
Access to the published version: http://doi.org/10.1177/2043610617734987

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Title: ‘Transforming early childhood experiences with digital technologies’

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Abstract
The aim of this article is to stimulate a discussion beyond just the use of digital technologies in the early years of education, to also consider the broader societal implications of their use. The Freirian notion that education has the power to transform lives is reflected upon in this article, and it explores the use of new technologies in ways that have the potential to significantly alter the everyday practices adopted in the early years curriculum experience. Projects underpinned by a critical or postmodern framework and how they used digital technologies to make crucial changes in the lives of their participants will also be analysed in an attempt to further inspire the future research endeavours.

Keywords
critical, digital technologies, early years, postmodern theory, transforming

Introduction
Education either functions as an instrument which is used to facilitate integration of the younger generation into the logic of the present system and bring about conformity or it becomes the practice of freedom, the means by which men and women deal critically and creatively with reality and discover how to participate in the transformation of their world. (Freire, 1970: 16)

Freire supported the transformative power of education even before the experience and expansion of new technologies had begun. His reference to the critical and creative element of educational practices is still relevant today. He stressed the need for education to be relevant to reality, to contemporary lives and not merely a preparation for the future. Freire, as a critical theorist, was aware of education’s inherent power to change and transform people’s lives.

This article will discuss ‘transformative pedagogies’ in relation to the use of new, digital technologies in the early years of education. It will be suggested here that traditional views of static curriculum with fixed content is not relevant to contemporary living and learning. At the same time, in agreement with Keirl’s (2015) suggestion that ‘a philosophical engagement with one’s field is a powerful way to maintain perspective, to entertain deeper questions and uncertainty, and to think
about futures’ (p. 13), this article will discuss how transformative thinking can also influence the way digital technologies are used, how the use might be ‘transformed’.

As the author of this article, I have experienced a long, 20-year journey engaging with technologies in early childhood education (ECE). I have been transformed many times over, in my attempt to rediscover relationships with new technologies and young children. I believe that deep questioning, reflective thinking and ongoing critique are valuable resources or ways of being that can offer rich insights into our work and help us transform practices and pedagogies, even when change (e.g. technological change) is unforeseen and unexpected. Echoing De Vries’ (2005) position that ‘The philosophy of technology is more like a mosaic...Mosaics ... have their charm’ (p. 7), this is a continuous process that we all engage with in a fluid manner that has no end.

**Views of children**

According to Mac Naughton (2003), when transformative practices are adopted, new possibilities for young children and teachers open up enabling more emphasis on social justice and equity in education. Child centred pedagogies and goals that are collaboratively constructed, to accommodate the interest of the child, enhance their autonomy and strengthen their voice in the curriculum and ultimately create a positive disposition towards learning, are prioritised. There is also a strong focus on teaching the learning process rather than the content/product model to advocate for lifelong and lifewide learning as beneficial for students (MacNaughton, 2003). Children seem to be open to new ideas and suggestions and seem to enjoy the unrestricted freedom that open-ended play contexts enable. When they have the freedom to transform, adapt and modify their world, they are able to make sense of it in new and dynamic ways and in different modalities. Educators can facilitate learning by providing a democratic climate within their educational setting to empower children to act upon change and develop children’s critical skills. In this context, the role of educators is to provoke inquiry into the social justice and equity within themselves and with others including the educational environment, families, communities and global connections. Children will then experience learning that is individualised, connected and authentic.

Adopting change, in the form of new curriculum and pedagogies, is not an easy process. It involves trial and error, and personal reflection to consider the implementation of ideas in practice. New approaches to curriculum and pedagogy require a transformation of established practices, challenge universal concepts and teacher expertise and involve multiple ways of doing and being (Mac Naughton, 2003). In these contexts, teachers are enabled to actively build their own views of
children as learners in relevant circumstances at specific times (Mac Naughton, 2003: 77). These contexts are beneficial for supporting learners as they create a personal learning context specifically adapted for each child.

In line with these views on how to transform pedagogical practices, new technologies have a significant role to play in multimodal learning. Digital technologies have the affordances that address the learning needs of individuals and groups, respecting different learning rhythms and assisting with solving different types of learning scenarios. Moving away from a simplistic view of technologies as being regarded as just ‘tools’, the next section will elaborate on ways in which the use of technologies can also be transformed when a transformative approach is taken.

