Computers & Education 77 (2014) 91–100

Contents lists available at ScienceDirect

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

Digital learners and the overlapping of their personal and educational digital engagement

Binod Gurung [a,*], David Rutledge [b,1]

[a] Department of Curriculum & Instruction, New Mexico State University, Las Cruces, NM 88003-0014, USA
[b] Department of Curriculum & Instruction, New Mexico State University, MSC 3CUR, P.O. Box 30001, Las Cruces, NM 88003-0029, USA

ARTICLE INFO

Article history:
Received 12 February 2014
Received in revised form
13 April 2014
Accepted 15 April 2014
Available online 1 May 2014

Keywords:
Digital engagement
Digital natives
Learning ecologies
Digital learners

ABSTRACT

Current K-12 students are considered digital learners because technology is as pervasive in their academic world as in their personal lives. Technology enthusiasts argue that these learners are the "digital natives" having sophisticated technology knowledge and skills that can be potentially harnessed for better learning engagement inside the classroom. This phenomenological study investigates how some current high school students as the digital learners engage with technology at home and school; and how these two types of engagement overlap in their learning inside the classroom. Data were gathered from phenomenological three series in-depth interviews with five participants and also field observation. Findings show that the overlap between the personal and educational digital engagement(s) of these students was not necessarily positive as portrayed by the prevalent discourses of technology enthusiasts. The overlapping had mixed roles – facilitative as well as obstructive. Pedagogical and future research implications are discussed.

1. Introduction

Digital learners in US schools are commonly misunderstood because technology is as pervasive in their academic world as in their personal lives. Technology has penetrated every classroom in the United States (Rutledge, Duran, & Carroll-Miranda, 2007; Wells, Lewis, & Greene, 2006) impacting student engagement, learning, teaching, and achievement in multi-faceted ways. Technology has also been phenomenal in the lives of the digital learners (Pew Internet, 2013). The Pew Internet Research's report (2013) shows that 93% of teens have a computer or have access to one at home, 78% of teens have a cell phone, and 95% of teens consistently use the Internet. The new generation of digital learners are "surrounded" with and immersed by technology, often called the "digital natives" (Palfrey & Gasser, 2008; Prenksy, 2001, 2010). According to Prensky (2010), the digital natives naturally immerse themselves in digital technologies such as computers, cell phones, MP3 players, and videogames. Similarly, Tapscott (2009), referring them as the "Net Geners," states that they are the first generation to have grown up digital and "be bathed in bits" (p. 7), for whom "using the new technology is as natural as breathing" (p. 18). At the core of the digital natives discourse is that their personal use, innate-like digital skills, and proclivity for using technology can be easily utilized to forge meaningful learning engagement inside the various classroom settings (Palfrey & Gasser, 2008; Prensky, 2010).

However, portraying the current K-12 students as digital learners (i.e., as digital natives/Net Geners) is overly enthusiastic because it feeds into an idea of technological determinism – a dreamy viewpoint that technology provides solutions to historical problems of society, education, and student learning and achievement (Bennett & Maton, 2010; Kennedy, Judd, Dalgarnot, & Waycott, 2010; Selwyn, 2003, 2009; Smith, 1994). As result, there is a growing debate between the technology enthusiasts and skeptics (Collins & Halverson, 2009). Enthusiasts chart the "hope argument" (Hull & Nelson, 2005; Palfrey & Gasser, 2008; Tapscott, 2009) promoting the idea of harnessing the technological knowledge, skills, and attitudes of digital learners to better learn in the twenty-first century classrooms. These enthusiasts posit that teachers do not have to teach any new technology related skills for these learners, but merely integrate their existing knowledge and skills that they have developed through the personal use and experience of technology. In contrast, the skeptics (e.g., Openheimer, 2004; Selwyn,

* Corresponding author. 512 Sweet Ave, Las Cruces, NM 88001, USA. Tel.: +1 5756463825, +1 5756459909 (Home).
E-mail addresses: binod@nmsu.edu (B. Gurung), rutledge@nmsu.edu (D. Rutledge).
[1] Tel.: +1 575 6465637.

http://dx.doi.org/10.1016/j.compedu.2014.04.012
0360-1315/

2009) express the "fear argument," who see little, if any, the significance of highlighting the personal use of technology and the subsequent integration into classroom learning engagement. Although their personal use of technology is widespread, digital learners are not equipped with the types of academic skills that are essential for learning. Because so called digital learners are basic technology users having functional skills of game playing, social networking, texting, and surfing information on the Web, their learning engagement is limited lacking technology-mediated productivities such as self-created learning content, research skills, and using computers as cognitive tools (Jonassen, 2006; Livingstone, 2009; Luckin et al., 2009; Rowlands et al., 2008; Selwyn, 2009). In this bifurcated context, it is important to explore and understand how these digital learners engage in using technology for personal purposes at home and how their personal use might impact their learning engagement inside the classroom.

In this article, we present a phenomenological study that examines the intersections of personal and academic uses of technology by some digital learners across home and school settings. We explore the technology use of five "digital natives" students, who were attending a public alternative high school called South West Alternative High School (SWAHS) – a pseudonym – in order to see how they pursue their personal and educational digital engagement; and how these two types of engagement overlap. In this study, the term digital engagement is defined as the learning and everyday engagement of digital learners with technologies available in their learning ecologies including in their everyday life (e.g., home) and the learning contexts of the school. The study was guided by the two research questions stated below:

- How did the digital learners engage with technology for personal and educational purposes? How did their personal and educational digital engagement overlap with each other?

2. Digital learners as digital natives

Prensky, Tapscott, and others (e.g., Palfrey & Gasser, 2008) have created a popular discourse of the digital learners – "digital natives"/"Net Geners" – that has become highly influential in policymaking, teacher education and professional development, and in the educational technology field. Digital natives, Tapscott (2009) explains, naturally assimilate technology as "just another part of their environment," soaking it up "along with everything else" (p. 7). He further states that the digital natives "do not just observe; they participate," for which "They inquire, discuss, argue, play, shop, critique, investigate, ridicule, fantasize, seek, and inform" (p. 21). Central to the argument is that these digital learners bring wealth of everyday technological knowledge and skills from home that can be effectively harnessed for learning engagement inside the classroom (Oblinger & Oblinger, 2005; Palfrey & Gasser, 2008; Prensky, 2010). However, characterizing the new generation of students as digital learners and integrating technology into teaching and learning for these learners are concomitantly exciting (e.g., Oblinger & Oblinger, 2005; Prensky, 2010) and problematic (e.g., Bennett, Maton, & Kervin, 2008; Selwyn, 2009).

