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Our Digital Children

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Abstract

The power relationship between adults and children in the West is shifting. Factors of age and life experience are becoming counterbalanced by children's affinity for burgeoning developments in digital technology, where skills developed in online gaming and social media provide a strong foundation for knowledge economy occupations. The implications for parenting, schooling and society are immense. This paper summarises the current debate on issues around children's use of digital devices and social media. It argues that for many parents a lack of familiarity and understanding creates anxieties and impairs them from helping their children realise the opportunities for social, moral and economic development afforded by the new technologies. Schools have a leading role to play but are hampered by teachers' technical skills and confidence to innovate. The paper concludes with recommendations for a proactive approach to yield benefits for both children and adults.

Introduction

This paper examines the burgeoning phenomenon of children's use of digital devices and ICT (Information and Communications Technology) applications in home and school. Societal, technical and educational perspectives are taken in reviewing the potential dangers and also in assessing evidence of the potential opportunities. Populist fears of new technologies are discussed, followed by a more evidence-based consideration of national surveys conducted in three countries. A technical perspective is taken in comparing the new multi-way and multi-mode online environment to the static Web it preceded, with the observation that producer-consumer roles exploiting these new possibilities are more likely to be adopted by younger users. Many parents admit to knowing less about Internet matters than their children, and a widening gulf is noted between an emerging digital youth culture and the institutional culture of schools. The paper cites a number of studies suggesting the beneficial social and moral potential for children's experience with new technologies and ways in which parents might become more closely involved. Finally, recommendations are made in respect of parents and teachers for an informed and proactive response to this 21st Century problem that demands fresh thinking and fresh solutions.

Tabloid trepidations

Righteous indignation and 'moral panic' have fuelled a growing trend in British right-wing newspapers. For almost a century the *Daily Mail* has led the press pack with its own best-selling brand of sensational outrage and protest against all things modern. Computers and the Internet have been a predictable target for its sketchily-researched bombast, in which concern for sales of the paper seem to trump any objective concern for making rational deductions from reliable evidence.

An example can be found in the article 'The five signs your child is addicted to their iPad - and how to give them a 'digital detox'' by Victoria Woollaston (2013). The article claims:

- *One in three children are using tablets and phones before they can talk*
- *The rise in gadgets is being attributed to the rise in technology addiction*
- *Addiction in children can interfere with their sleeping patterns and eating*
- *Signs include withdrawal symptoms and a rise in devious behaviour*

- *Experts explain how to impose a 'digital detox' if a parent is concerned*

However, no evidence is cited for the “one in three” or for the next three claims. The ‘experts’ quoted are two psychologists, who identify the signs of some children’s dependency on devices such as smartphones, but who say nothing about whether this is a widespread or growing problem. The phrase ‘digital detox’ turns out to be journalistic alliteration rather than medical recommendation.

A second example is ‘Infants 'unable to use toy building blocks' due to iPad addiction’, an article by Graeme Paton (2014) in the more ‘serious’ (but equally right-wing) *Daily Telegraph*. Paton’s claim that “The Association of Teachers and Lecturers warn that rising numbers of children are unable to perform simple tasks such as using building blocks because of overexposure to iPads” appears to derive from the comments of two teachers at a conference of the Association of Teachers and Lecturers (ATL) in the UK. One reported the views of some nursery teachers he had talked to, and the other said over-exposure to technology had been linked to weight gain and aggressive behaviour. Both teachers were expressing personal views rather than the official policy of the ATL. Indeed, the Association’s position as set out in a discussion paper from their Future Steering Group, is that:

> *Transformation is essential if we want a match between learners and the curriculum. Incorporating learners’ cultural capital as the basis for our curriculum, and ensuring experiences are relevant, contextualised and purposeful by default, involves the effective use of digital technology and digital literacy experiences.*
> (Campbell & Overton, 2012 [unpaged])

The article therefore seems based upon a second-hand account of what an unspecified number of unnamed nursery teachers are said to have said. Perhaps unsurprisingly, the *Telegraph* journalist does not appear to have visited the ATL website.

Many more examples of such under-researched and indolent journalistic practices may be found in the British press, and no doubt in the populist newspapers of other countries. Their message is one of paranoid fear: that the complacent certainties of the established order are being undermined by sinister new developments that are beyond their control. However, is this merely smoke without flame? The next section of this paper will present some more factually-based evidence on the rise of new digital technologies and their increasing use by children.

