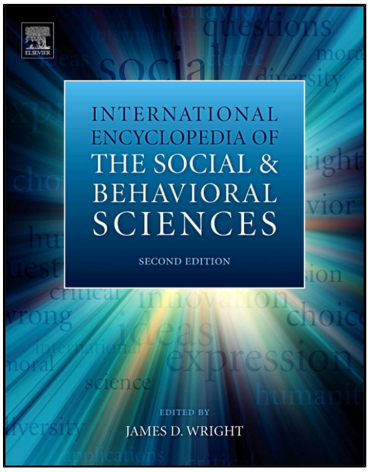

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Sociodigital Revolution: Digital Natives vs Digital Immigrants

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Abstract

The purpose of this article is to review what engages *digital natives*, i.e., children and adolescents who have, from the beginning of their lives, been socialized to use sociodigital technologies. Surveying the research literature, we present findings as to what pursuits digital natives find interesting, motivating, and involving in both informal and formal learning environments drawing upon motivation theories of flow and engagement. Our conclusion, in this article, is that adolescents' ways of engaging in using digital technologies are heterogeneous; a minority of young persons has access to parental or peer support and facilitation that engagement in creative use of digital technologies together with their own motivation and efforts may require. Although sociodigital technologies facilitate creating and maintaining extended networks, cultivating technological fluency, and participating in passionate interest communities and networks, there are worrisome trends; these include 'addictive' use of technology, fragmented processing of information, and 'digital divides' between creative and educational use of sociodigital technologies.

Introduction

The purpose of this article is to review the pursuits that engage digital natives intellectually, emotionally, and socially (Prensky, 2001, 2012; Palfrey and Gasser, 2011). *Digital natives* are adolescents who have from the very beginning of their lives been socialized to intensive use of sociodigital technologies (i.e., integrated systems of technological tools, social media, and global information networks that support collaborative creation and sharing of activities, media, and knowledge). Prensky (2001) claimed that there is a profound discontinuity between engagement of the young people who have been immersed in sociodigital technologies from very early in their lives and the so-called *digital immigrants*, for instance, their parents and teachers, who have learned to use digital technologies in adulthood, if at all. At the age of 20, many Western adolescents have accumulated 10 000 h of computer or game console use, 10 000 h of mobile use and exchanges, and 200 000 received and sent e-mails and instant messages (Prensky, 2012: 78). Presumably because of extended socialization to use of sociodigital technologies, there appears to be a special relation between young people and various digital technologies that differentiates them from the older generations. Accordingly, adolescents are often very comfortable with various sociodigital tools and applications and able to fluently learn novel applications. They are thought to be used to more extensive multitasking and to be more effective in task switching than their parents and teachers while handling the intensive digital information and media flow (Palfrey and Gasser, 2011; Prensky, 2001). This possible generational gap should, however, be studied properly in controlled experimental setups. In any case, whenever young people have a problem, they seek help via the Internet whereas older participants still more often consult books and go to libraries. Rather than relying on traditional physical books and handwriting, digital adolescents constantly process virtual information on the screen. Being online is an integrated part of their daily life and they do not appear to experience a similar difference between online and off-line realities than older generations do (Ito et al., 2010). Further, at least a half of the young people are estimated to have taken part in such creative processes as creating media content and one-third of them have shared some personally produced content through the Internet (Jenkins et al., 2009; Lenhart and Madden, 2005).

