Exploring the Association Between Leisure Time Digital Immersion, Attention and Reasoning Ability in Pre-Teens

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ABSTRACT
Some researchers claim that digital natives are endowed with greater cognitive abilities than digital immigrants, due to the interactive nature of digital technologies. This study investigates relationships between different types of digital activity, reasoning ability and attention in a pre-teen population. Two hundred twenty-four participants (139 males, 85 females) aged 10-12 years completed a questionnaire measuring leisure time digital immersion. Factor analysis reveals 5 distinct types of users. Ninety-two participants completed tests of reasoning and attention to ascertain the relationship between type of digital user and cognitive ability. Results indicate that users who engaged in simple low level writing and drawing tasks with technology were inclined to have low literacy levels and poor concentration levels. In addition, users who engaged in computer mediated communication and content creation showed inconsistent and unstable attentional ability.

Keywords: Attention, Cognitive Ability, Digital Immersion, Digital Native, Learning, Leisure Time Activity, Reasoning

INTRODUCTION
In developed countries life in the 21st century has become a digital experience for the majority of people. It has now become extremely difficult to avoid digital technologies. Digital media is pervasive in both work and home environments. At work, if the computer network crashes you are likely to suspend your work until it is repaired. At home, if a crisis looms or there is a need to gather information Google™ search is likely to be the answer. Game consoles or mp3 players fulfill the leisure needs of millions of people every day. In a recent survey of technology use responses indicated that 99% of teenage boys and 94% of teenage girls played computer games in their leisure time (Lenhart et al., 2008) and 74% of adults have a propensity to go online (Jones & Fox, 2009). The fact that technology
is pervasive in society has raised a number of questions amongst researchers as to how technology impacts individuals and whether those immersed in technology differ in terms of their cognitive aptitude compared to those who are not.

**Cognitive Ability and Digital Activity**

Commentators argue that digital immersion causes profound changes in behaviour and that prolonged immersion causes individuals to think and learn differently (Donaldson, 2006; Feiertag & Berge, 2008; Prensky, 2001a, 2001b; Robinson, 2007; Tapscott, 1999). Whilst adoption of technology is relatively new, two cultures seem to have emerged, one a group of individuals immersed in technology from birth, the other a group introduced to digital technologies later in life. This has prompted some commentators to differentiate between the two groups by the use of the terms digital native and digital immigrant (Prensky, 2001a, 2001b). However, others view the distinction drawn between digital immigrants and digital natives by year of birth to be unhelpful and suggest that a more useful distinction would be to consider differences between those who use technology a lot and those who do not, possibly, further differentiated by breadth of use and depth of use (Helsper & Eynon, 2010). We prefer the latter approach of differentiating by level and type of digital engagement rather than age. An increasing body of recent studies suggests that considerable cerebral plasticity exists within the developed brain and that environmental factors change and mold existing neural architecture (Halperin & Healey, 2010; Nisbett, 2001; O’Boyle, 1998). Such brain malleability is purported, by some, as an explanation for cognitive differences between digital natives and digital immigrants (Herther, 2009; Oblinger, 2004; Prensky, 2009, 2001a, 2001b), with the premise that prolonged exposure to digital media changes the brain. However, in reality we know little about how digital exposure actually affects cognition and whether there are truly cognitive differences between those who use technology extensively and those who do not (Bennett, Maton & Kervin, 2008; Helsper & Eynon, 2010). Prensky (2001b) argues that immersion in digital media, especially the playing of computer games, helps develop visual selective attention, literacy, concentration, comprehension, problem solving, deductive reasoning and other desirable cognitive qualities. Other researchers support some of these claims particularly that extensive playing of computer games can result in improved iconic and visual attention skills and that immersion in digital technology can improve student’s academic outcomes (Johnson, 2006; Subrahmanyam, Kraut, Greenfield & Gross, 2000). McHale (2005) opposes such views by advocating that individuals labeled as digital natives have reduced attention spans resulting in increased time spent moving from activity to activity or multi-tasking. Carlson (2005) when interviewing Naomi Baron, a linguistics professor, reported that “students have a very short attention span … in part because of the media that we as teachers and parents have encouraged them to spend their time with, and in part because we haven’t taught them to have longer attention spans” (p. A34). Ophir, Nass and Wagner (2009) support this view with a study that showed how extreme multi-taskers demonstrated a different information processing pattern than individuals who did not multi-task. Using established tests of cognitive control the experimenters were able to show that individuals who were prolific multi-taskers were more prone to interference from irrelevant interference. Such results indicate that high multi-tasking individuals have a tendency to concentrate less on the task at hand but tend to widen their attention to other external cues, as opposed to low multi-tasking individuals who tend to channel their attentional resources towards the task at hand. Although this tendency for high multi-tasking individuals allows them to split their attention more effectively than low multi-tasking individuals it does however suggest that they are less able to focus their attention...
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