Digital Interaction: The effects on school learning and social communication

Christopher Boyle and Gerald Wurf

…more people of *all* ages in the UK are physically and socially disengaged from the people around them because they are wearing earphones, talking or texting on a mobile telephone, or using a laptop or a Blackberry. (Sigman, 2009, p. 15)

Comment: The selection of this quote suggests that the chapter is going to present an argument that digital interaction has a negative effect on social communication.

Online interaction: Is it all bad?
Parental responsibility The social brain Stimulation
Digital communication Millennial generation Isolated
The digital dumb down Rage against the machine
Knowledge Digital Interaction Emotional intelligence
Death of the nerd generation Technical nerds Television
Violence and the digital world Depressed Relationships Child engagement
Social communication Online engagement

Comment: Many of these terms/phrases could be used for the core concepts and keywords.

Comment: Reviewer's additional core concepts: brain development, ICT education. 21st century skills.

Learning Objectives

After completing this chapter, you should be able to:

- Understand the pervasive nature of digital technology in the modern world
- Identify characteristics of the millennial generation
- Be aware of the link between screen violence and behavior
- Be aware of the positive and negative effects of digital communication
- Demonstrate knowledge of the learning and social implications of new technologies

Comment: I think that this is an interesting objective, and more information could have been provided.

Comment: Pardon the pun, but I think that there was overkill on this concept – it could be tightened up.

Comment: This was the main theme throughout; however, at times it was hard to follow - by re-organizing some paragraphs and sections it may flow better for the reader. It's really interesting stuff so we don't want to lose our reader in the constant counter-arguments!

Comment: I was looking for more here as this seems to be what the educator is looking for, as well as recommendations.

Introduction

Technical advances in digital technology are visible in all walks of life and in situations that could not have been envisaged even fifteen years ago. For example, the first author of this chapter (Boyle, 1997) conducted research on the prospect of online banking which was then in its infancy. At that time it was inconceivable just how dependent entire economies would become on online financial transactions. Many people in the European Union now frequently perform a myriad of tasks online that ten years ago would have been performed by other methods e.g. visiting a bank or a post office. The demise of many of these activities which often afforded incidental opportunities for face-to-face social interaction, demonstrates how changing technology influences patterns of social interaction. Ironically these changing patterns of face-to-face social interaction have occurred as the use of social networking websites has enjoyed phenomenal growth. Whilst there will be little dissent to the advantages that digital technology has brought to wider society and education, there are social implications which could throw a virtual spanner into the cogs of digital technology revolution.

This chapter will discuss the implication for the societal increase in the use of digital technology and the commensurate suggestion of a decrease in the face-to-face interaction that has been hitherto an important aspect of human socialization. The impact on learning in schools for students is reviewed and there is a suggestion that a clear message does not exist as to whether online social interaction is necessarily at the expense of the more ordinary method of connecting - i.e. direct face-to-face contact. Consideration is given to the possibility that the digital technologies may enhance this type of contact but other studies and anecdotal evidence seems to suggest that the two types of interaction may be mutually exclusive.

Advances in digital technology in society in general and especially in schools are impressive in terms of…. improving access?. For example, software is now available that can allow a visually impaired student to operate email and Microsoft Office as adeptly as a sighted student. Video conferencing can connect students to schools on the other side of the world. These are just two examples and the complexities and advances in digital technology are changing constantly.

New Generations/New Millennium

The effects of digital technologies on student learning and development have been popularized by notions of the current generation of school students as 'millennials', typically born between xxxx and xxxx, (Howe & Strauss, 2000) being 'digital natives', (Prensky, 2001a). These students have grown-up in a world that has been heavily influenced by the use of new information and communication technologies including the Internet, new types of media/telephone technologies and electronic social networking. The effects of these technologies on student

Comment: I think the distinction needs to be made between those who have adapted to the new technologies, and those who have grown up with it. It's only the people currently educating the young that think that something previously inconceivable has happened; to the kids, this is how it has always been.

On a personal note, my 16 yr. old daughter gets annoyed when society infers that kids are too plugged in because, as she states, it's the older generations that invented the technology in the first place - It's not their fault that were born into this generation!

Comment: I keep referring back to the chapter's title that is not only on social communication but also school learning. Would it be better to stay with K-12 examples? The smartboards that have replaced blackboards, the ebooks replacing textbooks, blogs replacing newsletters, global epals replacing penpals, and not only replacements but new ways such as truly interactive technology where students are not only consumers of information but also developers and creators?

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Comment: This last sentence is provocative, but the arguments and evidence that follow never refer back to this statement.

Comment: This second paragraph and the chapter objectives only loosely align – this paragraph leaves me feeling a bit lost as to what I will learn – is the chapter presenting a literature review, or will the reader be left with practical suggestions and recommendations based on the current research and autho… [1]

Comment: This is an interesting paragraph., but perhaps is misplaced in the introduction? Also, the previous paragraph set up that … [2]

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Comment: Again, the title of the chapter is confusing as we seem to be flipping between school learning (and I presume the … [3]

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Comment: I presume the naming of the generations is a worldwide convention? If so, does it make a difference where one is … [4]

learning and development are still not well understood but it is not unusual to ascribe to the millennial generation exceptional digital literacy and opportunities for greatness. Despite the hyperbole surrounding the use of digital technology, a range of genuine concerns have emerged in the academic literature that provides caveats in how digital technology should be used in schools.

Howe & Strauss (2000) have identified seven core traits that mark millennials. These traits include being special, sheltered, confident, team oriented, conventional, pressured, and achieving. Overwhelmingly, Howe and Strauss stress the positive effects of engagement with technology and the only negative trait identified is the idea of millennial students as 'time poor'.

Prensky (2001b) also focuses on the advantages that digital technologies can bring to the classroom. He is a strong advocate of the need for schools to embrace these new technologies and even goes so far as to argue that the brains of 'digital natives,' because of their increased exposure to digital media whilst growing up, are likely to be physically different from older (or previous?) generations. He believes schools should adopt the digital language of current students and utilize digital games and the gamut of other new digital technologies in the classroom. Much of the school curriculum (writing, arithmetic, logical thinking, understanding the ideas of the past) Prensky (2001b) is happy to relegate to 'legacy' content while 'future' content is seen as far more attractive to the current generation of students. According to Prensky, future content includes the study of subjects such as information technology, ethics, languages and sociology.