Facts and figures

Developed by Apple Inc., the iPad has proved highly successful, selling one million units worldwide in the first 28 days from its arrival in 2010. It spawned a range of tablet computers from technology rivals such as Samsung, Google and Sony, and sales of tablets are predicted to overtake all other types of computer by the end of 2014. Unlike desktop and laptop computers, tablets can be easily used by young children, and as the following surveys show, they have been a major factor in the recent dramatic growth of technology access by this age group.

In China, a survey of tablet and smartphone use conducted in 2012 of 1,047 children and 500 parents in Guangzhou, found that 40% of families owned iPads and children's average starting age was 4 years. (Wang, 2012).

In the In the UK, a national survey conducted by Ofcom (2012) the telecommunications regulator, found that a third of 3 to 4 year olds and 87% of 5-7 year olds use the Internet. Below this age children mainly watch videoclips, but from the age of 4 start playing online games, with their interest later widening to include information seeking and socialising. Some of these activities are conducted without parental involvement: indeed, some parents admitted that they felt unable to take the lead, as the survey found.

> *Forty-six per cent of parents agree with the statement: "My child knows more about the internet than I do". Agreement increases with each age group, with 22% of parents of a 5-7 year-old agreeing, 35% of parents of an 8-11 year-old and 67% of parents of 12-15s.*
> (Ofcom, 2012, p. 7)

In the USA, a nationally representative survey of parents of children aged 8 and under (Common Sense Media, 2013) found dramatic increases in usage over the two-year period 2011-2013. Although the use of television by children under 2 years remained at 66% over this period, their use of handheld media such as smartphones and tablets almost quadrupled: from 10% in 2011 to 38% in 2013. This was consonant with the five-fold increase in ownership of tablet devices such as iPads among families with children age 8 and under: which climbed from 8% in 2011 to 40% in 2013. The survey's third major finding was

a doubling in the number of children aged 8 and under who had used mobile media and a trebling of the average amount of time spent with these devices.

In just a few years, handheld digital devices have become commonplace in households across the Developed World. The pace of this growth is unprecedented and appears to be accelerating. It is a largely domestic phenomenon, and although some schools in the USA and UK have moved from the knee-jerk stance of banning smartphones and tablets to actually encouraging them (Nagel, 2013; Hinks, 2013) schools are still playing catch-up in both resourcing and educational use. In the latter regard, schools as institutions, locked as they are into 20th Century assumptions and practices (Williams, 2008) have an even greater distance to travel, as will be discussed in the next section of this paper.

Consumers to contributors

Radically new technologies initially suffer the fate of being interpreted in terms of existing ones. Hence, the radio was at first the 'wireless telegraph' and the automobile the 'horseless carriage' (prompting Henry Ford's acerbic comment "*If I had asked people what they wanted, they would have said faster horses*."). The World Wide Web, developed in the early 1990s by Tim Berners-Lee (Gillies & Cailliau, 2000) as a scientific data access system, was initially regarded as a one-way broadcast medium like television. It was thought that a small number of corporate bodies would host their information collections to a large number of individual 'viewers', and the high cost of creating and maintaining a website underpinned this assumption. However, with incremental developments in computing it soon became apparent that any individual with a modest amount of technical knowledge and resource could set up their own website and create their own content. The term *Web 2.0* was coined by the information architect Darcy DiNucci (1999). The system she envisioned would be transformed from the static paper magazine -style pages of Web 1.0, viewed on a desktop computer, to a dynamic transport medium that would manifest in various guises across a wide variety of portable devices. Essentially, it would be *interactive*: a multi-way communication 'adhocracy' rather than a one-way hierarchy.

Barely fifteen years later, the World Wide Web with which we are now familiar is a system for posting as well as reading content. You Tube, Facebook, Twitter and thousands of other

social media applications co-exist in an almost anarchic Tower of Babel where hundreds of millions of participants across the globe daily offer and consume their information, ideas, opinions, trivia and cultural creations. The rapid and widespread take-up of this mode of use suggests its compatibility with changing societal views of the individual's relationship to power and a *Zeitgeist* of personal expression and informality.

Returning to the issue of formal education raised in the previous section the seemingly lawless cacophony and 'creative destruction' of Web 2.0 – enabling a medium for the erosion of deference to authority – poses major challenges for an institution-centric educational paradigm that looks more at home in the safe world of Web 1.0. This sub-theme of the paper will be returned to in the next section.

Net Gen or Not Gen?

