female	PhD and > 3 years	-
ETE2	±40 year old Black Female	PhD and > 10 years	-
ETE3	±60 year old White Female	Masters and < 10 years	-
ETE4	±30 year old White Female	PhD and > 2 years	-
Parent of a child in ECE enrolled in a school utilising digital learning			
EP5	±30 year old White Female	-	Honours, two children aged 3 and 5
EP6	±30 year old Black Female	-	Bachelors, two children age 3 and 4
Teacher within ECE, ranging in roles as teacher, centre manager, head teacher, and curriculum developer			
ET7	±20 year old White Female	Certificate (NQF 5) and > 3 years	-
ET8	±30 year old White Female	Diploma (NQF 6) and > 10 years	-
ET9	±30 year old White Female	Certificate (NQF 5) and > 3 years	-
ET10	±30 year old Black Female	Honours and > 5 years.	-

ECE, early childhood education.

Data presentation and findings

Interpretive phenomenological approach data sets elicited the lived experiences of the stakeholders, and participants shared their descriptions of their experience, context, role and function, as well as answering questions that provided insight into the strengths and weaknesses of DL in early childhood. The findings have been thematised around concepts and constructs that emanated from the literature and theoretical framing studied. The themes, in line with DL, are centralised on the construct of connection. The terms *connected*, *disconnect* and *reconnected* will be used to unpack the empirical evidence to highlight the position towards DT and the possibilities for transformation that DT affords in children's learning.

Theme 1: Connected

Connected goes beyond mere connection to digital devices for effective DL in early childhood. It brings to the fore the strengths that can be transformed into pedagogical opportunities for DL through appropriate provision, as well as the notion of accessibility and advocacy. Nine of the ten participants, in their various roles, mentioned the accessibility of DT and that it is considered as a strength:

'It is so useful having anytime access to information, videos, pictures, museums, games, people and experiences.' (ET 4)

Three participants elaborated further by speaking about their lived experiences where children are already familiar (and skilled) in using digital tools and that experimenting with and incorporating it in the early childhood classroom is a benefit to education as captioned in the response:

'They [*children*] are already skilled in the world of DT and incorporating it into the classroom is exciting and is an asset in their future education. Young children need the opportunity to explore and venture into a world of DT that will enhance their development with the help of knowledgeable and skilled teachers.' (ETE3)

'I am for DT as I feel my kids personally have gained a huge understanding... to learn through audio and visual, which may be the best way for a specific child. Digital learning can also allow a shy or introverted or special needs child to excel, by removing the pressure of peers around them or giving them access to needed support.' (EP7)

'With access to these devices, they can access learning material that gives immediate feedback and gives children a chance to explore.' (ET10)

The notion of access, and use in and for DL, can be understood in light of the sociocultural perspectives alluded to by Edwards et al. (2016) and the frames of reference for pedagogy (Oliveira-Formosinho & Araújo 2011). The data presented gives some evidence of transformation in educational practice according to the concept of time, place and role. It shows where and when DL takes place, as well as the role and circumstances of DL in terms of who learns and with whom.

One of the early childhood parents also mentioned that there is no DL at the school, although technology is used to communicate with parents in various ways. Interestingly, two of the teacher educators mentioned the strengths of DL, but that it is not explicit in their teacher preparation programmes; however, their mode of learning was online. In that way, preservice teachers are exposed to the various possibilities of DT. As outlined below, the other two teacher educators fused DL into their pedagogies with the preservice teachers that they train:

'I incorporated and modelled digital learning [*or*] play in my lecturing of students as we live in a digital era where children from a very young age are familiar with digital media and teachers need to be able to respond to that.' (ETE3)

'Teachers cannot ignore the strengths of digital learning and have to take it into account in their own teaching practices.' (ETE1)

The other early childhood teachers who use DL in their settings highlighted the advocacy of DL as a strength. Necessitated by current conditions of living in a pandemic, as well as the 4IR, they were able to support learning using technology which could be noted as an avenue for transformation:

'Due to COVID, this [*digital learning*] helped our children not to fall behind in learning and developing.' (ET9)

'In terms of teaching, learning and assessments, we encouraged the use of online platforms, this assists children and parents who might be at home [*due to the virus*] to continue learning. Looking at this, in the school setting, no child is excluded when it comes to digital learning.' (ET10)

The data above show that DT ensured that children take part in the educational process. It further provides some affirmation that spaces are created for children that are democratic settings, inclusive, and give all actors a voice (Oliveira-Formosinho & Formosinho, 2012).