The implications, if the above conceptions of millennium learners/digital natives are correct, would be that classrooms will be comprised of more connected, engaged and socially aware students. The wholesale uptake of new technologies is often seen as fostering student-centered learning. Such learning is considered to be intrinsically motivating whilst providing extensive opportunities for gaming and social networking.

Significant criticisms have been directed at the arguments of Prensky (2001a) and Howe and Strauss (2000). Many authors have questioned whether there is such a distinct grouping amongst the current generation of students given wide differences in individual learning preferences and styles. Bennett, Maton, and Kervin (2008) largely dismiss Prensky's position as an example of 'moral panic' and find little evidence to indicate that, on balance, students are disaffected and alienated from anachronistic school systems. Nevertheless there is good evidence that information and communication technologies are pervasive in young peoples' lives.

Rideout, Roberts and Foehr (2005) have published one of the most thorough and representative samples of North American students' use of information and communication technologies. Using survey data from 2,000 students aged from
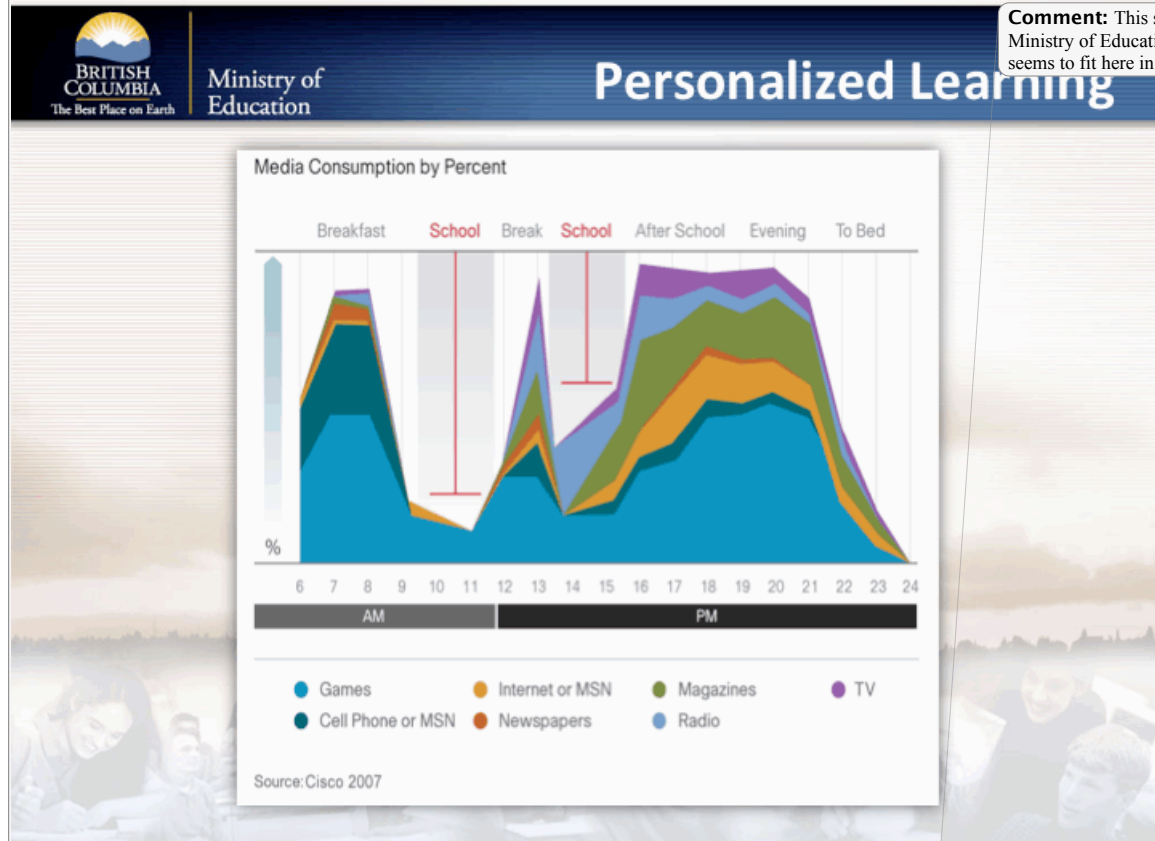
Comment: As the reader, this statement got me excited as I then looked for the caveats, and hopefully recommendations, further on in my reading but never clearly found them.

Comment: 8th trait?

Comment: Not sure that this paragraph is needed, unless the concepts within it are more developed, otherwise, it can probably be deleted.

Comment: Many academics and educators worldwide are talking about 21st century skills – should some of that research and discussion be included in this chapter to keep it relevant?

Comment: I don't follow how this conclusion was reached. This paragraph would benefit from being further developed to connect to the previous and transition to the next.

Comment: I don't see the moral panic in Prensky's position – maybe more was needed to be included for the reader to see this.

Comment: Not sure that this matters, but I noticed that we were in the EU, now North America. For a global book., is it important to ensure that more examples are used from more places? Or better to just choose one area to focus on rather than bits and pieces from many places? As it reads now, there is research from North America, but little from elsewhere.

8-18 years and an analysis of seven-day media diaries kept by 694 of these students, they concluded that students spend an average of nearly 6½ hours a day using digital media. Across a typical week, the amount of time engaged with digital media is equivalent to the time spent at a full-time job and the figure rises to an equivalent of an 8½ hour day if all media use is taken into account (e.g. listening to music while searching the Internet). Young people typically spend nearly 4 hours a day watching TV, videos, DVDs and prerecorded shows. Approximately 1¾ hours a day are spent listening to the radio, CDs, tapes or MP3 players. Young people spend an hour a day on the computer (not including homework) and 50 minutes a day playing video games. An average of 43 minutes a day was spent reading print media including books, magazines and newspapers which were not directly required for schoolwork.