There are new and exciting teaching and learning opportunities generated by the affordances of new digital technologies such as mobile learning (M-Learning – learn wherever you go), ubiquitous learning (U-Learning – anytime, anywhere learning), one-to-one computing, collaborative learning with social media and Web 2.0, and massive online open courses. Adaptive to such technology-mediated teaching and learning opportunities, it is generally understood that the digital learners, who do not have to "translate or learn ICT, but merely experience it" (Nasah, DaCosta, Kinsell, & Seok, 2010, p. 532), can utilize technologies for having rich and meaningful learning experiences. Furthermore, digital learners are often perceived as more creative and for being constantly connected as they "live much of their lives online, without distinguishing between the online and offline" (Palfrey & Gasser, 2008, p. 4). This perception of creativity and connectedness seems rationale to the enthusiasts' hope argument that technologies can transform education by offering many new and previously unimagined pedagogical possibilities (Collins & Halverson, 2009; National Educational Technology Plan [NETP], 2010).

In contrast, technology integration and the whole discourse of digital learners are equally problematic. Digital learners lack many essential technology-related academic skills such that their learning engagement with digital tools and resources is limited, sporadic, and unspectacular (Livingstone, 2009; Selwyn, 2009). Their learning engagement is often limited to game playing, texting, and retrieving information from the Internet while little involvement in producing and sharing self-created content occurs (Luckin et al., 2009). They are mostly ordinary and basic users, who use emerging technologies (e.g., Web 2.0) less frequently, but use standard features of technology such as texting, social networking, and listening to music regularly (Caruso & Kvavik, 2005; Kennedy et al., 2010). Therefore, they lack an ability to effectively use the Internet and other emerging digital learning tools for academic purposes (Rowlands et al., 2008). This re-affirms the historical fact that despite the massive amount of time and money investment, technology has also become a cause of unspeakable anxiety and frustration engendered by the failure to meet the desired teaching and learning outcomes (Cuban, 2001; Kulik, 2003). So, the skeptics' fear argument seems plausible and that technology integration, including new digital technologies such as computers and the Internet, is doomed to failure as has happened in the past with the Educational Radio movement, television to support learning, and the teaching machine. This also reaffirms the skeptics' argument that the current portrayal of digital learners is generally misplaced technological and biological determinism because their digital engagement is often varied and far less than what it is expected from them (Bennett et al., 2008; Selwyn, 2009).

3. Home access to technology

Personal use of technology and the subsequent development of the digital skills of students are determined by their home access of technologies such as cell phones, computers, the Internet, as well as video and online games among others (Palfrey & Gasser, 2008; Tapscott, 2009). Home access to technologies also has multifaceted benefits for learning that it helps students for better educational outcomes (Fairlie, 2012) by providing them with increased opportunities for learning engagement through independent and personalized learning (Livingstone & Helsper, 2007; Roschelle, Pea, Hoadley, Gordon, & Means, 2000), increased motivation and study hours (Kerawalla & Crook, 2002; Kerawalla et al. 2007), acquiring information and communications technology (ICT) related skills and confidence (Kong & Kai, 2009), and even the development of some cognitive aspects in younger Pre-K children (Fish et al., 2008).

Studies show that the students' home access and experience with technologies (e.g., computers, the Internet, and video games) are found to be positively influential on how they develop technology fluency, build interest in taking formal technology-related courses, and generate

learning opportunities in general (Barron, Martin, & Roberts, 2007). In several ways, home access to technologies is a more significant factor than the school access when considered the school performance (Attewell & Battle, 1999; Lee, & Brescia, & Sissinger, 2009). Students using computers, even if less than one hour per day, do better in reading and math than their counterparts who do not have access to computers from home (Lee, Brescia, & Sissinger, 2009). A much larger scale study by Organization of Economic Co-operation and Development (2011) comprising some seventy countries from around the world also indicates that students' home use of computers for schoolwork is positively correlated to their academic performance, while the school use of computers is mixed to negative.

4. Theoretical framework

Understanding the digital learners and how they use technology at home and school is a complex issue enmeshed in their personal, academic, and socioeconomic backgrounds. In this study, we used the theory of "learning ecologies" (Barron, 2004) to explore and understand how digital learners access and use various types technology in their learning engagement. The theory of "learning ecologies" provides a baseline to understand how these learners use, interact, and learn with technology at home and school settings; and how their use of technology overlaps across these two settings (Barron, 2004; Nardi & O'Day, 1999). Barron (2004) defines, "a *learning ecology* as the accessed set of contexts, comprised of configurations of activities, material resources and relationships, found in co-located physical or virtual spaces that provide opportunities for learning" (p. 6).

This theory, derived from the "ecological theory" (Brofenbrenner & Evans, 2000), stresses the importance of understanding the "multiple contexts" (e.g., formal and informal learning contexts such as home and school) and distributed resources of learning over the physical and online environments. Furthermore, it helps to explain the types of interactions between the learners and resources at the micro (e.g., interaction with peers or with a particular resource such as computers) and macro (e.g., learning community and cultural contexts) levels (Lai, Khaddage, & Knezek, 2013; Rogoff, 2003). Within a learning ecology, technology plays a central and mediational role creating "information ecology" with "a system of people, practices, values, and technologies in a particular local environment," thereby influencing their life, learning, and work (Nardi & O'Day, 1999, p. 49). The theory of learning ecologies also highlights "for study the emergence of interest and competence and the dynamics of how learning proceeds once interest is sparked" as resulted by the students' learning environment (Barron et al., 2007, p. 80).

5. Method

5.1. Research design

A qualitative method was used to explore the digital engagement – digital learners' engagement with technology across home and school contexts. According to Denzin and Lincoln (1998), a qualitative study allows us to interpret phenomena "in their natural settings" by capturing our personal experiences that "describe routine and problematic moments and meanings in individuals' lives" (p. 2). Among the several qualitative methods, we used the phenomenological method (Moustakas, 1994; Patton, 1990). Phenomenological inquiry method extracts the essence of lived experiences about certain phenomena by capturing their "core meanings mutually understood through" the common experiences of multiple individuals about the phenomena involved (Patton, 1990, p. 70). This method is based on the philosophy of phenomenology that "seeks meanings from appearances [of phenomena] and arrives at essences through intuition and reflection on conscious acts of experience, leading to ideas, concepts, judgments, and understandings" (Moustakas, 1994, p. 58).

5.2. Research site

The study was conducted at SWAHS, a public alternative high school. In the school year 2010–2011, there were 183 students enrolled in 9 through 12 grades. This was the only public alternative school in the district that had approximately 25,000 students in the same school year housed in its 35 schools – 24 elementary, 7 middle, 4 high schools, and 1 vocational school.

At SWAHS, by race and ethnicity, there were Hispanic 139 (76 percent), Caucasian 35 (19 percent), Black 7 (4 percent), Asian 1 (less than 1 percent), and Native American 1 (less than 1 percent) students. By gender, 95 males and 88 females were currently enrolled at this school. Majority of the students at SWAHS came from low-income families as the school record indicated that more than seventy percent of them were in the free and reduced lunch programs. Since many students were in transitional programs at this alternative school, once the "suspension" or "probation" is over they could go back to their "home" school. So, the student population at this school was in constant flux changing in the range of more or less 20–40 students throughout the school year.