Theme 2: Disconnect

Children's participation in the learning process and the creation of knowledge through ongoing, interactive experiences are the goals of participatory pedagogies. According to Feenberg (2005), it is the day-to-day existence of a contemporary society, where technology dominates almost every aspect of the contemporary life; and in this way, people seek out and identify meanings. In most exchanges, power is only incidentally involved, and when it is, resistance is momentary and limited by the place of the persons in the system. However, as more people join systems where technology dominates, resistances will undoubtedly grow. This may have an impact on how the systems and their products are designed and configured in the future. Disconnect refers to the divisions that exist in DL, which are caused by various weaknesses in needed systems and structures. Disconnects that impede DL were highlighted by the various participants.

Since provisioning of DT is unequal and somewhat undecided, DL is disparate. Among the participants, two early childhood teachers were not in favour of DL because of their associated fears with DT and therefore not included in their daily teaching. In the same way, the children's socio-economic circumstances may impede DL. One teacher remarked:

'Most of our children come from poor backgrounds and so most parents cannot afford to move with times.' (TE9)

One teacher educator mentioned inaccessibility to DT as a weakness, but also young children's own differences that might be disadvantageous to DL in early childhood:

'Young children in early childhood may not all have the same opportunities for digital learning either at school or at home. They might also feel threatened by the fact that they are different. That might result in a negative attitude and a barrier to learning with DT.' (ETE3)

This theme did not only highlight a lack of resources as an existing divide that is deepening. In addition, all participants mentioned weaknesses to DL because of language, content, age or socio-economic positioning. Moreover, a number of participants mentioned that the content being created and shared is not always suitable, for both age and context. Similarly, parents and teachers' knowledge and use of suitable digital technologies play a vital role in successfully offering meaningful DL:

'Technology with young children is detrimental when there isn't accessibility because parents cannot afford it and when the "wrong" type of digital learning takes place.' (EP5)

'As much as accessible content is an advantage to digital learning, inappropriate content for young children is the flipside.' (EP 6)

'Whilst some countries have made use of several platforms to create context-friendly content, in South Africa, there is still a lack of these and this includes language problems with our multiple official languages for instance, history stories and so on.' (ET 10)

'Young children are keen to use DT for learning, but most teachers lack digital literacy skills to meet their interest.' (ETE1)

Children are exposed to various risks when using DT. Fears associated with these risks form part of the theme that deals with the threats of DL. Seven of the participants mentioned that DT detracts from the fundamental skills and physical activity that require development in the early years. This was also apparent in the literature surveyed:

'Threats are that, there are skills acquisitions that children are skipping because of DT, for example, children do not get to hone their gross motor skills by getting physical, instead, they can be couch potatoes and "play" video games.' (ETE2)

'It is also a fact that if not managed properly too much screen time can prevent young children's fine and gross motor development, as well as their cognitive development.' (ETE3)

'... [A]ffects their ability to utilise and integrate all their sensory systems that are crucial for learning. Although ICT seems

interactive and activating all senses it does not really give children the full experience of exploring a concept, skill or value.' (ETE4)

The above data can be examined through the framing of a critical theory of technology which understands that as more people join technical systems, resistances will undoubtedly grow and may have an impact on how the systems and their products are designed and configured in the future (Feenberg 2005). What this implies in children's DL is that it gives ECCE stakeholders the power to act as co-constructors, or re-constructors if you like, in meaning making with children through DL in ECCE.