Comment: I wonder if it would be more significant to compare hours using digital media to hours spent in school? Especially as you could say that the time spent using digital media is approximately twice as much as time spent in school!

Comment: This info may be more readable if presented in a chart.

Comment: This slide was used in a BC Ministry of Education presentation – this info seems to fit here in this chapter.

Comment: Not sure that this paragraph contributes much to the chapter, esp as it only focuses on American students and no doubt is already date. As this book is geared towards a global audience, it may be more interesting to use studies that compare students' access and use from different countries.

American young people typically live in a home with an average of 3.5 TVs, 2.1 game consoles and 1.5 computers (Rideout et al., op. cit.). Around half of the young people surveyed live in homes where the TV is left on most of the time,

even when no one is watching. Over the past decade digital technology has increasingly moved into students' more private spaces. The majority of North American students (68 percent) had a TV in their bedroom. Half of the students surveyed had a VCR/DVD in their bedroom and 49 percent had a video game player in such close proximity. Fewer students had a computer in their bedrooms, although nearly one-third of American student sampled had such ready access to a PC. Not surprisingly it was found that young people with TVs/video games in their bedrooms were significantly more likely to use those media. On average they spent almost one and a half hours more watching TV than those students without a TV in their bedrooms (Rideout et al., op. cit.).

Digital technology is no longer limited to physical spaces and increasingly it is possible for students to be in any place at any time using the virtual world. Watkins (2009) describes the new media as 'anywhere/anytime media' and growth in mobile phone, social networking sites and iPod uptake has been extraordinary. In 2007, it was estimated that 77 percent of US teenagers owned a mobile phone while 40 percent of students in the 8-12 year old age group had their own mobile phone (Watkins, 2009). Palfrey and Gasser (2008) note that millennials have created a 24/7 network that blends the human with the technological to a degree we have not seen before and that millennials are leaving more traces of themselves in public domains than any other generation. Studies from the United Kingdom have shown a similar pattern of extensive digital technology use amongst the millennial generation. Sigman (2009) reported that during the period 1987-2007, the amount of time that children spend interacting in the family home decreased from six hours a day in 1987 to around two hours per day in 2007. During a similar time period, electronic media use rose from just under four hours a day in 1987 to approximately eight hours a day by 2007. Dealing with student use of this 24/7 technology is increasingly becoming a regular management issue for classroom teachers and school administrators.

The learning punch: Violence and the digital world

For over 40 years, the link between watching violence on a screen and subsequent aggressive behavior has been carefully studied. In a series of now classic 'Bobo doll' experiments Bandura (1977) systematically exposed groups of children to varying levels of violence modeled by adult actors and then observed the children's free play with a large inflatable Bobo clown. In one variation of the experiment, he also demonstrated that children model or imitate adult aggressive actions that were observed on television. Bandura found the extent of the imitation could be influenced by mediating factors such as sanctions being placed on aggressive behavior. From these experiments, he proposed Social Learning Theory to account for the findings that learning can occur through the direct and indirect observations of the behavior of others.

Comment: Similar comments for this paragraph as for previous two paragraphs – perhaps put data into a chart to make it more readable, and consider expanding the comparison beyond US/UK students, unless your focus for this chapter is on students from developed countries, in which case perhaps make that more clear from the outset.

Comment: I wonder if you might include some discussion about what the technology is being used for? We know that students are using the tools and devices and programs, but for what? Communication? Research? Games? Reading? Writing? Entertainment? Etc?

Comment: This sentence seems to be the whole crux of what this section could be about – the practical applications for educators. Yes, they know that technology is prevalent and that students are connected, so what adjustments can educators make to mitigate the negative aspects and harness the positive aspects? This chapter doesn't need to provide the answers, just raise the questions, and I don't think it quite gets there yet, although hints at it such as in this sentence.

Comment: I query the inclusion of this section – yes, the research is solid on this topic, but the emphasis given to it in this chapter is not balanced with the other examples provided. If the authors want to keep this entire section, perhaps it could be an appendix to the chapter? I'd suggest reducing this section, and including some recommendations or suggestions; in other words, what are the implications?

Since Bandura's pioneering work, a range of meta-analytic reviews have been published on the effects of young people being exposed to screen violence and playing violent video games. These reviews aim to combine results from the most methodologically rigorous studies and evaluate effect sizes. In one major study Anderson et al. (2003, p. 86) summarized multiple findings from hundreds of randomized experiments and concluded:

> *"Brief exposure to violent dramatic presentations on TV or in films causes short-term increases in youths' aggressive thoughts, emotions, and behavior, including physically aggressive behavior serious enough to harm others. The effect sizes are moderate on the average but vary greatly depending on the outcome measure used; usually, effect sizes are smaller for more serious outcomes than for less serious outcomes. There is some evidence that youth who are predisposed to be aggressive or who recently have been aroused or provoked are somewhat more susceptible to these effects than other youngsters are, but there is no evidence of any totally immune group."*

The effects of playing violent video games have received considerable media attention especially since the Columbine High School massacre in the late 1990s. Concerns have been expressed that over the past decade, violent video games have become even more violent, graphic and interactive as general gaming technologies have advanced. Anderson (2003) updated his earlier meta-analysis of published "best-practice" studies using the results from 32 independent samples involving 5240 research participants. On the basis of these results he concluded that violent gaming was associated with increases in aggressive cognition, aggressive affect, and physiological arousal, and with decreases in helping behavior. More recently Polman, Orobio de Castro and van Aken (2008) have found that playing violent video games resulted in greater aggressive behavior than when an experimental group only watched the games being played.

Professional bodies have been uncharacteristically unanimous in their conclusions about the scientific links between youth exposure to violence and its effects. In the United States the American Psychological Association, the American Academy of Pediatrics, the American Academy of Child and Adolescent Psychiatry, the American Medical Association, the American Academy of Family Physicians and the American Psychiatric Association have all concluded "the data point overwhelmingly to a causal connection between media violence and aggressive behavior in some children" (Anderson & Bushman, 2002, p. 2377).