It is tempting for adults to think of today's youth as substantively different to themselves. As seen earlier, the sales of tabloid newspapers benefit from scare stories of the wickedness of the new, and Socrates is supposed to have railed against children: *"Our youth now love luxury. They have bad manners, contempt for authority; they show disrespect for their elders and love chatter in place of exercise"*. Prensky (2001) saw young people who have never known a world without computers as *digital natives* whose early experience with technology has shaped neural patterns to the extent that they really do think and learn differently to their *digital immigrant* parents. This stark dichotomy has been challenged as too simplistic and alternative models have been suggested. White & Le Cornu (2011) propose a continuum between *Visitors* and *Residents*, with the former using technology sparingly to accomplish specific tasks and the latter fully bought-in and living a significant part of their lives online through social networks. The ability to 'media multi-task' is another feature of younger users, and the Ofcom survey (2012, p. 3) found 12-15 year-olds most likely to engage in texting or Internet browsing at the same time as watching television.

In relation to the sub-theme of formal education, Oblinger & Oblinger (2005) in their book *Educating the Net Generation*, report an easy familiarity with ICT among 'Net Gen' university students in the USA, and note a rift between students' preferred methods and the practices of their teachers. In the UK, the report *Their Space* (Green & Hannon, 2007) collected data

from academics, teachers, secondary school students and their parents. They found social networking to be heavily colonised by the young, but their main finding was articulated in the prefacing observation *"Young people are spending their time in a space which adults find difficult to supervise or understand"*. No evidence was found of students using the Web dangerously or inappropriately; instead they seemed to be well aware of potential dangers and how to avoid them – in contrast to the views of many of their parents. The authors comment upon what they see as a widening gulf between an emerging digital youth culture and the institutional culture of schools, and make a number of recommendations for policy and practice.

There are indications that the skills developed by 'Net Gen' students through social networks are closely related to the economic skills of the future. Williams (2014) compares a number of studies and projects in which Knowledge Economy skills have been identified, finding that in addition to familiarity with information acquisition and processing are the interpersonal and intrapersonal skills of teamwork, communication and a readiness to learn through active exploration. Mark Brown, Director of the National Institute of Digital Learning at Dublin City University, argues that access to digital devices in the home is essential.

> *We have a responsibility to address the growing problem of digital exclusion. Learning through technology is one way of ensuring that we develop a more inclusive society where children develop appropriate 21st century skills.*
> (Brown, 2013 [unpaged])

Brown advocates a proactive stance by parents and teachers in guiding their children's media access.

> *Learning is inherently a social activity and rather than trying to ban children from joining such networks and playing online games where they collaborate with other players from around the world, we need to educate them, and many adults, on appropriate usage. Digital literacy is here to stay and if we are serious about taking advantage of the potential benefits of digital learning then we need to appropriately resource our schools and teachers.* (ibid.)

Francis (2006) discusses the benefits of computer-based games for providing rich simulations within which learners can develop collaborative problem solving and 'embodied empathy' with characters in historical scenarios. He proposes a Games Based Pedagogy in which learning including role play is situated and reflective discussion is employed to encourage alternative interpretations of historical events. However, the employment of these scenario simulations and other forms of immersive virtual environments requires

technical competence on the part of teachers and a preparedness to depart from tightly prescribed school curricula.

The effectiveness of teachers' use of ICT in schools is determined by a number of factors. A report by Cox et al. (2003) for the Education ministry in England found many teachers confident in a limited range of ICT applications, but few were competent in going beyond. The authors noted that many teachers were still wary of some applications – which prevented the teachers from using them effectively. A willingness to employ ICT widely was associated with teachers' beliefs about the nature of the educational process, with those who embraced a constructivist view of teaching more likely to identify opportunities than colleagues with a more traditional pedagogical orientation. The problems of preparing student teachers to use ICT is discussed by Mackie et al. (2010), who arrive at similar conclusions, finding that although most of the student teachers surveyed were experienced and confident within a fairly narrow range of ICT skills, their competence beyond this was limited. A further matter of concern was that most student teachers seemed to underestimate the ICT abilities displayed by many primary school children.