Safety was also a concern that was raised through participants sharing their perceptions of DL:

'The risk of exposure to unsuitable content, no supervision is dangerous. Kids can also be easily distracted with images [or] colour [or] sounds therefore they do not focus on what they are learning.' (EP5)

'Children using DT are more exposed to inappropriate things and with such easy access to it, their wellbeing can be compromised.' (ET7)

This theme also highlights the ethical decisions that are required with all the stakeholders in DL. Praxis is critical reflection and action with the purpose to implement a range of educational practices and processes, and creating not only a better learning environment but also a better world. As praxis, DT establishes links between teaching, learning and living, and is committed morally and socially to fostering individual and societal transformations (Farren 2016). Since there are decisions to be made regarding the dignity, fairness and welfare of all actors (especially children) around the technology that is developed and relied upon, the transformational nature of DL should be carefully examined in ECCE.

Digital citizenship, which is a concept discussed in literature, foregrounded the weakness resulting from a lack of clear policy guidelines:

'... [T]here is no formal curriculum that teaches learners how to become excellent digital citizens. At this moment, it does not seem that learners have a deep understanding of what it means to responsibly be part of the digital world although it is something happening to them.' (TE10)

Access was noted as a strength for DL, but one teacher found it to be a threat in various forms as she stated:

'Access, I believe access the greater threat. [1] Access to great connectivity is a disadvantage for some children that can download all sorts of content. [2] Access to people, in our certain classroom settings, for instance, learners have over 2hrs of alone time, they are not collaborating ... This might have a negative influence in child-child as well as teacher-child interaction. [3] Computer literate, some children have an advantage at their homes but others do not. Even when they can get access to devices, they might struggle, especially if they are also with family members who experience challenges to being digitally literate.' (ET9)

The above excerpt highlights the importance of the pedagogical relationships between DT and the teachers, and children. The potential of technology potential is built into the structure of technological activity, which establishes a particular type of relationship. Engelbart (1962) premises that human aspects should co-exist with digital tools in order for DL to be beneficial.

Lastly, one teacher educator summarised:

'The inequality of it all, some children in well-resourced centres will have connectivity and access to digital resources and digital learning will be successful. While on the other hand, disadvantaged centres won't even have for all the other children.' (ETE 2)

When examined from the critical theory of technology, the data generated highlight the need for democratic decisions in DL in ECCE, from and for both the design and outcome of DL.

Theme 3: Reconnected

In this theme, reconnected is the space in which the opportunities of DL are present and through which possibilities of pedagogy, theory, and transformation can occur. With regard to pedagogical implementation, it seems that the onus lies with teacher training to expose pre-and-in-service teachers to pedagogies that will work with digital technologies:

'Institutions of higher learning are encouraging digital learning and they should capacitate the teachers and the pre-service teachers. Since the government is in support of digital learning, we need to start building the foundation.' (ETE1)

'A great effort needs to be made to ensure that DT is more available to all young children and probably more importantly that teachers are equipped to use it effectively.' (ET9)

There are certain skills that are noteworthy and mentioned for living and learning in present times. Teacher educators, parents and teachers made mention of these specific skills as opportunities for DL. For example, the following excerpts include possibilities that DL has for developing the skills of collaboration, communication, critical thinking, and literacy:

'Using DT does provide opportunities that ordinary teaching cannot provide. Collaborating with children all over the world, utilising real time formative feedback, and using ICT and other platforms to enrich their learning experience are just a few.' (ETE3)

'Communication with and feedback from teachers becomes easier as well as accessibility to a broader group of supporting role players.' (EP5)

Access has been noted in all the themes from various lived experiences. From the vantage point of it being a worthy prospect, the notion of life-long learning was highlighted:

'Potential opportunities include life-long learning – learning can no longer be associated with the physical classroom setting only,

children and parents can have access to their learning material anywhere, anytime.' (ET10)

Pedagogy-in-participation considers pedagogical elements that comprise the learning context in the acknowledgment of the learning environment as a second teacher (Formosinho & Formosinho 2016). DL enables transformative pedagogy by supporting more inclusive and democratic interactions between teachers and students (Farren 2016).

Discussion

Digital learning is potentially transformative as it embraces democratic methods providing *all* adults and children the chance to exercise their agency and voice. Although the National Integrated Early Childhood Development Policy (Republic of South Africa 2015) exposes the potential of DL to promote children's rights and participation in the information age, as well as support and deliver ICT infrastructure and skills, the empirical findings of this study prioritise conventional early childhood pedagogy, in line with Shriever (2018).