SWAHS was selected as the research site for two reasons: a) because it had developed and implemented a technology-integrated Triad model into the curriculum and instruction of core content areas, and b) the students at SWAHS were quintessentially digital learners "born after 1977" (Tapscott, 2009). The Triad model is a technology-integrated pedagogical model developed by the teachers at SWAHS designed to utilize the schools' technology resources such as one-to-one laptops, computer lab, media lab, Cybercafé, and other technologies available in the school. The model, as its name suggests, consists of three components based on the classroom hours or instructional minutes – one third, direct instruction, another third, self-regulated learning using computers, and the final third, project work that culminates the other two components. The first component was teacher-based because it involved direct instruction by teachers. Teachers presented lessons, often lecture-based, with or without using technology (e.g., PowerPoint presentation). On the other hand, the second and third components of the model were learner-centered and also required the use of various types of technologies such as computers and online learning resources (e.g., Odysseyware® course management system and Carnegie learning software for math) by students. Within the self-regulated learning component, students used computers and the Internet to study their course materials, take online electives, and work on their credit recovery. The project component was designed for students to demonstrate their learning by using technology such as multimedia and PowerPoint presentations, videos, and other types of computer-based assignments (e.g., essays). During the self-regulated learning and project work, teachers played the role of facilitators helping and monitoring their students' learning activities.

5.3. Data sources

Data sources of this study included the interviews with students and fieldnotes gathered from the "close" observations (van Manen, 1990). Using the purposeful sampling method and to incorporate the "maximum variation" (Patton, 1990; Creswell, 2007), five students with diverse demographic representations were selected for the interviews. The selection of the participants was made to represent the school demographic including race/ethnicity, socioeconomic background, gender, and academic grade level as much as possible (see Table 1). Given the high mobility of students (e.g., transferring and going back to "home"/regular schools) at SWAHS, participants were selected from the pool of students enrolled at this school for at least two consecutive academic semesters (e.g., Fall 2009 and Spring 2010 or Spring 2010 and Summer 2010, and so forth) so that they could describe their "lived" experiences of using technology for a significant period of time (e.g., two or more semesters).

We conducted in-depth interviews three times for each participant using the "three-interview series" method (Seidman, 1998). In the three-interview series method,

> The first interview establishes the context of the participants' experiences. The second allows participants to reconstruct the details of their experience within the context in which it occurs. And the third encourages the participants to reflect on the meaning their experience holds for them (Seidman, 1998, p. 11).

The interviews were conducted using open-ended and semi-structured questions exploring the participants' lived experiences of using technology for personal and educational purposes. In the first interview, participants were asked to tell about their personal and familial socioeconomic backgrounds, past schooling experiences, and the current personal and educational experiences of using various types of technology (e.g., computers and gadgets) at home. The Second interview sought to explore how participants perceived and used various types of technology in the classroom and school contexts. The final interview was intended to allow the participants to reflect upon their own lived experiences of using technology across home and school contexts for personal and educational purposes.

The length of each interview was about 60 minutes. All the interviews were recorded using an audio recording system called "Audacity" on a laptop. Then, the recorded interviews were transcribed verbatim.

For gathering the fieldnotes, one of us regularly visited the school as a "close observer" (van Manen, 1990). The observer was, then a doctoral student, developing expertise in qualitative inquiry methods, particularly focusing on the phenomenological method. He "closely" observed (e.g., based on the research purpose) the participants in their classrooms (i.e., Language Arts and Social Studies) in order to see how they use technology. The observation in the beginning was broad and general that explored the integration of technology at the school level. After the first week's few visits, the observation was gradually more focused (e.g., in a Social Studies classroom) and selective (i.e., focusing on the study's participants only). The observation took place at least three days a week for over one and a half months. We, the researchers of this study, also set up a series of weekly conferences to discuss the obtained fieldnotes, which aimed to maintain the connection to the study's research questions.

5.3.1. Data analysis

To capture the essences or meanings of the phenomenon (here, digital engagement), the data were analyzed using the four steps of phenomenological data analysis: horizonalization, individual textural descriptions, individual structural descriptions, and composite structural descriptions (Moustakas, 1994). Since the first two steps are the procedural stages, we present our findings at the third and fourth levels of data analysis (i.e., the individual and composite structural descriptions). Briefly, the data from the transcribed interviews were *horizonalized* by highlighting the significant statements or "horizons." Then, based on the substantive meaning or *essence* gleaned from the interviews, the participants' statements were *clustered* into *themes*. The clustered themes were utilized to develop *individual textural descriptions* – the organic experiences of the participants about using digital technologies for personal and educational purposes. With further analysis of the *individual textural descriptions*, we developed the structural descriptions at the individual and composite levels. The *individual structural descriptions* provide the structures of each participant's lived experiences about their digital engagement while the *composite structural descriptions* revealed the common structures of digital engagement as a group. Based on the phenomenological data analysis method (Moustakas, 1994), we employed "imaginative variations" (Moustakas, 1994), particularly the divergent "frames of references" (p. 60) and "perspectives" (p. 97) to develop *composite* structural descriptions. The divergent "frames of references" were basically a further investigation into the *individual* structural descriptions by using the "etic point of view" or the researchers' perspectives (Flick, 2009), whereas for the "divergent perspectives," theoretical framework of the study and the relevant literature were utilized.

6. Findings

The individual structural findings revealed that the participants used various technologies to meet their personal and educational purposes and needs. The composite structural findings showed two types of digital engagement – personal and educational – of the

Table 1
Participants' profiles.

Caitlin	• 18, a Caucasian, female, senior, and came from a middle class family • An avid music listener
Lucia	• 18, a sophomore and female, a mixed racial background and low-income family
Amelia	• 18, a Hispanic, female, senior, and from a low-income family • A music listener and a casual video-gamer
Keith	• 18, a senior, male, from a mixed racial background (Brazilian father and Caucasian mother) and upper middle class family • A hardcore video-gamer and an aspiring computer programmer
Carlos	• 18 years old, a Hispanic, male, junior, and came from a single-mother led low income family

participants. Below are presented the descriptions of individual structural findings for each of the five participants (i.e., Caitlin, Lucia, Amelia, Keith, and Carlos) followed by the descriptions of composite structural findings.