Pirouetting possibilities

The social and moral potential of children's experience with new technologies is an emerging area of study. The notion that children's play is an important influence on their moral development is well established and uncontested in the West. Bergen & Davis (2011, p. 84) elaborate:

> *Play provides a medium in which individuals can test roles, boundaries, and possibilities, can take risks, and can speculate about the effects of imagined behaviors — all without the real-world consequences associated with their activities. The imagined world supported by the medium affords individuals experiences that can subsequently influence their moral emotions, moral behaviors, and moral reasoning.*

The authors report recent studies into children's emotional and moral behaviour when playing with technology-augmented toys and personified technologies – which both employ interactive features and some level of artificial intelligence. In a fascinating study by Kahn et al. (2006), eighty pre-school children were observed playing with the robotic dog AIBO and a stuffed dog. AIBO (Sony, 2006) is described as an 'autonomous robot' dog with moveable

limbs and various sensors that enable it to 'learn'. The way in which it is gently patted or sharply tapped on the head after it has performed an action will increase or decrease its tendency to perform that action. Thus, AIBOs develop individual 'personalities' according to the way they are treated. In the study it was found that children engaged more often in apprehensive behavior with AIBO than with the stuffed dog, unsure how it would react. In addition, they were more likely to mistreat the stuffed dog and endow it with animation. The authors comment (p. 430):

> *Contrary to our expectations, we found that in certain respects children engaged morally with AIBO. Specifically, the majority of children said that it is not okay to hit AIBO (69%), to leave AIBO alone for a week (74%), or to throw AIBO in the garbage (86%). About half the children said that AIBO feels pain (46%). In turn, 78% of the children backed up their evaluations with moral justifications, mostly focused on AIBO's physical welfare (e.g., "because he will be hurt") or psychological welfare (e.g., "because he'll cry…till when you finally come back"). In terms of the two moral content questions, almost all of the children said that the interviewer should do something to help AIBO if AIBO gets hurt (100%) or if AIBO's tail comes off (91%).*

Observing that children made more attempts at reciprocity with AIBO than with the stuffed dog, the study cites established literature identifying reciprocity as central to moral development, initiating concerns for the wellbeing of others and for fair and equitable behaviour.

A second example of moral behaviour is reported by Freier (2008) in a study of children's interactions with a personified software agent in the form of a talking and listening screen avatar called Judith. The views of sixty children aged 8-9 years were sought in the way they responded to transgressions against the avatar that were initiated by the researcher: breaking the rules of a simple game, and verbally insulting Judith. Two variants were enacted: one in which Judith did not respond to the transgressions and the other in which the avatar complained that 'her' feelings had been hurt by the insult. The outcomes suggest that children did have an awareness of this as a moral violation, and significantly more so in the variant when the avatar expressed harm and made claims to its own rights. Freier reflects with the speculation that children's moral attributions to such personified agents might have positive effects for their emotional and moral development.

Marina Krcmar has conducted a number of studies into the effect of new media on children's moral perceptions and behaviour, employing the level definitions of Kohlberg's stages of moral development (1981). In a recent paper (Krcmar, 2013) she compared

children's experience of passive media, such as books and television, with their active engagement in multi-player games and social media, finding evidence that the latter show more potential for children to extend their experience of the consequences of their actions. She concludes (p.213):

> *Technology is so new that we as a culture have not really determined what children should be taught. Adults have not generated consistent repetitive moral messages for children about new media technology as they have for matters such as sharing or aggression. … In the end we need to establish a common cultural message; a mental model for new media technology; a model that can be presented to children as easily and regularly as those for sharing or aggression.*

Earlier sections of this paper have identified the problem of parents' and teachers' lack of familiarity with the operation of new technologies and of the digital worlds in which their children have become residents – *Their Space*, in the title of Green & Hannon's (2007) report. While there are positive opportunities for using digital devices and social media to help children develop personally, socially and morally, there are also undoubted dangers in unsupervised exposure (for example, Ey & Cupit, 2013). The report *Zero to Eight. Young Children and their Internet Use* (Holloway et al., 2013), funded by the European Union, reviews recent research and makes a number of recommendations, including (p. 5):

1. *The development and promotion of realistic, evidence-based guidelines for parents/carers regarding very young children's engagement with digital technologies and the internet.*
2. *The development and promotion of age appropriate internet safety education for all age groups — including pre-primary school or nursery/kindergarten settings.*

In addition, the report recommends continued engagement with device and software designers to ensure that default privacy protections and other safety features appropriate to very young users are integrated into their products. These recommendations are essentially 'top-down' and address what could be achieved by governments but not by parents. A complementary approach is the promotion of digital applications that actively bring together parents and their children, as outlined in the remainder of this section.