Views of digital technologies

Despite the unquestionable speed associated with the spread of new technologies, the theoretical frameworks underpinning much of academic research around the use of technologies in all levels of education are either vague (Bulfin et al., 2014; Selwyn, 2012) or mostly based on developmental stage theories (Grace and Henward, 2013; Yelland, 2005). Socio-cultural paradigms are also present in educational research with technologies and children (Edwards and Bird, 2016; Hatzigianni et al., 2016; Verenikina et al., 2016; Yelland and Masters, 2007), and although a lot of ideas from these theories are fundamental, it is worth considering how an alternative theoretical framework underpinned by a critical stance could impact on the integration and the research about digital technologies. Following Selwyn’s (2012) suggestions, academic research in the area of educational technology should ‘fulfil certain conditions’, such as ‘engagement with the politics of education and technology; consider how education, technology and society can be made fairer’ (p. 214). Further clarifying this approach, the suggestion here is to consider the theoretical principles as espoused by critical theories and their relationship or influence on the use of digital technologies in school-based contexts. This viewpoint is much broader than just a ‘values-based’ pedagogical approach (Fleer, 2016) to the use of technologies for education, even though similarities might be apparent. The ‘values-based’ approach to the use of technology is one of the nine discrete pedagogical approaches described by Fleer (2016). In this approach, the learning focus is on ‘conscious thinking about values, culture and ethics’ (Fleer, 2016: 286). Emphasis is placed on the process and not the product, on children’s competence and agency, and children are also
encouraged to consider environmental and political issues as they engage with technology. Yet, while there may be similarities, elements of critical questioning, enable problematising, reflective thinking and preparing action plans to solve social problems are missing.

A further line of theorising around the use of digital technologies from a critical perspective is to work philosophically, with ‘Virtue Epistemology’, which is based on Aristotelian virtue ethics (D’Olimpio, 2013). In working with Virtue Epistemology, the focus shifts from what the knower knows to the knower themselves. In other words, concentrating on what qualities the knower needs to be a good knower (D’Olimpio, 2013: 41). It is expected that one of those qualities for a good knower would be to engage effectively with critical thinking and questioning. Teaching philosophy has a lot of advantages especially for young learners as explained in papers around the ‘philosophy for children’ (P4C) movement (Millett and Tapper, 2012; Splitter, 2011). Critical perspectives are enhanced and children are supported in posing questions and learn through dialogue and reflection. These skills can be very helpful when including digital technologies. For example, the formation of ‘Communities of inquiry’ could be very useful when engaging with social media and the Internet (D’Olimpio, 2013: 45). However, in this sense, philosophy is a useful means to enhance critical skills in line with modern curriculum imperatives but doesn’t actually disrupt or transform traditional pedagogical practices.