6.1. Individual structural findings

6.1.1. Caitlin's digital engagement

Caitlin was a Caucasian, female, senior student at SWAHS and came from a middle class family. Caitlin's digital engagement was dynamic and varied. She used technology for personal and educational purposes. Personally, she had basically all types of personal gadgets such as an iPod, cell phone, television, radio, and a personal computer with the Internet access at home. She "loved texting all the time" but felt "guilty" while driving and texting. She knew she was not allowed to "text," but she texted frequently during the class. Similar to that of "digital natives" (Palfrey & Gasser, 2008; Prensky, 2010), for her "texting" was "almost natural," as she put it, "But you don't know when you are texting" (SOA_Caitlin, p. 4).

Caitlin said that most people watch television (TV) for entertainment with different interests, but she mostly turned on TV to accompany her loneliness at home. She explained,

> I mean, I go home and I turn on TV for the background noise; not just me in there and quiet. I mean I don't necessarily sit and watch, but I turn it on for some background noise … I think it just depends on the person, everybody has different interests. (SOA_Caitlin, p. 5)

Caitlin loved listening music and she believed that the music interests of people "model" and "define" who they are. She said that music had helped her to "not get bored," "calm down," and "block unwanted talk" in the classroom. She believed that mindfulness, attention, and flow in her study occurred during music listening (Diaz, 2013). She even went on to say that teachers should allow students to listen to music in the classroom because she thought "it would be easier in classroom to have your music on and then work because instead of having to listen everybody talk" (SOA_Caitlin, p. 4).

Academically, Caitlin was able to harness benefits from the technologies for her educational purposes at home and school. At home, she did her schoolwork by accessing Odysseyware® "whenever she got a chance" to study. Sometimes she did her school projects at home such as preparing PowerPoint presentations. At school, she was taking two electives online courses including the advanced placement course on photography and a computer graphic design course, in which she was engaged in "creating logos and labels and designs using computer, newsletter and stuff" (SOA_Caitlin, p. 12). She saw benefits of utilizing the multiple affordances of technology integrated Triad model at SWAHS for her learning. She said,

> You can take night school classes or you could take these as day classes in the Cybercafé. You can take extra credits here. Like 6 credits a semester, which is still a lot of work. The technology here is really good. I mean like it's good to have or put the people in institution where people have to learn about computers and all that. Because now days everything is on the computer like working in a job you need to know like how to work through the computer … I think it kind of helps you little bit more in the future like how to type and get to the Internet and work and all that. (SOA_Caitlin, p. 7)

Caitlin did not take any night classes, but she fully utilized the other aspects of technology integration and the Triad model at SWAHS. She took online classes; she took courses for credit recovery so that she could graduate on time; and she completed her assignments at her own pace using Odysseyware®. As stated above, she also realized that her digital engagement at SWAHS provided her opportunities to develop and enhance her technology fluency or skills that might be useful for her future job. She did not have to go to any computer institution or make an extra effort to learn about using computers for general tasks (e.g., reading, typing, and online surfing).

6.1.2. Lucia's digital engagement

Lucia was a mixed racial background, female, and sophomore student from a low-income family. Lucia used technology for personal and educational purposes. She had a cell phone, MP3, iPod, television, and a laptop with the Internet access at home. She listened to music, specifically from the older bands of the 1980s. She listened to music not only for entertainment, but also to fall sleep at night. She had also a "chain" habit of texting, as she put it "well, I use the cell phone because I text all the time" (SOA_Lucia, p. 5). On television, she watched "The Simpsons and any other cartoons that's for teenagers like the Family Guy and South Park" (SOA_Lucia, p. 6).

Academically, Lucia had generally a positive learning engagement with technology. She found that Odysseyware® was quite helpful to pursue her credit recovery and take electives online. She explained, "I use the Cybercafé in my fourth period every day. I think it's really helpful because I have to get more credits the semester and it has helped me" (SOA_Lucia, p. 12). In fact, she had been enjoying taking the online classes. She said,

> I do [she says enjoying it, very confidently] because I think it's really an easy way to learn. Yeah, it does [connect with the real world]. A lot of projects that I do on the Odysseyware® make you [and] take you outside the computer, you know. Like they make you reference you what you do in your life and everything. (SOA_Lucia, p. 11)

Furthermore, she preferred to go online for looking up information than going through the books. She said the "it's lot easier [on the Internet] than looking through your book for your information, because sometimes books are outdated and it doesn't have enough information about what you are looking for." She further added, "There's not any, really any, except for the search engine, Google, which gives millions and millions of websites for your help."

She also mentioned that Cybercafé provided her better learning opportunities at SWAHS. She utilized the Cybercafé as a quiet learning space, as she put it, "when the classroom is too loud or something like they are working on a project and I am dreading on my computer, I go to the Cybercafé so that I can concentrate better" (SOA_Lucia, p. 9).

Although she described the various benefits of using digital tools and resources for her, she also said that computers could be a distracting factor in the classroom. She explained,

> … because on the computer there's a lot of ways to distract yourself from reading it and in a book like just read the questions and look 'em up and read the materials. And on the computer it's harder to look it up, I guess it's with the social networking sites that's really distracting. If you know the correct way to which sites to go on and proxy it through yourself, and then yeah … [you are going to distract yourself a lot]. (SOA_Lucia, p. 7)

In sum, Lucia harnessed benefits from using the computers and the Internet that were provided by the school through the Triad model, the Cybercafé, and Odysseyware®. She also had her own personal choices and habits of using technology such as texting, listening to particular music (e.g., the older bands), and watching certain TV programs (e.g., The Simpson and Family Guy).

6.1.3. Amelia's digital engagement

Amelia, 18 years old, was a senior at SWAHS. She came from Mexico when she was 13 and started her middle school in the United States at seventh grade. Based on the school record (e.g., free-and reduced meal program), she was from a low socioeconomic background. Amelia used technology for texting, listening to music, and playing video games. She had her own personal digital gadgets including a cell phone, a radio, two gaming consoles that she shared with her siblings (i.e., PlayStation 3 and Wii), and a personal computer with the Internet connection. At home, she occasionally logged on to her Facebook, frequently texted, and watched specific TV programs (e.g., The Simpsons). Speaking of music listening, she said that "I have like almost all kinds of music like I have in English, I have in Spanish and I have one in French, but I did not know what it was saying so I erased it. I have like 350 tracks." She usually played videogames, especially on the Wii, such as tennis and boxing.

She also used technology for her studies in various ways. Currently, Amelia was taking an elective course on finance online. She was also using the computer for her learning, at least a third of the time in the classroom, as the Triad model at SWAHS required. In addition to classroom, she was occasionally using the computer at home for educational purposes that "Sometimes I just look for information on the Internet and I read it. Or if I have a book and there words that I don't understand, I look for definition in the computer because I don't have a dictionary" (SOA_Amelia, p. 9).

