Seven Myths About Young Children and Technology

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P arents and educators tend to have many questions about young children's play with computers and other technologies at home. They can find it difficult to know what is best for children because these toys and products were not 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 box on p. 32). We visited families repeatedly over a period of a year or more, getting to know the families well. Our multiple methods (such as observations, child-led home tours, and shared discussions with parents and children) helped us 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 was 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 5 in the United Kingdom), the children in our studies had encountered cell phones; televisions; games consoles; DVD and MP3 players; desktop, notebook, and tablet computers used for work and leisure; and technological toys, such as play laptops or interactive pets.

A lot of media coverage has explored the advantages and disadvantages of children being exposed to computers and other digital media at ever-younger ages, but little concrete evidence is available for making such determinations. In its absence, a number of widespread myths about children's experiences with technologies have emerged. We have selected seven 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 well-being (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 such activities 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 believed they had achieved a good balance 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, health, or 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 speak of a natural bond between today's children and technology. We lost count of the number of times that parents or preschool educators told us that 3- and 4-year-old children know more about technology than they do themselves. The widespread use of the term "digital natives" reflects the belief in this bond. According to Prensky (2001), those who have grown up with technology and feel comfortable using it are the digital natives. Today's children have been born into a digital world, and 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. While these "immigrants" have learned a certain level of adaptation to their technological environment, 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, the basic design of computers had changed very little for decades; their internal processing became faster and more powerful, but most still consisted of a vertically oriented screen, a mouse or trackpad, and a keyboard. On traditional computers, reading and writing text is still the main mode of interaction, which is 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 play console and tasks on play laptops.

Interaction does not come as naturally as the term "digital natives" suggests for children ages 3 or 4 who are faced with an unfamiliar website or game and have not yet learned the conventions of interface design. In fact, 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 permits independent use.

This support is not just showing a child how to use a particular device. While parents sometimes provided purposeful direct instruction (e.g., 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); the children had learned 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 "digital immigrants," suggesting that the term is not completely accurate for young children.

3. Technology hinders social interaction

Many fear 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. Saturation of the home with leisure technologies is seen as a key factor, leading to increased television viewing and play with console games. Many parents are exhausted when at home due to the demands of busy working lives and thus are thought to see electronic babysitting as an attractive option at the end of the day.

Our research suggests that this vision is unwarranted for 3- and 4-year-old children. In some of the homes we visited, the television indeed was usually switched on yet the 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 they dressed up like the characters and acted out scenes. When parents or siblings also watched, the shows 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, 2012).

Young children are not just consumers of media devised by others. Cell phones, e-mail, social-networking sites, webcams, and digital cameras have revolutionized young children's experiences with long-distance and remote communication, prompting them to address issues of audience at a much earlier age than was the case in the past. At 3 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 was communicating with relatives in Australia by sending them photographs and messages containing emoticons (as he could not write at this stage) and using a webcam for video calls. In communicating with relatives 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 avenues of communication 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). An analysis of 200 messages showed that more than one 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 on weekends was spent eating, napping, shopping, cooking, or going on outings with the child's enjoyment in mind. A study on this scale is not conclusive, but these results indicate that technology does not necessarily dominate 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 game 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, and 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—finding out about people, places, and the natural world
• Dispositions to learn—showing greater concentration and persistence and gaining self-confidence and self-esteem while becoming increasingly competent users of digital media
• The role of technology in everyday life—observing adults involved in a wide range of pursuits via technology and thereby learning 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. While these activities get less attention than the technologies that have more obvious educational potential, 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. Learning toys are marketed to 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 the ease of sharing 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: existing technology cannot adapt itself to an early reader in the same way as a more capable partner sharing a reading experience can. 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 and so let them spend time at the homes of relatives who had computers or acquired 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 4 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.

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. We found, however, 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 caregivers induct children into culturally significant technological practices
• 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 opportunities for children to both observe and 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" (National Association for the Education of Young Children & the Fred Rogers Center, 2012, p. 7). 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 toward a broader range of competences and dispositions and recognizing that children will start school with diverse experiences with digital media, involving not only computers but also a range of leisure technologies and interactive toys.

We believe that children's early experiences when 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 in managing their emotions if they get frustrated. This is no different from the ways in which children learn from other kinds of experiences and activities that they encounter in their early years. Interactions that we observed at home also can be modeled and demonstrated by early childhood professionals. While educators are expert at providing responses that are intuitive and finely attuned to children's specific circumstances and abilities (e.g., when children are baking cookies), they can find this more taxing when technology is involved. The technological landscape changes quickly and new opportunities and challenges will emerge as new software and technologies are developed.

Howard-Jones (2011) has conducted an analysis of research in neuroscience and psychology that examines the impact of digital technologies on human well-being. 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 elements that are likely to pose the most significant risk to children's development. He judges these to be an increase in aggressive response from playing violent video games, interference with psychosocial well-being and attention, and the potential for disrupted sleep. However, these risks

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 the children attending for a full working day. Preschool education in Scotland is provided for children between 3 and 5 years old, with 96% of 4-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 (led by Plowman and 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 (led by McPake, Plowman, and 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 (led by Plowman, McPake, and 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 14 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.

are based on 1) excessive use and 2) exposure to violent content, and we have no evidence from our family visits to suggest that 3- and 4-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, including technology-related activities.

Our discussion of the seven "myths" is based on case studies of families that provide rich detail about how and why technologies are used. We acknowledge, however, that we cannot claim that all families are like the ones we visited; the choices available to families are influenced by such factors as geographical location, ethnicity, household income, experiences and values of the parents, and preferences of the children. 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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