

Seven myths about young children and technology

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ABSTRACT

There has been widespread media coverage about the advantages and disadvantages of children being exposed to computers and other digital media at ever-younger ages, but research evidence to inform this debate is limited. In its absence, a number of myths about children's experiences with technologies have emerged. We select seven statements, both for and against children's use of technology, to represent positions we have come across from the media, parents and educators. Findings from detailed case studies of the everyday lives of three- and four-year-old children in Scotland are used to interrogate some of these myths. The discussion includes a description of which technologies children encounter at home, how family practices influence children's encounters with technology, and why it is beneficial for education professionals to know more about children's experiences with technology at home.

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Parents and educators tend to have lots of questions about young children's play with computers and other technologies at home. They can find it difficult to know what's for the best because these toys and products weren't around when they were young. Some will tell you that children have an affinity for technology that will be valuable in their future lives. Others think that children should not be playing with technology when they could be playing outside or reading a book.

The research background

Over the last decade we have carried out a series of detailed case studies with more than fifty 3- and 4-year-old children and their families (see information box). We visited families repeatedly over a period of a year or more, so we got to know these families well. Our multiple methods (such as observations, child-led home tours, and shared discussions with parents and children) enabled us to construct multifaceted pictures of children's everyday lives, how parents and children think and feel about a range of issues, and the role of digital media in supporting learning. Our choice of research methods has been informed by an ecocultural approach that looks at the ecology of children's experiences and the cultures in which they participate, seeing these as key developmental factors (Weisner, 2002).

In this discussion, 'technology' refers to the devices such as computers and cell phones and to the products or outputs – such as DVDs, websites, games, and interactive stories - that are viewed, read, played or created on these devices. By the time they started school (at age five in the UK), the children in our studies had encountered cell phones, televisions, games consoles, DVD and MP3 players, as well as desktop, notebook and tablet computers used for work and leisure, and technological toys, such as play laptops or interactive pets.

There has been a lot of media coverage about the advantages and disadvantages of children being exposed to computers and other digital media at ever-younger ages, but there's little evidence to go on. In its absence, a number of widespread myths about children's experiences with technologies have emerged. We have selected seven statements to represent some of the different positions we

have come across from the media, parents and educators and use the evidence from our research to provide a commentary on each one. We conclude by considering why it is beneficial for education professionals to know more about children's experiences with technology at home.

1. Childhood and technology shouldn't mix

Those who believe that childhood should be a time of innocence and play see technology as responsible for children's lack of social skills and emotional development, the loss of pleasure in books and reading, and attacks on their physical and mental wellbeing (Plowman, McPake & Stephen, 2010). Technology, it is thought, has particularly adverse effects on preschoolers because they are still developing cognitively and socially, leading to advice that young children should not be exposed to computers or television because this will be detrimental both at the time and later in life (American Academy of Pediatrics, 2010).

We found that young children's experiences with technology differed considerably from one family to another: nearly all children watched television and DVDs, but they varied in their enthusiasm for activities such as playing video games, surfing the web, or playing with interactive dolls and pets. Children expressed their own play preferences: some were keen to play with these devices, but others had little or no interest (Stephen, McPake, Plowman & Berch-Heyman, 2008).

All parents considered it to be important for young children to balance technology-based activity with more traditional games, books and outdoor play. Most felt that they had got the balance right for their own children, although some worried that cell phones could endanger health, and others were concerned that it was easy to become 'addicted' to video gaming. We did not find evidence from parents to support the notion that children's experiences with technology were having a detrimental effect on their behavior, their health or on their learning, although large-scale, experimental studies over a long period of time would be needed to supplement this case-study data.

2. Young children are 'digital natives'

While some say that technology is harmful, others consider there to be a natural bond between children and technology. We lost count of the number of times that parents or preschool educators told us that three- and four-year-old children know more about technology than they do themselves. The widespread use of the term 'digital natives' reflects this belief. According to Prensky (2001), those who have grown up with technology and feel comfortable using it are the digital natives. Children have been born into a digital world, so they have known nothing else during their lives; they are contrasted with the so-called digital immigrants, such as their parents and teachers, who have adopted technology later in life. These 'immigrants', it is claimed, have learned a certain level of adaptation to their technological environment but they do not fully assimilate: they can do what they need to do, but it does not come naturally.