On the other hand, although she used laptops and Odysseyware® in the classroom, she did not use computers much that were available in the Cybercafé. She mentioned that

> [in the Cybercafé], I just go to print out something and yeah it's like three times I have printed there. I just go there and log in a computer and print. [Also] when we do like essays and some papers have to be formal one with the computer. I think it's faster. But I think, like I don't want to be in the computer all day because my eyes start hurting, my head and my back. (SOA_Amelia, p. 9)

In sum, she had access to computers and the Internet from home, but used it in a limited way such as for looking up information and finding "definition of words." At school, she used technology for her learning as required by the Triad model.

6.1.4. Keith's digital engagement

Keith was a senior at SWAHS with a mixed racial background, a Caucasian mother and a Brazilian father. Keith came from a middle class family. He was an advanced computer user with game designing and computer hardware and software knowledge and skills. He said that "I now know what it takes to be a computer technician; I know everything I need to know. Not in a professional level like how you need your certificate but I know all the material" (SOA_Keith, p. 5). He aspired to become a computer technician and a game designer in the future. Currently he was taking a course on game design and game programming at the local community college. Since he was going to graduate that semester, he was not taking any online courses. But he took a mass media class and he liked "to do the filming" in that class and he used the school's media lab for these projects. Keith also used computers in the Cybercafé whenever his culinary teacher sent him there to look up information.

At home, he owned a personal laptop, desktop, iPod, and three "leading" video gaming consoles including PS3, Xbox, and Wii. He had a cell phone once but his parents cut it off as they could not afford fifty dollars a month to pay for his use only. Nonetheless, he said that it was in his top priority to have a cell phone soon as he recently landed a job. Keith's family also had access to Cable TV and DVD player. About watching TV, he said,

> Usually we go to renting out a movie and watching it on a DVD, together the family or we try to get the family together … or if we are bored we have a cable so we watch TV … I usually like the more comic shows like, popular shows like Family Guy, South Park, and The Simpsons. (SOA_Keith, p. 4)

He did not use the computer much at home for his learning except for sometimes searching more information on the Internet while preparing for his tests. When asked about studying at home using his personal computer, he said that "School work at home? No, we don't do that. I pretty much cover everything in school. At home, I just play with my computer, watch TV, and stuff" (SOA_Keith, p. 6). In other words, Keith's digital engagement was much more related to his personal ambitions and interests such as learning more about computers and playing games than for school and educational purposes. Keith said,

> I would say most of my hours are going to computers and video games. And then I also tend to play lot of videogames on my computer … Right now I have all three of the main leading consoles – the Wii, PS3, and Xbox. And I don't play them very often anymore because I don't have my own TV for hooking up and I just don't have one in my room. We have a TV in the family room; my PS3 is hooked up there actually. And when nobody is watching the TV or nobody plans on watching TV for a while so I just sit down and play it. (SOA_Keith)

Thus, Keith was a "hardcore gamer" (Poels, Annema, Verstraete, Zaman, & DeGroof, 2012) when considering his time investment, ownership of gaming consoles, self-identification as a gamer, association with a virtual gaming community on the web, and the overall

knowledge about gaming. Although, Keith did not use technology much at home for academic purposes, his selection of electives was based on the personal/home use of technology (e.g., taking an elective on videogame programming and designing). Given the fact that he was an advanced computer user, he also enjoyed filming and editing videos in his mass media class. Additionally, he had set a career goal to become a computer technician and videogame designer in the future based on his personal technological knowledge and skills.

6.1.5. Carlos' digital engagement

Carlos was a male and junior student at SWAHS. He was a Hispanic and came from a single-mother led, low-income family, per the school's lunch record. Carlos used various technologies for personal and educational purposes. Personally, Carlos used his cell phone for texting and MP3 for listening to music. He did not have a computer, nor the Internet access from home. However, he did occasionally access online social networking sites from his girlfriend's laptop, who was a college student at the local university.

Academically, Carlos had mixed lived experiences about using technology for learning, sometimes useful and some other times problematic. Talking about the usefulness, he utilized the schools' computer at the Cybercafé for his afterschool study. During the day, Carlos said that, "[he uses the Internet] all the time. I always do. If I ever have a problem or something, I look it up on the computer and find the information" (SOA_Carlos, p. 11).

He also talked about the usefulness of the computer for writing. He said, "Well in a computer, whenever you type up something, it looks nicer. You could check for errors and you could have a grammar check on it. In the notebook, you have to go just over everything and re-correct it and rewrite it" (SOA_Carlos, p. 11). Similarly, he was also able to utilize technologies for extending his learning opportunities. Carlos explained, "I use the Cybercafé whenever I stay after school [5–7 pm] to catch up on work." They provide computers and just a quiet place to work. I use it sometimes. I do my work and it's open access (SOA_Carlos, p. 11).

On the other hand, Carlos had experienced many problems related with the use of computers and the Internet. Simply, he was bothered and frustrated because he had to use the computers "all the time" for doing his course work, taking electives online, and so on. Below is a lived narrative of Carlos that depicts his frustration about using computers and the Internet:

> … It's just bothering, it makes everything lot harder you know. It's frustrating, especially when the Internet is down and most of our classes are based on the computer work. And then it's ridiculous when the Internet is always going down in the school and a lot of people don't know how to access to computer whenever they go home. There are always library and stuff but still, it'd be a hassle you know just you go to library and I don't even have transportation to go to library. (SOA_Carlos, p. 14)

Carlos found that the Internet "going down" and the Odysseyware® not working set him back from progressing his schoolwork. Since he did not have access to computer and the Internet at home, he found that it was not easy to take online courses and complete the assignments as required by the Triad model from home. He also found that the school offering the electives online (e.g., using Odysseyware® for Physical Education – PE) was "boring, stupid, and retarded," when compared to his earlier experience of taking face-to-face PE classes as electives. On the other hand, Carlos also expressed his preference of doing "work" on the computer than in the book. Currently, he was taking the U.S. history online for his credit recovery. In sum, Carlos had mixed lived experiences of using computers and the Internet for his learning engagement.

6.2. Composite structural findings

Two common structures were found within the participants' digital engagement as a group that they were simultaneously involved in personal and educational digital engagement. Briefly, the personal digital engagement (e.g., texting, listening to music, playing videogames) was generally found to be individualized, positive, varied, and multiple. On the other hand, their educational digital engagement was found to be proactive, dynamic, multi-faceted, and mixed.

6.2.1. Personal digital engagement

The participants' personal digital engagement can be described in terms of developing their own "digital habits" and "niches" (Tapscott, 2009) similar to that of the digital natives (Prensky, 2001, 2010), based on their varying individual interests. Texting and listening to music were some of the common features of the participants' digital habits. Other kinds of digital habits involved playing videogames and online games, watching TV, and participating in online social networking activities such as Facebook. These habits were built and consolidated over time because of their positive outlook about using technology and their repetitive engagement to perform these activities. Their personal digital engagement can be characterized in the given four ways: personalized digital habits and niches, positive attributes toward using technology, ownership of digital gadgets, and boundary blurring.