Huesmann and Taylor (2006) have concluded that media violence is a threat to public health in that it leads to increases in real world violence and aggression. Violence in fictional and news programs as well as in video games has been linked to increased aggression and after an extensive review of the outcomes

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from published studies Huesmann and Taylor (2006) argue the effect size is large enough to place it in the category of known threats to public health.

The 'Digital Dumb Down'

How the integration of digital technologies into everyday life has influenced the cognitive abilities and academic achievements of the millennial generation is widely debated. Bauerlein (2008) typifies one extreme of the debate in his book *The Dumbest Generation: How the Digital Age Stupefies Young Americans and Jeopardizes our Future*. He argues the millennial generation has little knowledge of the past, that they do not read books, cannot spell and that they are immersed in a world of technology including digital music players, text messaging and YouTube. Bauerlein believes students no longer attend museums or become involved in community services and that on measures of academic achievement students are doing worse than previous generations.

Bauerlein relies on a selective use of the available evidence. While students in the United States have performed relatively poorly on international tests of achievement such as PISA and TIMMS, early results from the latest round of testing indicate relative improvements in the literacy achievements of USA students rather than systematic declines. Even in the USA, with weaker comparative literacy outcomes than many Asian and European economies, 86 percent of school leavers do reach minimum benchmarks for literacy (NAAL, 2006). There is also substantial evidence that in the UK literacy levels have not dramatically changed since the early 1950's (Brooks, 2006). Brooks contends that schools in the UK have been generally successful in maintaining the standard of achievement in literacy despite economic cycles, the rise in the number of students having English as a second language, a broadening of the school curriculum and the spread of other sources of information and entertainment. From the results of more reliable and valid measures of literacy outcomes there does not appear to be convincing evidence that the millennial generation is any less literate than previous generations. Furthermore, there is strong international evidence of a steady improvement in many countries of high school retention levels to Grade 12/13 especially amongst minority groups that have been traditionally more socio-economically disadvantaged. This would suggest that students are in fact more engaged in school learning than in the past.

There is also substantial evidence to show that far from being "dumbed down" successive generations of students are becoming more intelligent. Steadily increasing scores over the past 100 years have been a noted feature of re-standardization studies of modern intelligence tests. On the widely used Wechsler intelligence scales and the Stanford-Binet intelligence scales, steady improvements in norm group test scores have been well documented for over a century (Flynn, 2007). The so called "Flynn effect" provides a powerful rebuttal to arguments of declining intellectual abilities amongst the millennial generation.

Comment: Consider moving this paragraph to the New Generations/New Millennium section, as it provides a nice counter-argument to the paragraph on the seven traits.

Comment: The new IALS test will look at ICT skills, http://www.oecd.org/document/35/0,3343,en_2649_201185_40277475_1_1_1_1,00.html.

Are the two big arguments against and for digital technologies the violence vs results on int'l assessments? A lot of space is used on these two issues but again no recommendations or implications are suggested but they would be helpful.

Should a definition of literacy be included? Increasingly literacy definitions include ICT skills, and for communication in the 21st C these skills seem important. Info on this can be found in OECD, UNESCO etc.

Again, thinking about the title of this article, it's about learning and social communication – these look different in the 21st C compared to the 20th century (relevant as your chapter discusses generations) due largely to globalization, the knowledge economy, and advanced technology.

My personal opinion, but I believe that people crave connection and communication, and the new technologies are facilitating this, not impeding it. If there is research and evidence to refute it, it would be interesting to include it in this chapter – scare mongering with the piece on violence may be a bit of moral panic itself! A more balanced perspective would increase the readability, unless the authors are writing a persuasion piece supporting the idea that digital technology is making students less socially engaged.

Comment: Are students truly more engaged, or just trying to get ahead economically by advancing their formal education?

Indeed Flynn (2007) has argued that newer forms of communication and entertainment provide vehicles for individuals to seek out environments that are more cognitively challenging to them. This in turn should lead to cognitive growth not decline.

The measurement of cognitive abilities is complex, but historically factor analytic studies have yielded two important components of thinking. These are overall verbal reasoning abilities and overall visual reasoning abilities. Given the nature of the visual-motor-spatial skills required for many modern keypads/keyboards/controllers, we would expect that improvements in the visual reasoning domain would accompany the increased use of these devices. A comprehensive review by the OECD Centre for Educational Research and Innovation (Pedro, 2007) of millennium learners concluded that research into computer games provides consistent evidence that visual-spatial-motor abilities can be improved through practice and training. Further improvements in the visual reasoning domain may be more significant over time than those in the verbal reasoning domain.

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Perhaps one of the more salient stereotypes of the modern school classroom is a hapless teacher calling a digitally distracted class to attention. Watkins (2009) notes that parents are the strongest advocates of mobile phones in schools and that the 'anytime/anywhere' media results in students only being able to provide continuous partial attention to any task. Hallowell and Ratey (2005) have developed the theme in relation to Attention Deficit Disorder and they postulate that an attention deficit trait can even be created by digitally laden environments that demand short attention spans and competition for attention from short messages and images. The evidence for such a proposition is highly speculative and given the overall improvements in general cognitive abilities shown by the Flynn effect, digital technologies could just as likely improve attention. As well as this, the increasing use of digital "clickers" in university lecture halls and classrooms indicates teachers are using these very digital technologies to improve attention and student engagement. This is especially where time and large student numbers mitigate against checking for more personal/individual understanding of learning.

Comment: I like the format of this paragraph, and wonder if the other sections could be similarly organized? The authors state the issue, provide examples and evidence, then conclude with real-world practical applications. The entire for/against argument is presented clearly.

Empirical support from randomized experimental trials (e.g. Yourstone, Kraye & Albaum, 2008) provides evidence that mid-term and final test scores improve when these technologies are used as part of the instruction. In future it is expected that mobile phones will replace digital "clickers" as a tool for immediate electronic feedback from students and software to collate the results from mobile phone feedback is currently under development.

Comment: Clear and concise paragraph – great!