While some children's facility for technology can be surprising, our observations revealed that many children of this age are not 'digital natives'. They can feel a bit overwhelmed, at least initially. This is particularly noticeable with computers that were originally designed as an adult technology to use in the workplace. Until the emergence of tablet computers, their basic design changed very little in decades: their internal processing power has become faster and more powerful but most still consist of a vertically oriented screen, a mouse or trackpad and a keyboard. This means that reading and writing text is still the main mode of interaction, a potential challenge for preschoolers with just-emerging literacy. When asked, children sometimes told us that using computers was 'hard' (Stephen et al, 2008) and we also observed their initial timidity with the Wii and tasks on play laptops. Interaction does not come as naturally as the term 'digital natives' suggests for children aged three or four who are faced with an unfamiliar website or game and have not yet learnt the conventions of interface design: Prensky coined the term to refer to college students and did not originally intend its use to extend to preschoolers. We found that children need the support known as guided interaction (Plowman & Stephen, 2007) until they have a level of familiarity that means that they can become

independent users.

This support is not just about showing a child how to use a particular device. While parents sometimes provided purposeful direct instruction - by showing which buttons to use on the remote control or how to scroll down a page - much of the support they provided was unintentional. They guided interaction by showing interest, asking questions, or making suggestions. When we asked how their children learned to do things with technology, parents replied that they just 'picked it up' (Plowman, McPake & Stephen, 2008), unaware that children learn by watching and copying others. In these cases, the so-called digital natives were learning from the parents and educators who have been positioned as ineffectual digital immigrants, suggesting that the term is not as accurate for young children as might first appear to be the case.

3. Technology hinders social interaction

There are fears that the lure of technology has led to children's lack of engagement with their families and a failure to develop the communication skills they will need at school and in later life. The home's saturation with leisure technologies is seen as a key factor, leading to increased television viewing and play with console games. The demands of busy working lives for many parents and their exhaustion when at home are thought to make electronic babysitting an attractive option at the end of the day.

Our research suggests that this vision is unwarranted for three- and four-year-old children. In some of the homes we visited, the television was usually switched on but children were adept at ignoring it. By this age, the children had favorite programs and DVDs of children's television series and films that they enjoyed watching repeatedly, often interspersed with other activities. They chose toys related to the program or film and played with these in ways that connected to the action on screen or dressed up like the characters and acted out scenes. When parents or siblings watched too, they became shared experiences that could be discussed or re-enacted at other times (as also reported by Takeuchi & Stevens, 2011). In this way, digital media can provide stimuli for questions about the world and for the development of their own narratives and imaginative responses (McPake, Plowman & Stephen, forthcoming).

Young children are not just consumers of media devised by others. Cell phones, email, social-networking sites, webcams and digital cameras have revolutionized young children's experiences of communicating with people at a distance, prompting them to address issues of audience at a much earlier age than would have been the case in the past. At three years old, Colin was already a proficient photographer when we visited his family. With help from his mother, he was learning to store and retrieve digital photos and, with his five-year-old sister, was communicating with relatives in Australia by sending them photographs and messages containing emoticons (as neither could write at this stage) and using a webcam for video calls. In communicating with relatives whom he had never met, Colin was learning how to describe his life in ways that would make sense to them. In earlier eras, these skills could only develop once children had begun to master the technical demands of the written language. With the right support, digital media can open up the means of communicating over time and distance and provide new and intriguing possibilities for the development of young children's communicative skills. This suggests that, used thoughtfully, technology can enhance rather than hinder social interaction.

4. Technology dominates children's lives

Many people feel that the domination of children's lives by technology means that they don't get enough exercise or spend enough time playing. However, our research showed that technology doesn't influence day-to-day life for children of this age as much as its ubiquity might suggest.

We conducted an exercise in which parents used cell phones to send us picture messages and a brief text description of their child's activities multiple times on three separate Saturdays (Plowman & Stevenson, forthcoming). Analyzing 200 of their messages showed that more than a third of the

activities recorded in this way, such as visiting relatives and going to sports events, took place away from home. Parents described one quarter of all the children's daytime activities as playing in one form or another; the rest of the time at weekends was spent eating, napping, shopping and cooking, or going on outings with the child's enjoyment in mind. A study on this scale is not conclusive, but it would be mistaken to think that technology dominates the lives of these children.

Nevertheless, technology is an important feature of family life in many households and most children use some form of device with a screen every day (see also Gutnick, Robb, Takeuchi & Kotler, 2011; Rideout, 2011). In our studies, computers were used for a range of activities, such as visiting CBeebies, Nick Jr., Club Penguin and Bin Weevils websites, sharing funny clips on YouTube with other family members, watching missed television programs or talking to relatives via Skype. Nearly all of the parents were relaxed about the amount of time their children spent on the computer or playing with games consoles. Parents were aware of the reported dangers of too much technological play but they felt that this was more of a problem for children from other families rather than their own. Similarly, Takeuchi (2011) found that few parents believe their own children are at risk and Funk, Brouwer, Curtiss & McBroom (2009) comment that media researchers seem to be more worried about this than parents.