6.2.1.1. Personalized digital habits and niches. On the surface, the participants seemed to do many similar things and activities with technology. But when examined deeply, each of them had developed their own "niches" (Tapscott, 2009) having a set of digital habits and interests based on their individualized choices and preferences (e.g., listening music to specific genres, watching specific TV programs, and playing specific types of games). For example, Lucia liked to listening music from the older bands of the 1980s. She listened to music to entertain herself and also to fall sleep at night. On TV, she watched only certain types of programs such as "The Simpsons" and cartoons that are made for teen-age audiences. Another participant, Caitlin was an avid music listener and she said that music, when allowed by some teachers, had helped her in the classrooms (e.g., "not get bored" and "block unwanted talk"). She also said that she turned on TV all the time at home, not for watching it per se, but as "a background noise." Caitlin, besides listening to music and watching TV, had a deep interest in photography and graphic design. Keith, another participant, was a "hard core gamer" (Poels et al., 2012), who played videogames and online games, usually for hours. He mostly played first-shooter types of video games and online massive multiplayer games. He had also a deep interest in computer hardware and software programming. Similarly, Amelia also played video games, but differently than Keith. She played console-based games such as Tennis on Wii and Boxing on PS3.

6.2.1.2. Ownership of digital gadgets. The participants' ownership of digital gadgets was based on their personalized digital habits. Caitlin, Lucia, and Amelia had basically all types of personal gadgets such as MP3/iPod, cell phone, television, radio, and a personal computer with the Internet access at home. Carlos also had all of these gadgets but the personal computer at home. They used these gadgets to meet the needs of their digital habits such as texting, listening to music, gaming, and surfing the web for online social networking activities and doing schoolwork. In addition to that Amelia also had a PS3 and Wii because she often played videogames. Keith was a hard core gamer; therefore, he had all three leading gaming consoles – the Wii, PS3, and Xbox. Thus, for all of these participants, their varied and personalized digital habits and the types of digital gadgets they owned were correlated.

6.2.1.3. Positive attributes. The participants' wholeheartedly embraced and proactively used technology, quintessentially like the digital natives do, in their personal and academic life, without any difficulty. Whatever they did with technology to meet their personal, social, educational, and entertainment purposes and needs, they did with a sense of enjoyment and ease.

They perceived technology as a useful tool and they embraced it in their everyday life and school. They liked listening music and texting was one of their favorite ways to communicate with friends. They also liked their gaming consoles, games, and playing games at home (e.g., Keith and Amelia).

6.2.1.4. Boundary blurring. Despite the school policy and teacher restrictions, the participants blurred the traditional boundary between the personal and academic usages of technology. The boundary blurring occurred when the participants took a number of their digital habits inside the classroom such as texting, listening to music, and accessing to online social networking sites during the class. This blurring, however, went beyond the digital habits to academic engagement. We called it overlapping, which we describe in details later in "The Overlapping" section below.

6.2.2. Educational digital engagement

The participants' educational digital engagement was based on the access to technologies within their "learning ecologies" (Barron, 2004) spanning over school and home. At school, they used technology for learning, taking online electives, and doing computer-based projects and assignment. They were provided with one-to-one laptop equipped with the Internet, a common printer, a TV with the playback system, LCD projector, headphones, microphones, and portable Interactive board. In addition to that they could easily access to computers, digital cameras, video cameras, and multimedia software in the schools' Cybercafé and media lab. Using the laptops and computers, the participants accessed to the Internet-based learning websites (e.g., Carnegie Software, etc.) and the Odysseyware® learning management system.

At home, the participants used computers to access Odysseyware® and to engage in an array of learning activities (e.g., writing, preparing PowerPoint presentation, and doing other types of assignments). Their educational digital engagement was proactive and dynamic, multi-faceted, and mixed, depending upon their learning needs and goals.

6.2.2.1. Proactive. The participants proactively used technology configuring their individual educational goals. As they were the alternative high school students, each of them had a varying degree of learning needs and goals such as taking specific courses for credit recovery and electives. Lucia was taking as many as six credits a semester, most of them on Odysseyware®, for her high school graduation on time, while others were taking one or two. Similarly, they utilized technology to take many different elective courses. Caitlin was taking electives on photography and graphic design whereas Keith was taking electives on game designing.

They also held positive attitudes toward the use of technology in their classroom. They were generally content with the learning opportunities provided at SWAHS, especially within the technology-integrated Triad model as the model provided them with time flexibility and content customization that are suitable to their learning goals and needs.

6.2.2.2. Dynamic. The participants used technology dynamically, essentially adapting to their own learning needs and goals. As Tapscott (2009) characterizes the digital natives, these participants also "loved" to "customize" and "personalize" the use of technology for their learning engagement. For instance, besides using technology for credit recovery, they also utilized technology as a compensatory tool to overcome learning and pacing shortcomings (e.g., Carlos) and as a learning management system to purse electives based on their digital aptitudes and abilities (e.g., Caitlin, Keith). Using the computer as a compensatory tool, Carlos, who often fell behind in his coursework, stayed afterschool in order to catch with the schoolwork. Using Odysseyware® at the school's Cybercafé, he was able to maintain his grade and course progress.

6.2.2.3. Multi-faceted. The participants' educational digital engagement had many aspects (multiple facets) that their engagement was subjective (e.g., using computers to meet individual learning needs and goals), progressive (e.g., they were taking advanced placement courses), and selective (e.g., Caitlin, Lucia, and Keith) based on their digital habits and interests. For instance, Caitlin, Lucia, and Keith were making choices of electives based on not only on their academic interests, but also their digital habits, interests, aptitudes, and abilities.

6.2.2.4. Mixed. Not all the participants proactively and dynamically used technology, especially in their learning. For instance, Carlos was usually frustrated with the use of computers and the Internet in his classrooms, whereas Lucia had enjoyed using them for harnessing "maximum" benefits for her credit recovery and online electives. Similarly, Caitlin and Keith used computers for pursuing advanced skills (e.g., photography, graphic design, and game programming), whereas Amelia used them simply as online dictionary and thesaurus to look up words and definitions of the words.

Furthermore, the participants' educational use of technology was very structured as it was made available through Odysseyware® course management system and the Triad model. Despite the pervasive use of computers and the Internet at SWAHS, the participants did not mention much about "high-level" use of technologies (Cuban, Kirkpatrick, & Peck, 2001) such as for critical thinking, problem solving, creativity, and collaboration (Jonassen, 2006). The participants used technology in simple and basic ways such as taking electives online, doing assignments (the final third component of the Triad model), and working for credit recovery.