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The capacity of digital technologies to improve learning within the school context is obviously dependent on their uptake within classrooms. Technologies are not universally available. Pedro (2007) reported that there was wide variation in broadband availability in primary and secondary schools depending on the

Comment: Love the global comparisons, and use of recent data.

country being considered. Within the USA, 98% of schools reported broadband availability whereas within the European Union, Greece (12%) and Poland (28%) were at a significant disadvantage.

In many schools, mobile phone use is banned in the classroom. Access to working computers is often hampered by numerous logistical and technical issues. Indeed, in the European Union only 50 percent of students in 2006 acknowledged that they had used a computer in the classroom in the last 12 months (Pedro, 2007). Ipsos MORI (2007) asked students about their preferred way to learn in a national survey of 15 year old students in the United Kingdom. Overwhelmingly, the most preferred way to learn was in groups (55 percent). Students also preferred to do practical things (39 percent) and to learn with their friends (35 percent) before they preferred to learn by using a computer (31 percent). Students reported that work on a computer was the 9th most common classroom activity. Computer use was far less common in English classrooms than copying from the board or a book, listening to the teacher, participating in discussion, taking notes, working in groups or working quietly on own. Similarly, it has also been found that students would rather learn languages face-to-face with their peers than via a computer.

Communication and relationships in the digital world

Throughout recent history, it could be argued strongly that technology has actually improved the lives of many people. The telephone, for example, introduced a new mode of long-distance social interaction that would have been envisaged as impossible prior to its invention. The radio, in its early days, brought many people together to listen to news events and music programs, whilst television initially did so through a visual medium. Given the social trends towards online digital communication and socializing, it is surprising to think that, in some ways, technology is contributing to, or even, creating, a degeneration of social skills and interaction that affects young people and adults alike. The computer, DVDs, IPODs, social networking sites such as Twitter or Facebook to name but a few, are encouraging solitary play, at least in a conventional sense – it seems that interaction is predominately with a machine as opposed to another person.

Hitherto, various forms of digital technology have played a large part in our everyday lives. However, in another 10, 20, or 30 years it may well be even more so – it could be argued that current and past trends in technological development leave us in no doubt of that outcome. Despite the improvements that can be seen in quality of product (e.g. advancement in gaming and speed of Internet access), caution about the effect of over-use of digital media should be considered. Greenfield (2007) has highlighted the danger for brain development when young people tend to spend too much time using the computer or the television; however it should not be forgotten how the use of social networking

Comment: It would be interesting perhaps to contrast this with examples where mobile devices are encouraged. Is there any difference in engagement?

Comment: This begs the question – is this teacher or student choice?

Comment: Not sure that this paragraph contributes to the chapter, unless implications are provided. I think that some of these results raise questions such as are students making their preferences based on access or availability of technology? For example, if they have to wait their turn to use a computer in the classroom, they may indicate a preference to work offline in the classroom because it's less of a hassle!

Comment: Is this speculation, opinion, or fact?

Comment: As I read this section, I wonder if the authors should make clear at the outset of this chapter the connection between learning, social skills, social interaction, communication, and engagement? It seems as if the chapter hints at these ideas, but doesn't articulate them succinctly; currently the chapter seems disjointed and jumps around the ideas.

Comment: An article reported by the Australian Psychological Society suggest that rather than replacing F2F contact, Facebook increases participation in real-life social gatherings: http://www.smh.com.au/digital-life/digital-life-news/facebook-now-ingrained-in-relationships-20101116-17v1n.html#poll

websites such as chat rooms, Twitter, Facebook, blogs etc. plays in helping many people with learning and in an almost paradoxical way, *social communication*. In some cases, this may not have been possible through conventional means of interaction. Some students with specific learning difficulties (e.g. dyspraxia or dyslexia) can gain significantly from the addition of computer-assisted technology in the classroom, without which it could be said that they may be at a significant disadvantage (c.f. Prensky, 2001).

Digital communication and the death of the nerd generation

Social communication was traditionally regarded as pertaining to person-to-person connections and the ability to express one's feelings to another and vice versa or even social communication could also be visible at a lower level of interaction in that two or more people are able to survive social awkwardness without isolating themselves. Autistic Spectrum Disorders (ASD) with specific reference to Asperger Syndrome (AS) is a condition where people of any age find interaction with other people generally extremely difficult, although it should be noted that there are exceptions to this such as children with AS finding that they can communicate more effectively with adults due to the former sometimes having a superior vocabulary compared with his/her peers. The irony may be that people who have hitherto found themselves regarded as socially inferior or inept, due to the aforementioned disorder, are finding themselves in a much more advantageous position as communication becomes more of a technologically-based operation.

Students with special needs may find themselves marginalized and labeled in society and schools with the possibility that the label brings them no real benefits except categorization (Lauchlan & Boyle, 2007). Research by Lau et al. (2005) investigated the social interactions of young people when they were involved in computing activities in an inclusive class. They suggest that there is evidence that children with special needs are not particularly successful at socially interacting when compared to peers without obvious difficulties and that there is more possibilities that these students find themselves socially isolated. Lau et al. (op. cit.) showed that if the teacher facilitated computer interaction activities between all children in the classroom then social interactions could be promoted through and as a result of the digital technologies. Thus, It seems possible that the essential element of social communication may come from the use of modern technology e.g. Internet, gaming, ICT.

At any stage of technological development there will be groups of people who are disenfranchised due to their comparative lack of technological knowledge. Concern about the digital "haves" and "have-nots" has been expressed in the debate that has become known as the digital divide. It has been recognized that internet use has privileged specific ethnic, geographic and economic groups. In the early debate, for example, Kitchin (1998) saw cyberspace as the domain of young, white, educated, middle-class males. Students with better reading and writing skills were also seen as advantaged. The increasingly pervasive nature

Comment: This entire paragraph seems really important, esp as it touches on recent brain development research as well as the notion that what is currently happening is changes in behaviour and ways of operating due to the new technologies, and individuals and society are only beginning to understand the implications.