In this article, with the emphasis on transformative pedagogies, I consider alternative ways of being. The definition and role of new technologies cannot be restricted to just being a ‘tool’ or ‘a resource’ (Keirl, 2015). The original, Greek root of the word provides useful insights to support the use of new technologies. The word ‘Technology’ comes from two Greek words: ‘techne’ and ‘logos’. The first part ‘techne’ comes from the verb ‘tikto’ which means ‘giving birth’ to something. The second part ‘logos’ is widely known as using one’s logical thought (logic). While the second part is also used in many other words (e.g. psychology, sociology, anthropology) and is easy to understand, the first part has been translated in different ways and has been associated mostly with ‘technique’ or other technical terms, often forgetting the ‘new’, ‘liberating’ and ‘creative’ aspect of the word. Moreover, as Rooney (1997) argued years ago, ‘techne’ is not just about the ‘gadgets’ but also about knowledge and actions around those ‘gadgets’ (p. 400). Similarly, Foucault (1988) analysed not one but four different types of technology: (1) technologies for production, (2) technologies of sign systems, (3) technologies of power and (4) technologies of the self. Although it is not the aim of this article to discuss the different Foucauldian types of
technologies, it is important to highlight the variety and the rich, contextual complexity of technology consistent with its Greek origin and consider the broader Foucauldian perspective. New technologies can be specific to certain areas or disciplines, such as medical technology, construction technology, and of course, information technology. But they can also be used to generally describe contemporary inventions, machines, skills and knowledge. The use of new technologies is complex, dynamic, conflicting, creative and ever changing. In educational contexts, the use of new technologies are not simply about the software and hardware and how to use new resources. There is a need to consider the systems of personal values, skills, relationships and the attitudes towards the implementation of new technologies at all levels of education, which is also relevant to other pedagogical beliefs. These include asking, what is useful for learning? or how should we teach? Factors of race, class and gender that impact individual or collective experiences are significant when we ask children to use new technologies and should not be ignored. Similarly, new technologies can also be regarded as ‘processes’, as ‘a sociotechnical network’ (Warschauer, 2002) or as ‘technological networks’ that are ‘the underlying structure of our lives’ (Castells, 2004: 224). In viewing technology as a ‘process’ or a ‘network’, we help children understand their world, criticising dominant discourses, investigating everyday problems but also communicate their views to others, and finding solutions to those problems. Using new technologies demands detailed planning as well as a deep consideration of social, educational, pedagogical, economical, political, cultural and environmental issues. Critical questions of how technologies shape and influence our lives cannot be left unanswered. It is not just how we use technologies but also how technologies ‘are using us’. Keirl (2015) and Turkle (2005, 2012) encourage us to stop and think about how technologies impact our ‘way of being’, ‘our identities’. We also need to consider, to what extent have we or our students and children contributed to this information age or digital era? Keirl (2015: 15) poses a series of philosophical questions (e.g. whether we have control over technology or whether active learning is facilitated by their use) around the role of education and technology. Such interrogations will assist us to engage with a transformative and critical view of technology. Direct reference to critical theory is also included in Keirl’s (2015) analysis about how we should interrogate the interests being served by adopting new technologies (p. 16). Before the expansion of tablet and touchscreen technologies and before the ‘Bring Your Own Device’ (BYOD) movement, Negroponte (1995) underlined the subjective nature of digital technologies and the absence of neutrality in their use. He also contended that technologies cannot be regarded as just
‘peripheral’ to a main activity in education (Keirl, 2015: 16; Negroponte, 1995: 13–14). It has become clear, so many years later as digital technologies are present in all aspects of our lives, we need to rearticulate our theoretical views on the use of technology, moving from a static, unilateral view to a flexible, dynamic, dialogic view with multiple interpretations and open to constant renegotiation. These rich and complex definitions of new technologies are in line with the transformative perspectives on pedagogical practices in which the elements of critical thinking and questioning are facilitated and valued; if a strengths-based approach is recognised and adopted, young children’s varying experiences are validated and their agency is supported. For example, when we approach new technologies with a critical view, we are not just consumers and/or passive learners. We view technology as a means to an end which could be used to improve and revolutionise ECE and act as a way to change society by strengthening our children’s and student’s voices, opening opportunities to have a positive influence on their community and to be active and informed citizens of their world. In other words, embracing Freire’s ideas, aiming not only at a reaction and cultivation of critical thinking, reasoning and communication but also learning to formulate an ‘action plan’ or what Morss (2000) describes as ‘action ... [that] celebrates thinking as creation’ (p. 189). This action plan can be conceived, produced, shared and revised with the help of digital technologies before becoming ‘alive’ and implemented. In this way, digital technologies will not only enhance children’s learning, thinking and creativity but will also contribute to improving their lives and the lives of their communities.