6.2.3. The overlapping

There was an overlap between the participants' personal digital engagement (PDE) and educational digital engagement (EDE). Their digital habits, interests, and aptitudes functioned as the linking components between PDE and EDE. The overlapping occurred in terms of the participants' digital habits and interests almost "naturally" occurring in the classroom (e.g., texting and listening music during the class), taking electives to match their PDE (e.g., digital habits and aptitudes), and in some cases choosing their career goals. First, the participants, despite the school policy and teacher restrictions, constantly blurred the boundary between the personal and academic worlds when it came to using technology. For instance, they brought in their everyday habits of texting, listening to music, and visiting social networking sites while using computers to learn in the class, often without perceiving any boundaries between the personal and educational digital engagement.

Second, an overlap was seen on how the participants utilized their digital habits, interests, aptitudes, and abilities in choosing electives (e.g., Keith and Caitlin). Third, their PDE seemed to have a far-reaching overlap such that some of them had planned a career trajectory based on their digital habits (e.g., Keith aspired to become a video game designer/programmer). Thus, as the past studies have shown (e.g., Barron et al., 2007; Lee, & Brescia, & Sissinger, 2009), personal use and home access to technology have positive influence on how these participants generated and pursued their academic interests based on their prior technology knowledge and skills (e.g., gaming, photography, and taking online courses).

The overlapping had both types of roles – facilitative and obstructive. Their digital habits and aptitudes played a facilitative role for pursuing credit recovery online, selecting electives, and even choosing a career path. But their very same digital habits and aptitudes did not necessarily always play a positive role – an ambiguity, if not a contrary role, to the claim of the digital learners discourses (e.g., Nasah et al., 2010; Palfrey & Gasser, 2008; Tapscott, 2009)that their technology knowledge and skills successfully enable their learning activities (see Kennedy et al., 2010; Selwyn, 2009). For example, the students digital habits such as texting, listening to music, and accessing to social networking sites during the classroom learning played an obstructive role hindering the "flow" – "flow," a deep immersion, in her learning and with the learning environment (Csikszentmihalyi, 1990) – and attention of their learning engagement.

7. Conclusion & implications

The present study's findings showed that two types of digital engagement – PDE and EDE – overlapped with each other impacting in various ways about how digital learners interact, engage, and learn with technology blurring the boundary between home and school. This overlapping has some important implications for integrating technology into K-12 classrooms. The exploration and analysis of overlapping can be helpful for K-12 teachers (and also teacher educators) in understanding their students as digital learners, who belong to the generation of digital natives (Palfrey & Gasser, 2008; Prensky, 2001; Tapscott, 2009).

For teachers, it is important to realize and understand that digital learners have proclivity for blurring the boundary between PDE and EDE and these students believe that such boundary blurring actually help them stay focused in their study. For example, they utilize music listening to avoid classroom distractions (e.g., peer talks and noises) and focus on their task at hand. Furthermore, as this study has indicated, students' PDE (e.g., videogame playing and photography) can have profound and long-term impacts in learning and even in choosing a career path. Therefore, teachers can no longer afford to dismiss students' personal digital knowledge and skills. Rather, it will be "highly" beneficial if students' digital habits and skills are recognized, explored, and promoted in the classroom. This might result a better EDE, especially when many current high school students are simply bored or disengaged in their classrooms. But a cautionary note, it is imperative that teachers and schools align and integrate resources across students' learning ecologies (e.g., home and school) so that the lack of home access to technology (see, Carlos' case in this study) is addressed.

We recommend that teachers should be able to avoid overly enthusiastic or pessimistic viewpoints about the digital learners when integrating technology into teaching and learning. Being presumptuous about the adeptness of digital natives to harness technology for learning may not be effective unless teachers design the pedagogical models that foster meaningful learning engagement for students. Howland, Jonassen, and Marra (2012) state that meaningful learning engagement can be achieved through the activities that are intentional, active, constructive, cooperative, and authentic learning. But for meaningful learning engagement (e.g., active learning and collaboration using technology), teachers cannot be too unenthusiastic and limit students as basic technology users (e.g., for drill and practice), but they should allow students to utilize technology knowledge and skills they have.

Future studies should explore the quantitative and qualitative details and theoretical aspects of the overlapping between these two types of engagement, particularly focusing on how it facilitates or obstructs students' learning engagement. Potential inquiry questions could be, for instance: What if music listening is allowed inside the classroom? Does it hinder or increase learning and achievement? How and why students pursue technology based advanced placement courses such as videogame design and computer programming? Does their PDE play a major role? What if students are allowed for PDE such as "bring your own devices (BYOD)" in the classroom and utilize them for learning engagement? Does BYOD hinder or increase learning and achievement? We hope these are important questions to ask about the overlapping of PDE and EDE that might help us better develop and design technology-integrated pedagogical models while addressing the learning needs of currently emerging K-12 digital learners.

References

Attewell, P., & Battle, J. (1999). Home computers and school performance. *The Information Society, 15*, 1–10.
Barron, B. (2004). Learning ecologies for technological fluency: gender and experience differences. *Journal of Educational Computing Research, 31*(1), 1–36.
Barron, B., Martin, C. K., & Roberts, E. (2007). Sparking self-sustained learning: report on a design experiment to build technological fluency and bridge divides. *International Journal of Technology and Design Education, 17*(1), 75–105.
Bennett, S., Maton, K., & Kervin, L. (2008). The 'digital natives' debate: a critical review of the evidence. *British Journal of Educational Technology, 39*(5), 775–786.
Bennett, S., & Maton, K. (2010). Beyond the 'digital natives' debate: towards a more nuanced understanding of students' technology experiences. *Journal of Computer-assisted Learning, 26*, 321–331.
Brofenbrenner, U., & Evans, G. W. (2000). Developmental science in the 21st century: emerging questions, theoretical models, research designs, and empirical findings. *Social Development, 9*, 115–125.