Comment: No explanation or definition has been provided for this term – if the section title stays as is then that may be helpful to provide some context. As it reads now, nerd could mean special needs students, but I don't think that's the authors' intent!

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Comment: The few references to special needs students are scattered throughout the chapter; I wonder if it would read better to have a section on special needs students and other minority or subgroups who may benefit from digital technology?

Comment: The three sentences that make up this paragraph are awkward, and don't flow as smoothly as some of the other paragraphs.

Comment:

Comment: Great paragraph, reads well. One suggestion though – the final sentence confuses me – what is the essential element? The last sentence could probably be deleted and the paragraph would still be great!

Comment: For consistency, use either upper or lower case for Internet, but not both (both styles have been used in this chapter).

of the internet and significant cost reductions in hardware and service provider costs has led other authors to argue that this gap is now closing (Compaine, 2001). Schools have often been seen as a potential bridge in closing the gap and it is not uncommon for schools to provide more equitable access to cyberspace than is available in students' homes.

Technological advances in computer-based augmentative and alternative communication systems (such as symbol-based vocabulary systems) are enabling students with significant language and intellectual disabilities ready access to visual forms of communication. From a period where stereotypical 'technical nerds' dominated online social communication we have moved to a phase where many people interact online, especially adolescents, and in the future it could be envisaged that most people will socialize online. Therefore, the nerds of yesterday are the social communicators of the future and they are bringing everyone else with them. On the face of it, social communication may have changed forever.

Effects of the digital world on social interaction

Questions are continually being raised as to the impact, either from a positive or negative standpoint, that the digital communication networks have on our face-to-face social interaction (e.g. Snook, 2002; Barylick, n.d.; McInnerney & Roberts, 2004) but the answers remain far from clear as to whether social interaction is diminishing as a result of the increased usage of the digital form of social interaction. Sigman (2009) writing in the influential British publication *Biologist* collated various recent research articles in the area of social networking and the effect on the face-to-face social interaction that has, hitherto, been taken for granted by the wider population. Sigman believes that the evidence his research has uncovered indicates that the use of social networking sites such as Facebook or Twitter are causing a marked decrease in the need for people to connect with each other in ordinary social settings. There is less emphasis placed on the importance of these face-to-face interactions with digital communication being a more accepted and suitable method for many people to the possible determent of in-person connections.

Online interaction – Is it all bad?

It is a moot point as to whether the aforementioned argument put forward by Sigman (2009) is completely fair, considering the counter-argument that there are many people who are unable to communicate effectively in ordinary social situations. Moreover, social awkwardness is readily recognized in group interactions. It is not only plain old shyness that impedes social communication but also disability and the geography of distance. The point is that there may be a subgroup of the population who would not otherwise be communicating with anyone, therefore being online and building up social networks is a positive and fruitful method of interacting for this subgroup. It follows that social networking sites afford the opportunity for this sub-group to socially connect with others thus

Comment: YES YES YES to this paragraph. This seems core to the overall chapter. Perhaps the chapter could be built more around this paragraph that ties in literacy, 21st C skills, access to technology, application to schools and learning, and possibly links to home and community.

Comment: I understand the intent of this paragraph, I think, but is the idea that we've gone from nerds to mainstream and now extending use to minority groups such as special needs?

Comment: Apart from in the title of this section, the term nerd is not used anywhere else nor is it defined. While some readers may infer the authors' intent, the inclusion of this term may need some clarification.

Comment: It would seem so – just like the printing press changed business, society, economies, etc etc. so too has online communication changed everything, but we just don't know yet the full extent because we're in the middle of it! While the printing press changes were slow, but unstoppable, the internet changes are fast, but unstoppable!

Comment: I presume you mean F2F and not online? Should it be made clear?

Comment: There is evidence to suggest that online communication is the equalizer in providing an accessible, equitable and inclusive environment, regardless of race, religion, colour, appearance, gender, ability or disability, language, location, class status, etc etc. I think this paragraph is very important and could be more richly developed to provide the full gamut of potential value for those out of the mainstream or at any disadvantage.

Comment: Not according to some of the previous paragraphs! Maybe a new section title such as "Online Interaction – Can it enhance multiple forms of social communication?"

Comment: Many? Or a minority so a few?

Comment: What defines 'ordinary'?

facilitating their potential social improvement, albeit in an online environment. They are not necessarily doing so at the detriment of face-to-face interaction because with or without technology communication would not be occurring for that group. Antoci, Sabatini & Soldini (2009) address the social interaction debate from an economical perspective and suggest that if there is less value placed on 'social participation' or opportunities are not clear then people may naturally disengage from this process and revert to satisfying their own need for digital consumption. Thus, the argument is that if people are not able to see value in face-to-face interaction then they will be stop or reduce consumption in this way and go where the value is – which could be online interaction for many people due to the circumstances described above.

An article on the BBC (2009) News website about whether online networking harmed health was responded to in the feedback section of the Web page. The results were interesting in that they were diverse and indicated the mixed opinions about the benefits or harmful effects of online social networking. One theme that emerged was that of the benefits to immigrants who have moved to a new country but want to keep in touch with friends and family from the previous country. However, a respondent stated that '*...[these sites engender] a false sense of relationships with other people. People do not interact with each other properly, becoming more isolated and depressed*'. Another situation is highlighted with a respondent who has Asperger Syndrome who believes that these sites make it easier to meet people, possibly bringing down the initial barrier to getting to know someone which can be extremely difficult for persons who have this condition. Another respondent deactivated his account because he decided that he was spending too much time online to the detriment of his 'real-life' friends. His terminology suggests that if some of his online friends do not become face-to-face friends (geographical limitations accepted) then there is an argument as to how 'social', social networking is.