Sato (2012) describes two software programs designed to promote what she calls 'triadic relations' between child, parent and computer. The purpose is to develop parent-child dialogue through the creation of a graphic, computer-based story. This work builds upon her

earlier research (Sato, 2008; 2009) in the use of narrative production to improve young children's speech variety and to assist contextual integration

> *The software "PeKay's Adventures" … consists of three situations or scenes: Prologue, Development, and Solution. In Prologue, the parent reads aloud to the child, relating a problem that must be solved by the protagonist ... In Development and Solution, the child can proactively create his or her own story ... The child does this by operating the buttons while viewing the screen. The buttons can change the facial expression of the characters in the story as well as control the movements of the characters and the settings of the scene.* (Sato, 2012 [unpaged])

An experiment conducted with 5 year-olds compared the *PeKay's Adventures* software tool with a paper equivalent. The results showed that using the program stimulated more speech output and increased its variety, and the control over character expressions led to an increase in speech related to the emotions of the characters. The second software example focuses on the role of the parent in the story creation process and also builds upon earlier research that found variation in the degree to which parents were skilled in encouraging their children to talk about the stories they had created.

> *"Oyako de Monogatari" is a web application and can be used on the internet at home to create stories. The process of parent and child creating a story is recorded on camera … and the parent can watch the video and look back on their behavior ... At the same time, parents can share the video with other parents and children ... This "on-line workshop" system allows parents to learn through the above activities.* (ibid. [unpaged])

Trialling of this software with parent-child pairs resulted in improvements in parents' elicitation skills and in the quantity and variety of children's speech – making the online stories a rich focus for linguistic and personal development.

The examples above of interactive toys and avatars are early explorations of the potential of such systems for children's social and moral development. However, proactive parental involvement is seen as essential, and Krcmar and Holloway et al. identify some priorities for raising parents' awareness. The work of Sato makes a neat fit with this agenda and points the way to a new genre of interactive discussion games to facilitate parental understanding and involvement in their children's use of digital applications.

Conclusions and conjectures

The objective of this paper has not been to allay concerns about the dangers of children's use of new technologies. The dangers are very real – although not as stark as the hyperbole of newspapers with concealed agendas. Reasonable levels of supervision are necessary for all activities in which young children engage, but a particular problem in respect of digital devices is the speed at which they have proliferated in homes across the Developed World. Less curious and confident than their children, many parents have felt unskilled and unprepared in managing their use, giving children more freedom than they would for more familiar forms of play.

Schools have a key role in raising children's awareness of safe play, especially for activities involving the Internet. In the UK, schools' involvement in national campaigns such as Stranger-Danger (Kidscape, 2014) have proved successful (although may, ironically, have resulted in parents keeping their children more indoors). In order to meet the second main recommendation of Holloway et al. (2013), what is needed first is the education of teachers and school leaders in the opportunities as well as dangers of new technologies. However, given the continuing pace of change and the constant introduction of new devices and applications, this must be a continuing rather than a one-off process. Evidence from Cox (2003) and Mackie et al. (2010) discussed earlier indicates that this might be no easy task. It goes well beyond technical training, and Williams (2008) comments on the cultural reorientation that would be necessary in order to address the deep professional conservatism of teachers. Green & Hannon (2007, p. 58) express this problem well.

> *Rather than thinking of themselves as only directors, teachers need to re-imagine themselves as facilitators. Technology in the classroom currently does little to promote this shift; interactive whiteboards are too often employed as a high-tech version of chalk and talk. Children's independent, exploratory behaviour when learning with digital technologies can conflict with this approach, leaving them frustrated with the pace of pre-planned lessons directed by the teacher. Meanwhile, the expectation that teachers will always know more than pupils is disrupted by the fact that children are often more confident users of digital technologies than adults.*

In England, the discontinuation of ICT as a school subject in the National Curriculum by the present Conservative-led coalition Government and the shifting of Initial Teacher Education from universities towards schools – where traditional attitudes and practices are more likely

to be perpetuated (Williams, 1996) – can be seen as a backward step. Also discontinued by the present Government was a national agency (Becta, 2010) that had developed expertise in the provision of such ICT advice to schools and parents, and would have been ideally situated to take a lead. These decisions were taken by Michael Gove, the Education Secretary who was formerly a journalist for a Conservative-leaning newspaper.

This paper has examined the growing phenomenon of digital devices and applications in the home, from societal, technical and educational perspectives. While acknowledging the potential dangers to young children it has also provided evidence of the potential opportunities. A reactive response of pulling up the drawbridge and trying to censor children's access to these technologies will not work, and instead we need a proactive strategy that embraces the benefits they offer and acknowledges their place in our children's future. The final word must be from that great progressive educator, John Dewey:

If we teach today as we taught yesterday, we rob our children of tomorrow.

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