**ECE and new perspectives on digital technologies**

Brooker (2003) has proposed that ECE was leading the way in the use of digital technologies to support positive learning experiences for children. In ECE, there is ‘less pressure to meet strict targets and more opportunity to experiment with child-centred practice’ when compared with the school sector (Brooker, 2003: 261). Additionally, there are no standardised step-by-step procedures for integrating new technologies in early childhood. Despite the ambitious plans, the reality is very different almost 15 years later. Digital Technologies have been widely adopted in early childhood and research has revealed benefits and advantages for young learners (e.g. Christakis, 2014; Hatzigianni and Margetts, 2012; Howard-Jones et al., 2011; Kabali et al., 2015; Kermani and Aldemir, 2015; Plowman and McPake, 2013). However, other early childhood educators are still reluctant to voice the benefits of such findings (Choi et al., 2017; Mendelsohn et al., 2008;
In examining the history and philosophy of ECE, we can see a rich tradition of child-centred pedagogies, strong emphasis on reflective practices, an endless passion for children’s rights and an undisputable commitment to children’s well-being. The sector is still trying to break away from the dominance of developmental psychology and stage theories and has effortlessly embraced sociocultural approaches (e.g. the theories of Vygotsky, Bronfenbrenner, Malaguzzi). More specifically, the Australian Early Years Learning Framework (EYLF) for children from birth to 5 years of age (Department of Education, Employment and Workplace Relations (DEEWR), 2009) has successfully incorporated a broad range of philosophies by stating its five theoretical principles: (1) secure, respectful and reciprocal relationships; (2) partnerships; (3) high expectations and equity; (4) respect for diversity; and (5) ongoing learning and reflective practice (pp. 12–13). Although critical and postmodern ideas are present in the EYLF, not all early childhood teachers are familiar with these new ideas (Anderson, 2014; O’Rourke and Harrison, 2004; Ryan and Grieshaber, 2005). As a consequence, adopting a theoretical framework which is not very clear to early childhood educators, together with the contentious views about the use of new technologies remains a difficult challenge.

In facing this challenge, early childhood teachers need support and ongoing dialogue. New ways of thinking about teaching and learning can assist early childhood educators to better understand critical and postmodern philosophies, and can also boost their confidence around the use of new technologies.

By placing the emphasis on the process and not the product, on the how and not on what, on children’s agency and rights, on the conviction that new technologies can contribute to improving lives, eliminate inequalities/stereotypes, identify problems and think of solutions, early childhood educators’ pedagogies can be transformed. In adopting a new framework, early childhood teachers will not view new technologies only as a ‘tool’ or as a technical ‘skill’ necessary for the preparation for school. They will regard new technologies as an essential component for integrative educational processes which are constantly changing and which should not be taken for granted. Additionally, changing their perspectives from seeing technology as something which is part of all children’s everyday lives to something that not all children have or know how to use will also enable teachers to identify equity issues and ‘... differences in abilities to use technologies, to critically evaluate, analyse and interpret data, attack complex problems, test innovative solutions, manage multifaceted projects, collaborate with others in knowledge production, and communicate effectively to diverse
audiences …’ (Warschauer and Matuchniak, 2010: 213).

**Educator’s role**

In adopting a transformative perspective to implementing new technologies, we also should revise the role of all the stakeholders in children’s education and primarily the role of the teacher. Starting from valuing and exploring the experiences children bring to class, teachers can easily get a sense of the general level of children’s engagement, competence and satisfaction from using new technologies.

Involving children in the whole process of designing for learning with technologies is also crucial. Children’s interests and curiosity can be the educator’s guide. With a teacher who is committed to social justice, who teaches with a political intent, who critically questions specialised knowledge and advocates for young children, technologies can assist them to embrace multiculturalism, celebrate diversity and promote empathy and tolerance. Technologies can be used for more important tasks than to satisfy curriculum requirements, for example, to ‘build critical communities where each person’s history, knowledge, social and cultural identities are valued, validated and included’ (MacNaughton, 2003: 293).

With transformative pedagogies, reflective practice is also of immense importance (Freire, 1972, 2005; Habermas, 1972, 1974). Reflective practice is also highlighted in the EYLF (DEEWR, 2009). According to the EYLF, educators are encouraged to follow the reflective cycle of act – reflect – evaluate. The same cycle can be followed when engaging with new technologies and in further enriching the cycle, children’s reflections can also be encouraged and incorporated in future technological plans. Technology in different forms is being used for making children’s learning visible, for documentation purposes, but again children’s voices and active participation in this process is minimal and could be further supported.