According to Thomas (2011: 4), the discourse on digital natives typically involves three interrelated assumptions: Digital natives constitute a largely homogeneous generation and speak a different language vis-à-vis digital technologies from that of their parents, the digital immigrants; they learn differently from preceding generations of students; and they demand new ways of teaching and learning regarding technology. A number of investigators, however, have questioned one or more of these assumptions; indeed, the whole notion of digital natives has been said to be problematic; some have argued that the digital competencies of the young generations have been seriously misjudged (see e.g., Bennett et al., 2008). Most young people use sociodigital technologies only for everyday recreational purposes and do not have any of the claimed sophisticated competencies of alleged 'digital natives.' In many cases, differences between young people's digital competencies appear to be larger than differences between the younger and older generations (Jenkins et al., 2009; creative participation gap). There are considerably many representatives of older generations who have acquired high-level digital competencies (Bennett et al., 2008). Moreover, many educational researchers (see e.g., Jenkins et al., 2009) are more concerned about the differences among the digital natives and the underlying individual and contextual factors behind them. It is arguable that, so far, the discourse of digital natives has not been grounded on well-established empirical evidence (Bennett et al., 2008);

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instead, one sees numerous problematic claims that have not been empirically verified.

We argue that the concept of the *digital native*, although controversial, is a useful working hypothesis for addressing the profound impact of sociodigital engagement on intellectual and socioemotional activities of young people. The evolutionary significance of the extended human childhood and adolescence is in allowing new generations of humans to adapt to a radically different environment from that of the older generations (Wexler, 2006). The earlier and the more intensively one adapts to the cognitive, social, and cultural 'prostheses' (Clark, 2003; Donald, 1991; Ritella and Hakkarainen, 2012) provided by the use of continuously present sociodigital technology, the stronger their impact on a young person's intellectual, emotional, behavioral, and social engagement is likely to be. To acknowledge developmental effects, we do not have to assume that adolescents' engagement in using sociodigital technologies is uniform; our approach is to examine, with a person-oriented approach, how various populations of youth use sociodigital technology and their associated motivations. Although the concept of the digital native is in many ways problematic, it may be taken as a provisional tool for addressing various issues that appear relevant to understanding adolescents' learning and engagement.

The purpose of this article is to review the literature concerning digital natives' engagement in their chosen pursuits, within the framework of theories of flow (Csikszentmihalyi, 1996; see chapter by Nakamura & Dubin) and academic emotions (see chapter by Pekrun; also Inkinen et al., 2014). In the first section we present findings on adolescents' engagement in using sociodigital technologies to 'hang out' with their friends. The second section focuses on findings concerning adolescent's engagement in using sociodigital technologies to pursue their interests. Section three compares the digital divides between adolescents who engage only in shallow use of sociodigital technologies and those who have access to instruments, practices, and support that creative engagement in using digital technologies requires. Finally, we will address limitations of our current understanding of digital natives as well as outline fruitful lines of deepening inquiry in the area.

How Hanging Out with Peers Engages Adolescents

Rather than assuming uniform generational differences, investigators would do well to examine patterns of engagement of various populations of adolescents in using sociodigital technologies (Helsper and Enyon, 2011; Palfrey and Gasser, 2011); we maintain that a person-oriented approach (Laursen and Hoff, 2006) is fruitful. Ito et al. (2010) carried out a year-long ethnographic investigation of digital youth's engagement in using sociodigital technologies, distinguishing three levels of engaging in technology-mediated activity, i.e., (1) friendship-driven use of sociodigital technologies for 'hanging out' with peers, (2) interest-driven 'messing around' with technology and media that is oriented toward developing associated skills and competencies, and (3) 'geeking out' for seriously cultivating expertise related to digital technologies or creative working with media. The proposed notion of adolescents being driven by either friendship- or interest-related aspects resonates strongly with the results of recent studies (Eynon and Malmberg, 2011; Kennedy et al., 2010) that have addressed the variation in adolescents' sociodigital activities. These investigations, despite some diversity in the methods used in them, share the key finding that the largest group of adolescents engages mostly in friendship-driven activities, and only a small minority participates frequently in more demanding, interest-driven activities.