Research question part 1: *What are early childhood stakeholders' lived experiences of digital learning for young children?*

The IPA evidence, which is sensitive to roles, context and spaces, showed that there is evidence of the transformative aspects that the technology brings to learning in the early years. Stakeholders were rather concerned with the strengths and weaknesses of the actual technology. Digital technology was mostly considered a tool instead of a pedagogy which has the ability to enrich their skillset to encourage and deepen children's play, learning, and involvement, as well as to realise their responsibilities as an early childhood educator.

The value of how DT could enhance the young children's DL was analysed through the theoretical framing. Young children have access to DT, highlighted in the theme of connected, and stakeholders regard accessibility to DT and digital pedagogies as a strength. However, it is not clear what value, if any, is interrogated by stakeholders and if a critical framing is adopted when assessing the accessibility of DL.

The lived experiences of the stakeholders brought about in the disconnect theme, as well as the literature tend to focus on the weaknesses of DT. Unequal provisioning of resources as well as disparity in position, which encompasses physical, cognitive, social, policy and practice deficiencies are cited in literature and through stakeholders' experiences. Such divisions in systems and structures almost disqualify DL in early childhood. These shortcomings are contradictory to an approach that affords the pedagogic elements of the learning context in support of transformative goals for young children's learning, advocated for under the theme reconnected. Arguments against incorporating DL with young children revolve around the notion of time as context

and include the negative impact that technology has on children's well-being and questions their digital citizenship (Brito & Dias 2018; Edwards et al. 2016). Likewise, these perceptions of place as an area for social and physical activity cause adults working with young children to adopt traditional pedagogies over digital ones. Lastly, the adult's role is seen against the backdrop of the choices that are made for or against technology use as well as what they deem important based on their value of the associated technology.

Research question part 2: *How do early childhood stakeholders interact with technologies to transform practice?*

To successfully utilise DL for digital citizenship requires democratic participation in technical decisions, while at the same time, being aware of the value that the technology affords. In the critical theory of technology, either a democratic communication paradigm or a technocratic control model is given preference by technology. In more sophisticated digital worlds, a technocratic conception leads to a positioning of the user that dramatically restricts possible initiative, whereas a democratic understanding of modernity expands that initiative (Feenberg 2005). However, this argument and the technocratic conception of technology are thwarted by threats that are cited based on stakeholder's predominantly negative beliefs and attitudes towards DT use with young children. The focus on DT over DL prevails and it is important to bring attention to improving knowledge of how technology can be used most effectively to support and transform young children's learning and development instead. In line with the notion of reconnected, early childhood stakeholders interact with technologies to transform practice by recognising DL's potential to enhance pedagogy, collaboration, communication, critical thinking and literacy skills. However, teacher educators, teachers and parents may incorporate DL in their practice but whether it achieves desired outcomes or transformation is something that still needs to be investigated.

Conclusion

The findings of the research highlight the necessity of utilising DT's advantages, acknowledging that it may foster young children's agency, their ability to explore different viewpoints, and the development of their intellectual capacities – all of which have the potential to bring about transformation. In order for DL in early childhood education to reach its full potential, the government must continue to promote its pedagogical implementation and provide teachers with clear policy guidelines. It should be a top priority to provide teachers with the knowledge and skills needed for DL, which calls for a change in how we view education. But we also need to recognise how important cultural and social circumstances are in influencing the goals and actions that students and teachers take when interacting with DL. Future studies should therefore explore how early childhood stakeholders and young learners interact with technology rather than focussing only on opposing or supporting viewpoints in order to provide insights into the potentially revolutionary implications for practice and policy.

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Author's contributions

D.H., is the sole author of this research article.

Ethical considerations

An ethical committee at a South African public higher education institution granted permission for the study to be conducted (Ref: 2020/05/13/90237323/29/AM). Participants were asked for their written informed consent, which assured their safety during participation as well as no risk or harm of any sort, in compliance with the ethical requirements of the institution coordinating this study. The study was entirely optional, and participants were free to leave voluntarily.

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Data availability

The data that support the findings of this study are not openly available due to confidentiality and are available from the corresponding author, D.H., upon reasonable request.

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