The Home-School Partnership

If parents become reticent to help their own children develop communication and social interactional skills then it follows that the schools will increasingly have the responsibility to add social interaction to the curriculum if young people are to integrate successfully in wider society following school. It is possible that the scenario of parents expecting teachers to teach social interaction skills becomes as relevant as the expectation that teachers teach their charges about sex and drug education. For example, blame has been afforded to schools if teenage pregnancies are on the rise. In the future it may be envisaged that parents will be complaining about teachers and/or schools not teaching their children how to interact with other children and adults. It could be that in the future comments such as this would be common:

> Parent: *"I just don't know what they do at that school. I mean Sam came home and would not communicate with me. I mean I ended up having to go to her room and speak with her. You know, that's the teacher's job getting Sam to talk about stuff – next thing they will be getting me into the*

Comment: Aren't humans naturally 'social animals'? What are the educational implications here? Are the authors suggesting that when people who would not normally engage do so because of technology, is it now up to society to ensure that those engagements have value? What would this look like? An example would be helpful.

Comment: This entire paragraph is heavy on opinions – not sure that it adds value to the chapter in terms of considering learning and social communication unless the authors suggest some recommendations or things for educators to consider, such as the role parents and communities can take in modeling positive and effective online behaviour and management of social networking.

Comment: This is such an opinion-heavy and value-laden statement! Not sure that it adds value to the argument, unless you're trying to demonstrate that without evidence and research, all we have for now are opinions…

Comment: This next section seems to be coming down on parents and the 'fall of the family unit' – a bit harsh! If this chapter is about learning, then perhaps it would be more helpful to educators to instead look at the changing demographics in society, then use that info to consider how best to work with families and students. Also, how about communities? How do they fit in? In BC we talk about the role of community often as an important partner in education.

Deleted: **Parents absolved from social interaction responsibilities**

Comment: Is this the same expectation in the jurisdictions discussed so far?

class to teach physical education. I just don't know what has happened to schools these days."

It should be considered that if parents are tending to spend more time away from their children due to the pressure of having to pay for the ever increasing large home and car loans, then there may be a greater expectation placed on the school and the teachers to take a more responsible role in educating children in social nuances and social behavior. The changing demographics of modern Western families have been well documented (Fields, 2004; Mackay, 2007). Over the last 30 years there has been a trend for students to be sharing households with only one or no siblings. Increasingly where siblings are present, they are part of a blended family. Further it is not uncommon for up to 25-30 percent of students in the West to be living in single parent households and in the US this has been one of the most dramatic changes in the composition of households with children (Fields, 2004). The traditional nuclear family of two married parents living with children under the age of 18 years comprised only 23 percent of total US households in 2003 (Fields, 2004). Even in these two parent families in many economies both parents are now participating in the paid workforce with direct implications for the amount of time parents spend with their children.

One of the most alarming findings from the extensive survey of young people's media use conducted by Rideout, Roberts and Foehr (2005) was that the majority of young people (53% of students in Grade 7 to Grade 12) reported that their parents did not impose any rules on them regarding their use of TV, video games, music or computers. Students with the lowest grades at school spent the most time playing video games and were significantly less likely to spend time reading print materials such as novels and/or textbooks. Even with the advancement of Kindles, Nooks, and the iPad, encouraging this group of students to increase their time spent reading will remain a significant challenge for parents and teachers.

Teaching children how to behave has always been a large part of the schools' province (the hidden curriculum), and the virtual world provides a new and extended place that will require students to learn about social and acceptable behavioral norms. The question of who will fulfill this role has yet to be addressed.

Child engagement

Parents may spend less time with their offspring and as such children then become less socially engaged with their parents. As children become adolescents the argument would follow that this situation would become exacerbated. Already there is good evidence that self-disclosing conversations with parents decline dramatically during early and mid adolescence (Buhrmester, 1998). If this is the case then the art and skill of social interaction becomes less developed in young people and social insularity may become more pervasive

Comment: This seems a bit far-fetched – where's the evidence? Or is this speculation?

Comment: Is this a fact, or an opinion? Seems a tad judgmental.. Some parents work not for the big house or car, but just to put food on the table. And some choose to work because they want to work.

Comment: The traditional nuclear family is a bit of a ":Leave it to Beaver" myth, isn't it? Haven't changing demographics been a constant, and isn't it up to schools to adapt to changes in society and educate the kids that come in the door?

Comment: How about the counter-argument against 'helicopter parents'? And, do the authors have a problem with working parents? Or just the amount of time spent with children? And, is it really about time, or what happens during that time? I wonder if this whole section should be included at all as the book is about schools and learning, not an argument against modern society and how parents are possibly not doing their part to monitor/control/guide their offspring!

Comment: Didn't your research suggest that literacy rates were improving? If so, this comment needs some context to tie it back to literacy and learning. As the literacy advisor in BC, I agree with the statement!

Comment: It might make more sense to have this as the opening rather than closing paragraph for this section.

Comment: Isn't this a normal and desirable part of development? Or are you saying that in some situations parents are spending less time than is ideal with their children? If so, can you state the ideal? I wonder if rather than placing blame with parents, instead the authors' might consider providing a 'state of the world' and then discuss how schools might respond or adjust their practices in light of the reality? Educators can't change parents, but they can develop home-school-community partnerships to help ensure that children have optimal learning opportunities.

thus leading to more people experiencing difficulties with social communication. The first author of this article remembers from his teaching days in Scotland a mathematics teacher being asked to teach a religious education class and responding along the lines of *'I am a maths teacher – I have not been trained to interact with children'.* Are we possibly entering an age where parents are becoming unable to teach their children the skills required for social interaction or possibly more colloquially referred to as 'social skills'? This could be as a result of parents not being skilled enough themselves, which then becomes a generational argument that these techniques are being lost as we move through the different generations where argument could be made that in some Western societies value is placed on a materialistic culture at the expense of parent-child interaction as the mainstay of family life.

> **Comment:** Yikes! This is verging on a moral essay, or sermon touting certain virutes.

Computer home

Despite the broad and reasonably pervasive patterns of overall digital technology use by students, the effects of this and the roles schools play in supporting digital technology use are much more complex to evaluate. Many authors have pointed out that digital technology use in the home does not encourage isolation or the breakdown of family relationships, does not have a negative impact on friendships and that young people are sophisticated users of new technologies.

> **Comment:** Now you say it! I am not sure why there is a need to give print-space to such arguments and then counter-arguments, unless this chapter is a literature review or critical essay.