5. Play = learning

The question of the extent to which children learn through technological play is disputed. Most early years specialists agree that the best educational experiences are based on play, although it is difficult to establish a direct relationship in terms of specific learning outcomes. Our studies (Plowman, Stevenson, Stephen & McPake, 2012) suggested that interactions with technologies could support the four main areas of learning at home outlined here:

- *operational learning* – learning how to control and use technologies, getting them to do the things you want them to do and having opportunities to make your own inputs and get a personalized response
- *extending knowledge and understanding of the world* – by finding out about people, places and the natural world
- *dispositions to learn* – as they become increasingly competent users of digital media, children show greater concentration and persistence and their self-confidence and self-esteem flourishes
- *the role of technology in everyday life* – as they observe adults involved in a wide range of pursuits, children learn that technology provides opportunities to design things, order goods, research travel and send text messages, even though they themselves cannot yet undertake these activities.

The domestic context offered opportunities to combine play and learning – with or without technology - by developing an awareness of family cultural practices, whether children were directly involved in these activities or observers of them. Children were taking digital photos of the family pets or using old computers and non-functioning cell phones as props for play in imaginary offices, shops and schools. These get less attention than the technologies that have more obvious educational potential but they extend the range of possibilities for learning and playing.

6. If it's interactive, it must be educational

Some of the products available for young children use the concept of interactivity to claim they can accelerate progress in learning to read, write and use numbers. The learning toys are marketed at parents who want to get children ready for school but they are often based on mundane educational tasks disguised as entertainment. The so-called interactivity may well provide some initial motivation for learning but it rarely continues beyond the first few encounters and may even get in the way of the educational potential. Typically, 'interactive' refers to the operational aspects involved in creating a response from an action such as clicking, pressing or scrolling. Creating this interactivity can be an impediment to learning if children do not understand what they need to do or lack the fine

motor skills to achieve it.

Tablet computers can solve some of these operational problems (see Morgan, 2010). The touch screen and gestural interface, the portability and easy share-ability offer new dimensions of interactivity but they do not guarantee innovative learning; some apps simply reproduce tired versions of electronic books rather than exploit the affordances of the medium. Technological interactivity is meager compared to human interaction: so far, no technology is sufficiently intelligent that it can adapt itself to an early reader in the same way as a more capable partner sharing a reading experience. An electronic book that reads the words out one at a time or asks children to point to a picture with the stylus and then says 'well done' cannot simulate the experience of adult-child conversations (Plowman, McPake & Stephen, 2012). Technological interactivity does not guarantee an educational encounter.

7. Children need to get tech savvy for their future lives

When we asked parents whether children needed to learn to use technologies from an early age, some parents felt that it was important to prepare children for the future. They expected their children to use technologies at school and thought that they would be at a disadvantage as adults if they did not have these skills. Some parents lacked confidence in their own abilities and wanted to make sure that their children were better prepared for the world of work. Even in financially disadvantaged families, parents made sure that their children had opportunities to learn, by letting them spend time at the homes of relatives who had computers or by acquiring second-hand products.

Not all parents took this view. Some argued that there is no benefit in an early start because technologies are changing so rapidly: anything that children learn when they are four will be out of date by the time they are adults. Some parents had a more general concern that if they encouraged their child's familiarity with technology it would become all-absorbing, at the expense of more valuable pastimes. With or without technology, the education of our children has always involved trying to identify the knowledge and skills they will need in their future lives and finding ways of ensuring that they have the best possible start. So while most would agree that familiarity with technology is important for their future lives, it is not possible to say with any degree of certainty what kinds of products will predominate in the workplace or at home in 20 years, when the children in our most recent study will be starting their working lives.

What does this mean for educators?

Curriculum guidance in the early years emphasizes the importance of supporting children in all aspects of their emotional, social, cognitive and physical development in ways that will enable them to become increasingly independent and eager to progress in their learning. These aspirations are compatible with the examples of playing and learning with technology at home that we have described above, but we found that preschool staff tended to focus on what they saw as the overtly educational gains to be made – the acquisition of basic operational skills (such as learning to use a mouse), certain learning dispositions (such as taking turns), and the learning arising from the content (such as basic number games) rather than children's awareness of the different cultural and work-related uses of technology.

Our studies have identified a number of areas for consideration by early years educators. These can be summarized as the need to:

- recognize children's different preferences
- develop awareness of the role of a wide range of technologies in the child's home learning environment
- acknowledge the range and diversity of children's early experiences at home and the ways in which parents, siblings and carers induct children into culturally significant technological practices, and

- extend their vision of the nature of children’s technological competences beyond operational skills.