In line with these beliefs, the role of early years educators in the change process is vital and can take various forms. Educators of young children can move away from their established, conforming role of reproducing inequalities and understand their roles as ‘cultural workers’ and as agents of change (Darder, 2002: 171; Freire, 2005). They can be their own learning coordinators and facilitators, not just for the sake of learning but for transforming society, diminishing inequalities, supporting equity, interrogating power decisions, understanding the complexity and developing a new dynamic philosophy.
Unfortunately, the critical contribution of the educator’s role in orchestrating an appropriate and vibrant technological environment for young children has been compromised by lack of opportunities and appropriate professional learning around the pedagogical implementations associated with new technologies. In addition, the lack of resources and the shortage of continuous, cohesive professional development, and in many cases the lack of leadership, are contributing to ‘we are left behind’ feeling (Parette et al., 2010).

**Research on new technologies under a critical/postmodern framework**

Freire ([2004] 2016), in his work with adults, noted the challenges posed by technological restructuring: It is as urgent as it is necessary that technology be understood correctly – not as diabolical works always threatening human beings, but as having a profile of constant service to their well-being. The critical understanding of technology, with which the education we need must be infused, is one that sees in it an increasingly sophisticated intervention in the world, one that must necessarily be subjected to the political and ethical test. (p. 70). Even though Freire died before having the chance to witness the rapid growth of digital technologies, he prophetically signalled the need for exploring the transformative powers of technology by first testing the political and ethical assumptions of its use.

Although research around the use of technology with children is abundant, a limited number of studies follow a critical or a postmodern theoretical framework. Though the reasons for such a lack of research have not been appropriately identified in the literature, it might be assumed that one of the reasons might be associated with the pre-eminent place of the cognitive sciences and an emphasis on socio-cultural views especially in ECE (Di Santo and Kenneally, 2014; Grace and Henward, 2013).

There are also studies which reveal the gaps in educational research with new technologies and the limitations in identifying the serious social inequalities and class/racial divides (e.g. Lempbane and Prinsloo, 2014; Pallitt, 2009) or projects with immigrants and the use of new technologies to promote their digital skills (e.g. Machado-Casas and Flores, 2014). However, most of these studies again follow socio-cultural perspectives.

Research based on critical theory with some use of new technologies is more evident in the health disciplines. For example, in Health, Medical, Community-based participatory and Indigenous research, the use of cameras and photos, known as photovoice, or photo novella (other terms are
also used, for example, photo-interviewing, photo elicitation, reflexive photography) started long ago to investigate the needs of developing communities, promote critical dialogue and alert policymakers in the hope to solve vital problems in small communities (Castleden et al., 2008; Wang and Burris, 1994, 1997). Wang and Burris (1994) in their pioneering study in China gave cameras to children, rural women and grassroots workers to empower them, to awaken their ‘critical consciousness’ so they can discuss and take action about their life conditions (p. 172). Three years later, same researchers in another paper provide a detailed analysis of ‘photovoice’, a method based on ‘education for critical consciousness, feminist theory and documentary photography’ (Wang and Burris, 1997: 370). They also explained the history of how visual stimuli, in the form of photos or movies can play a significant role in awakening social consciousness and inform minorities (e.g. homeless children with the work of Hubbard, 1997) about their rights and how they can be transformed into active citizens and engaged community members (Wang and Burris, 1997: 370–371). They identify nine advantages in using photovoice for answering research questions around health issues, but they conclude with a direct reference to the Freirian context of problemposing education and how the images produced by the people have the power to transform their life in the community (Wang and Burris, 1997: 385).

More recently, Bisung et al. (2015) utilised photovoice for understanding environment and health issues (water, sanitation and hygiene) and to also encourage social action in Kenya with eight women. They also concluded that photovoice can be a very useful resource when based on strong theoretical foundations such as Freirian-based education, for behavioural research and interventions (p. 7). Following similar methodology (photo novella), Burke and Evans (2011) gave cameras to Oncology and palliative care nurses to explore what spirituality meant to them. Although this study was not about community participation or transforming people’s lives, it is also insightful as it offers us evidence for the creative aspect of technology and how it can be used for promoting critical thinking and reflection. Burke specifically comments on the advantages that digital technology can provide when exploring ‘complex and multifaceted health issues’ (p. 165) and highly recommends the use of digital cameras for exploring difficult issues and for ‘enriching research and society as a whole’ (p. 175).