Holloway and Valentine (2003), for example, found that although students were technologically more competent than their parents they also had a better understanding of the dangers that the virtual world can present. An unexpected finding from Rideout, Roberts, and Foehr (2005) in the aforementioned comprehensive survey was that those young people who spent the most time using media also reported spending the most time with their parents. The reasons for this finding were not clear but amongst the students who were high viewers (i.e. those viewing more than five hours of television per day) shared viewing of digital media with their parents may have accounted for much of this increase in time spent together. Similar to this pattern of heavy television use not impacting on time spent with parents, the survey found no differences between heavy and light television users in their self-reported physical activity levels or in their time spent pursuing other interests. One important difference between students who are heavy and moderate/light viewers of television is that heavy viewers report that significantly less time is spent on completing homework. However, it should be noted that this may not necessarily correlate with the quality of the submitted homework. This finding has been more generally replicated, however, as some authors have noted it is not clear if not having assigned homework is associated with the increased use of screen time.

> **Comment:** This seems outdated as my understanding is that television viewing time has decreased significantly (see the 2007 CISCO slide inserted above). I am not sure that students share computer time as they might have shared tv time with parents.

Social interaction and the social brain

Goleman (1996) who is the author of the seminal work *Emotional Intelligence* has stated that the brain is wired to be social; that it adapts and learns by adopting emotions from other people. Goleman argues that this increases the brain's

knowledge and strength of social communication and understanding. It is interesting that just as we are beginning to gain knowledge around the plasticity of the brain and its ability to adapt and learn in a social context, so we are in a society where social interaction i looks less like what previous generations have typically been accustomed to and more varied and complex. The argument could be extended to suggest that the strengthening of the neural pathways that Goleman describes could also be taking place with online interaction, which despite being fundamentally different to 'traditional' social interaction is still a skill to be learned and improved upon. Whether people who are adept at online interaction and not with face-to-face communication can only be proficient in one of these areas is a moot point. It has not been discussed in the literature as to the links between them and whether or not they are mutually exclusive forms of interaction thus implying that gaining skills in one area may not necessarily lead to strengths or losses in the other. This does not mean that the skill of social interaction has gone, in fact, many young people who are socially isolated, whether in school or elsewhere, are discovering the potential of communicating with people online. This is exemplified in work by McInnerney and Roberts (2004) who studied the sense of isolation that online study has for Australian learners. They suggested that it was widely regarded as an acceptable difficulty for students who study by this mode. However, it was found that *'this sense of isolation can however be minimized if forethought is given to the development of the online milieu by the educators involved'* (p. 80). Moreover, this suggests that not all forms of online communications are to the detriment of the face-to-face model and in some cases they are a necessary enhancer to what is already available.

Rage against the machine

It is suggested by Greenfield (2007) that children are interacting with machines more readily than before due to the immediate gratification and control that can be derived from this form of stimulation. Indeed there is always the danger that this form of interaction could become more important than with other people such as in school or the family environment. This could result in a society where normal development has been interrupted by technology, and schools may very well be expected to fill this gap in student knowledge, namely the art of social interaction.

The very definition of social interaction is now changing with many people potentially socializing online as much as face-to-face. In the not-too-distant future it is possible that the former will become the 'norm' with the latter being something that is so 'yesterday' in a quickly-evolving interactive world. The situation is summed up succinctly in a quote from a respondent on the BBC (2009) website, as mentioned earlier, who stated that *'If you are communicating with your neighbor by Facebook then that is a problem'*.

Deleted: s

Deleted: less obvious

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Comment: Is this a recommendation or implication for educators? If so, an example would help to hone in on the point.

Comment: Or, is it because of the availability and access? These kids have known no other world.

Comment: Only if it fulfills a human need not gained elsewhere. Are we really interrupting 'normal development', or are we evolving and adapting? The research on early learning and brain development is very clear on what babies and toddlers need to develop strong language, emotional, physical, and social skills – do we know as much about children and teenagers? If not, there are plenty of exciting discoveries to be made! Is social interaction a dying art, like writing thank you notes by hand, or is it merely changing to reflect the modern times in the 21st century?

Comment: Why is this a problem? Why can't this be looked at one of the many ways one can communicate with their neighbor? This quote, and the opening quote, suggest a bias or view by the authors that online communication is generally a negative. Is that the tone or view that the authors are promoting?

Summary

Notions of the millennial generation as privileged and holding superior digital knowledge appear to have been overstated in the literature. Nevertheless there is compelling evidence that engagement with digital technologies is now occupying as much time in the average students' life as a full-time job and almost double the time as spent in school. Television (old media) still remains one of the most important forms of digital entertainment for young people. The link between viewing high levels of violence and aggressive behavior has been demonstrated in major empirical investigations and is now accepted by most professional bodies concerned with the health and welfare of young people. While there is little systematic evidence that digital technology is 'dumbing down' students, there is compelling evidence that it can assist learning and thinking but the ways in which this occurs are complex.

Social interaction means and patterns are also changing with online connections being as relevant to some people as face-to-face connections. Mention has been made that there is a negative aspect to too much technology that is harming basic social interaction skills but there is evidence that, in some cases, there is enhancement for some people who lack the opportunity or ability to interact face-to-face getting the opportunity to interact online. 'Can online networking replace the 'real' thing?' is a difficult question to answer but as evolution in digital technology takes place at an alarming rate, it may not be too long before we have an understanding as to how much damage or indeed improvement to human interactions will occur as a result of increasing online social interactions.

Comment: Is this true? I think more recent research would suggest that it's probably mobile devices.

Comment: It would be helpful to have a conclusion that ties back to learning and the implications for educators as they consider the changing nature of social communication and engagement.

Glossary

[Please list words in alphabetical order, followed by periods; then their definitions, followed again by periods.]

Digital Interaction. Definition.
Millennial generation. Definition.

Social communication. Definition.
Digital Natives
Digital Media
Literacy
Digital Technology
Social Networking

[Page break follows glossary, starts References on new page.]

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