Our research suggests that technologies can expand the range of opportunities for children to learn about the world around them, to develop their communicative abilities, and to learn to learn. Even in low technology households, the home provided a richer mix of technologies than many preschool settings as well as providing opportunities for children both to observe and to participate in authentic activities. The National Association for the Education of Young Children claims in its position statement that ‘Technology tools can help educators make and strengthen home–school connections’ (NAEYC, 2012: p7). This means developing existing mechanisms to support links between home and school. Most nurseries routinely engage parents in discussions about literacy and numeracy activities at home; if these conversations also include children’s experiences with technology, however these are manifested, it should be possible to build up a more complete picture of the child’s home life and how links can be made to it. Educators can build on this information, shifting the current focus on skills towards a broader range of competences and dispositions and recognizing that children will start school with diverse experiences of using digital media, involving not only computers but also a range of leisure technologies and interactive toys.

We believe that children’s early experiences of playing and learning with the various technologies available to them at home can contribute to their learning, particularly when they are supported by adults who monitor activities, help when things are difficult, provide encouragement and praise for achievements, and assist children to manage their emotions if they get frustrated. This is no different to the ways in which children learn from other kinds of experiences and activities that they encounter in their early years: the interactions that we observed at home can also be modeled and demonstrated by early childhood professionals. Educators are expert at providing responses that are intuitive and finely attuned to children’s specific circumstances and abilities – when children are baking cookies, for example - but they can find this more taxing when technology is involved. The technological landscape changes quickly and as new software and technologies are developed, new opportunities and challenges will emerge.

Howard-Jones (2011) has conducted an analysis of research in neuroscience and psychology that looks at the impact of digital technologies on human wellbeing. While he is clear that some forms of digital media can enhance learning, he states that the developing brain can be more susceptible to environmental influence than an adult’s and so it is important to pay attention to those risks to children’s development that are likely to be most significant. He judges these to be an increase in aggressive response from playing violent video games, interference with psychosocial wellbeing and attention, and the potential for disrupted sleep. However, these are based on i) excessive use and ii) exposure to violent content and we have no evidence from our family visits to suggest that three- and four-year-old children are at risk from either of these, although we acknowledge that these issues may become more pertinent as children get older. Nevertheless, whether a child enjoys dressing up, playing with toys, running around outside or drawing and painting most parents would prefer them to enjoy a balanced range of activities rather than spend all of their time on one of them. The same goes for the amount of time that children spend with technology.

Our discussion of the seven ‘myths’ is based on detailed case studies of families. This provides rich detail about how and why technologies are used but we acknowledge that we cannot claim that all families are like the ones we visited: the choices available to families are influenced by factors such as their geographical location, ethnicity, household income, the experiences and values of the parents, and the preferences of the children. Certainty, whether from those who favor or those who are more guarded about technology for young children, is inappropriate: we hope that these brief commentaries will prompt educators to consider different ways of thinking about early childhood education and technology and to challenge what they read and hear.

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Summaries of the background research

All of the children in our studies attended preschool in central Scotland, typically for a half-day session, with a minority of children attending for a full working day. Preschool education in Scotland is provided for children aged between three and five, with 96 per cent of four-year-old children in part-time preschool education funded by the government and provided by the public, private or voluntary sectors. Families were recruited from nurseries that served disadvantaged populations. We refer to parents here but in some cases this refers to adult caregivers who took a parental role in the household. The studies were funded by the UK's Economic and Social Research Council; more information is available in Plowman, Stephen & McPake (2010).

Interplay: Play, Learning and ICT in Preschool Education (Plowman & Stephen) investigated the ways in which children's learning with technology can be supported and enhanced in preschool settings. The study was based in eight preschools which represented a range of types of provision and served 400 families. Researchers visited each setting on seven occasions and produced a technology audit, field notes, focused observations and video recordings. Each site implemented and evaluated two small-scale projects, identifying the ways in which guided interaction could be enacted. A sub-set of 16 children were visited at home, enabling us to look at their experiences across home and preschool.

Entering e-Society: Young children's development of e-literacy (McPake, Plowman & Stephen) investigated parents' expectations and aspirations for their children's futures as users of technology, provided observations of children using technology at home, and considered the extent to which a digital divide was emerging between young children who had opportunities to make use of technology and those who did not. The project focused on 24 families who were visited regularly over a 15-month period and included consultation with a range of education professionals on the implications of the project's findings for early years education.

Young children learning with toys and technology at home (Plowman, McPake & Stephen) focused on play at home, particularly with technological and traditional toys. It produced in-depth case studies and traced children's play experiences at home over the course of a minimum of nine rounds of data collection based on visits to fourteen households. Each round had a specific focus, such as parental recollections of their own childhoods, conversations with children, parental perceptions of their child's play and learning, and family interviews about the changes brought about by the transition to school.