Unfortunately, studies which utilised photovoice or photo novella methods for answering Educational research inquiries are not evident. A family study with immigrant Hispanics (Schwartz et al., 2007) used photovoice as one of their methods, with eight of their participants. The project’s
aim was to help participants improve their family planning, birth control decisions and the use of
and access to the health care system. Consistent with above mentioned research, Schwartz et al.
(2007) concluded that photovoice helped them significantly by enriching their data and providing
them with a deeper appreciation of their participants’ perspectives. Even more importantly, they
recommend the use of photovoice for ‘improving conditions of diverse populations’ (p. 765).
Such research can certainly inform the educational research community. The research literature
around the use of technology for addressing social justice/equity issues or for enhancing children’s
critical and reflective skills based on critical or postmodern perspectives is limited. Even the popular
research experiment by Mitra, from the ‘Hole on the Wall’ in Indian slums, which could have easily
adopted a critical perspective given the aims (acquisition of basic computing skills for poor children
with no access to technology at home) and the context (developing country, rural India), is situated
on the constructivist paradigm, as described by Mitra and colleagues (Dangwal et al., 2005: 42). In
contrast, a more recent study by Byker (2014) in India with primary aged children living in an
underprivileged area is clearly underpinned by Freire’s work on ‘critical consciousness’ and also
Amartya Sen’s concept of social justice (‘nyaya’). The researcher explored the meanings that
students and teachers assign to computer technology and also the negotiation of those meanings.
This case study gave underprivileged children, who are often suppressed or silenced, the
opportunity for their collective voice to be heard. This project underlines the positive impact of a
community initiative not just on advancing technological skills for children but also on raising their
confidence and empowering them to realise that through technology they can ‘reprogram the world’
(p. 27).
A fruitful field for research drawing upon critical and postmodern perspectives and also utilising
new technologies is the field of multiliteracies. Though conducted mostly with older children,
inspiring projects have taken place, such as Project Fresa (the strawberry project) where primary
aged students investigated their parents’ work in the strawberry fields of California and shared their
findings online. Teachers were motivated by the work of Freire and his aspiration not to just ‘read
the word’ but ‘read the world’ (Freire and Macedo, 1987), meaning to go beyond just meeting the
required literacy standards towards enhancing critical thinking and communication skills.
Finally, innovative research around the use of broadcast media and young children of 6–7 years
of age by Grace and Henward (2013), drawing upon Foucauldian theory (the six techniques of
power), postulated that when it comes to media interaction, consumption and production, young
children are competent learners. They argue against a deficit view of the child, and against the old, romantic and innocent views of childhood. Using a qualitative design, the study used specifically selected video clips to show to 36 children. The clips reflected areas of particular concern regarding media effects on children, for example, consumerism, violence, gender and ethnic stereotypes and others. Children were interviewed in small groups after they watched the clips. Findings revealed that children were able to perceive indirect media messages and had basic understanding of key media concepts. Alongside the important implications for practice of this kind of research, what is even more striking is that an awareness for the necessity to examine alternative theoretical paradigms has been raised.

Conclusion
Despite the dearth of academic research in this area, no one could disagree that there are certainly informal, unpublished examples of teachers using technologies in innovative, purposeful and critical ways in their everyday practice.

Critical and postmodern perspectives are evident in early childhood pedagogies and practices, but there is a disconnection of those perspectives with the use of digital technologies in the broader educational context. Possible reasons might be found in the lack of strong theoretical frameworks in the educational uses of technologies (Selwyn, 2012) or the dominance of developmental and socio-cultural theories, which have persisted as the dominant paradigm in ECE. It is evident from the research literature in other disciplines that digital technologies can be used as both a means to enhance critical thinking, questioning and reflection and also as a way to improve our communities and our world and not just for documenting children’s learning.

All levels of education should be involved and utilise technological advancements. Education is a lifelong process that doesn’t have a definite start or end, and new technologies permeate everything we do in our 21st-century lives. Learning about new technologies starts as soon as we are born and continues. Being actively involved in the designing of our learning and understanding the different dimensions, power relations, inequalities and decisions that are made about their use and the ramifications of their presence are important educational acts.

Shifting paradigms and giving up intellectually and emotionally familiar and secure places is hard, almost frightening (Anderson, 2014). However, this is a natural part of the transformation process, you are not sure of what the future will bring but you also know that as an educator you
have to evolve … the way your young children do.

**Funding**

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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