Caruso, J. B., & Kvavik, R. (2005). *ECAR study of students and information technology 2005: Convenience, connection, control, and learning. EDUCAUSE*. Retrieved September 14, 2013 from http://www.educause.edu/library/resources/ecar-study-students-and-information-technology-2005-convenience-connection-control-and-learning.
Csikszentmihalyi, M. (1990). *Flow: The psychology qf optimal experience*. New York: Harper & Row.
Collins, A., & Halverson, R. (2009). *Rethinking education in the age of technology: The digital revolution and schooling in America*. New York: Teachers College Press.
Creswell, J. W. (2007). *Qualitative inquiry & research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: SAGE Publications.
Cuban, L. (2001). *Oversold and underused: Computers in the classroom*. Cambridge, MA: Harvard University Press.
Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: explaining an apparent paradox. *American Educational Research Journal, 38*(4), 813–834.
Denzin, N. K., & Lincoln, Y. S. (1998). Introduction: entering the field of qualitative research. In N. K. Denzin, & Y. S. Lincoln (Eds.), *Strategies of qualitative inquiry* (pp. 1–34). Thousand Oaks, CA: SAGE Publications.
Diaz, F. M. (2013). Mindfulness, attention, and flow during music listening: an empirical investigation. *Psychology of Music, January, 41*, 42–58.
Fairlie, R. W. (2012). The effects of home access to technology on computer skills: evidence from afield experiment. *Information Economic and Policy, 24*(3–4), 243–253.
Fish, A. M., Li, X., McCarrick, K., Butler, S. T., Stanton, B., Brumitt, G. A., et al. (2008). Early childhood computer experience and cognitive development among urban low-income preschoolers. *Journal of Educational Computing Research, 38*(1), 97–113.
Flick, U. (2009). *An introduction to qualitative research*. Thousand Oaks, CA: Sage.
Howland, J. L., Jonassen, D., & Marra, R. M. (2012). *Meaningful learning with technology* (4th ed.). Boston, MA: Allyn & Bacon.
Hull, G. A., & Nelson, M. E. (2005). Locating the semiotic power of multimodality. *Written Communication, 22*(2), 224–261.
Jonassen, D. H. (2006). *Modeling with technology: Mindtools for conceptual change* (3rd ed.). Columbus, OH: Merrill/Prentice Hall.
Kennedy, G., Judd, R., Dalgarnot, B., & Waycott, J. (2010). Beyond natives and immigrants: exploring types of net generation students. *Journal of Computer Assisted Learning, 26*, 332–343.
Kerawalla, L., & Crook, C. (2002). Children's computer use at home and at school: context and continuity. *British Educational Research Journal, 28*, 751–771.
Kerawalla, L., O'Connor, J., Underwood, J., duBoulay, B., Holmberg, J., Luckin, R., et al. (2007). Exploring the potential of the homework system and tablet PCs to support continuity of numeracy practices between home and primary school. *Educational Media International, 44*, 289–303.
Kong, S. C., & Kai, K. M. (2009). Collaboration between school and parents to foster information literacy: learning in the information society. *Computers & Education, 52*, 275–282.
Kulik, J. A. (2003). *Effects of using instructional technology in elementary and secondary schools: What controlled evaluation studies say*. Arlington, VA: SRI International.
Lai, K. W., Khaddage, F., & Knezek, G. (2013). Blending student technology experiences in formal and informal learning. *Journal of Computer Assisted Learning, 29*(5), 414–425.
Lee, S. M., Brescia, W., & Kissinger, D. (2009). Computer use and academic development in secondary schools. *Computers in the Schools, 26*, 224–235. http://dx.doi.org/10.1080/07380560903095204.
Livingstone, S. (2009). *Children and the Internet*. Cambridge: Polity.
Livingstone, S., & Helsper, E. (2007). Gradations in digital inclusion: children, young people and the digital divide. *New Media & Society, 9*, 671–696.
Luckin, R., Clark, W., Logan, K., Graber, R., Oliver, M., & Mee, A. (2009). Do Web 2.0 tools really open the door to learning: practices, perceptions and profiles of 11–16 year old learners. *Learning, Media and Technology, 34*(2), 87–104.
van Manen, M. (1990). *Researching lived experience: Human science for an action sensitive pedagogy*. New York: State University of New York.
Moustakas, C. (1994). *Phenomenological research methods*. Thousand Oaks, CA: Sage.
Nardi, B. A., & O'Day, V. L. (1999). *Information ecologies*. Cambridge, MA: The MIT press.
Nasah, A., DaCosta, B., Kinsell, C., & Seok, A. (2010). The digital literacy debate: an investigation of digital propensity and information and communication technology. *Education Technology Research and Redevelopment, 58*(5), 531–555.
National Educational Technology Plan. (2010). *Transforming American education learning: Powered by technology*. Washington, DC: National Educational Technology Plan.
Organization of Economic Cooperation and Development. (2011). *PISA 2009 Results: Students on Line: Digital Technologies and Performance* (Vol. VI). http://dx.doi.org/10.1787/9789264112995-en.
Oblinger, D. G., & Oblinger, J. L. (Eds.). (2005). *Educating the net generation*. Boulder, CO: EDUCAUSE.
Openheimer, T. (2004). *The flickering mind: The false promise of technology in the classroom and how learning can be saved*. New York: Random House.
Palfrey, J., & Gasser, U. (2008). *Born digital: Understanding the first generation of digital natives*. Philadelphia, PA: Basic Books.
Patton, M. (1990). *Qualitative evaluation and research methods*. Newbury Park, CA: Sage.
Pew Internet. (2013). *Teen and technology 2013*. Retrieved March 15, 2013 fromhttp://www.pewinternet.org/Reports/2013/Teens-and-Tech.aspx.
Prenksy, M. (2001). Digital natives, digital immigrants. *On the Horizon, 9*(5), 1–6.
Prensky, M. (2010). *Teaching digital natives: Partnering for real learning*. Thousand Oaks, CA: Corwin Press.
Poels, Y., Annema, J. H., Verstraete, M., Zaman, B., & DeGroof, D. (2012). Are you a gamer?:A qualitative study on the parameters for categorizing casual and hardcore gamers. *IADIS International Journal on WWW/Internet, 10*(1), 1–16.
Rogoff, B. (2003). *The cultural nature of human development*. New York: Oxford University Press.
Roschelle, J. M., Pea, R. D., Hoadley, C. M., Gordon, D. N., & Means, B. M. (2000). Changing how and what children learn in school with computer-based technologies. *Children and Computer Technology, 10*, 76–101.
Rowlands, I., Nicholas, D., Williams, P., Huntington, P., Fieldhouse, M., Gunter, B., et al. (2008). The Google generation: the information behavior of the researcher of the future. *Aslib Proceedings, 60*(4), 290–310.
Rutledge, D., Duran, J., & Carroll-Miranda, J. (2007). Three years of the New Mexico laptop learning initiative (NMLLI): stumbling toward innovation. *AACE Journal, 15*(4), 339–366.
Seidman, I. (1998). *Interviewing as qualitative research: A guide for researchers in education and the social sciences*. New York: Teachers College Press.
Selwyn, N. (2003). Doing IT for the kids: re-examining children, computers and the Information Society. *Media, Culture, & Society, 25*, 351–378.
Selwyn, N. (2009). The digital native – Myth and reality. *Aslib Proceedings: New Information Perspectives, 61*(4), 364–379.
Smith, M. R. (1994). Recourse of empire. In M. Smith, & L. Marx (Eds.), *Does technology drive history? The dilemma of technological determinism*. Cambridge, MA: MIT Press.
Tapscott, D. (2009). *Grown up digital: How the net generation is changing your world*. Toronto: McGraw-Hill.
Wells, J., Lewis, L., & Greene, B. (2006). *Internet access in U.S. public schools and classrooms: 1994–2005*. Washington, DC: National Center for Educational Statistics.