More than 90% of adolescents in the Western countries have access to the Internet and recent study showed that 63% of them use sociodigital technologies once or several times a day for connecting with their friends and family members (Madden et al., 2013). They use mobile devices and social media applications to constantly keep up networking connections with their friends and to strengthen their face-to-face relations and sense of belonging with their peers (Ito et al., 2010). Three-quarters of adolescents are mobile Internet users in terms of using smart phones, tablets, or other mobile devices (Lenhart et al., 2010; Madden et al., 2013). This allows active participants to be in continuous connection with their friends through constant instant messaging, and lurking and commenting on friends' activities within social media. Virtual communication allows them to be together even when separated from one another temporally (e.g., evenings) or spatially (e.g., being out of their neighborhood when visiting relatives). Besides lurking and updating one's own status the friendship-driven activities rely on giving constant feedback (e.g., 'likes') to each other's updates and expecting social recognition in return. Sociodigital networks constitute an essential aspect of the social operating system of adolescents (Rainie and Wellman, 2012) determining the modality of connection, the nature of information exchanged, ways of collaborating, and so on. A decade ago, only a quarter of Finnish upper elementary school students reported using computers daily (Hakkarainen et al., 2000). Currently, many adolescents report having digital contact with their friends several times a day or having a continuous connection (e.g., 61.2% of elementary school sixth graders report *chatting* at least daily (36.6% several times a day or 'all the time') and 48.8% report using *social media services* at least daily (23.8% several times a day or 'all the time')). (The situation of young people's practices of using sociodigital technologies is rapidly changing. The numbers presented in this paragraph rely on data collected in 2013 from Finnish sixth grades across 33 schools of Helsinki, Finland.)

Beyond the intensity of keeping up networking contacts, the nature of adolescents' social networks is also changing (Gee and Hayes, 2011; Ito et al., 2010; Rainie and Wellman, 2012). Various applications of social media presently allow young people to keep up more extended and far-reaching networks than used to be the case. Adolescents who move from one school, neighborhood, city, or country to another, are able to keep up their friendship relations to an extent that was not possible before. Many adolescents have a very extensive network of 'friends' (these are connected persons, including acquaintances; according to Facebook 2012 statistics, an average Facebook user has 130 Facebook 'friends'; according to Madden et al. (2013) teens have an average of 300 'friends'). Currently, however, young people appear to be

moving from just building huge networks of designated 'friends' toward maintaining their social networks and web privacy in a new way and separating their public networks from their private (e.g., Madden et al., 2013). Some say this is due to the increasing presence of adults and family members in e.g., Facebook and the related difficulties of controlling their privacy.

Being in a constant networking connection is likely to make socioemotional regulation of activity become socially distributed. Many aspects of adolescents' lives are being collectivized by moving to the virtual network, including creation, keeping up, and breaking intimate relations (Ito et al., 2010). Young people often meet their intimate partners through the 'net' and publish their relationship status in social media. Beyond the sharing of positive emotions with peers, also negative emotions and frustration may spread through social networking connections. Simultaneously with providing a sense of relatedness, social media could make a young person to become obsessed with self-presentation in social media, compulsively following status updates of his or her contacts and managing impressions (Nadkarni and Hofmann, 2012). If participation in the virtual world replaces building of social relations and limits interpersonal encounters and interaction, it may lead to reduced well-being, disengagement, increased anxiety, and depression. The emergence of social media has made it clear that rather than leading to social isolation, intensive use of sociodigital technologies is usually embedded in a rich network of both online and off-line social interaction (Rainie and Wellman, 2012). The sociodigital technologies are, however, transforming so quickly that no one has clear understanding of the psychosocial impact and consequences of adolescents' engagement.

Interest-Driven Engagement with Sociodigital Technologies

When adolescents use sociodigital technologies to pursue their interests, they are 'messing around' or 'geeking out' with technology (Ito et al., 2010). The former is motivated by sharing interests, whereas the latter one involves enhancing competence and cultivating expertise; this has made some investigators enthusiastic about the positive impact of sociodigital technologies on adolescents' learning and development (Barron, 2006; Gee and Hayes, 2011; Ritella and Hakkarainen, 2012). Adolescents who become engaged in technology-mediated activities often start experimenting, with various technological tools and applications relevant to their interests. This 'messing around' represents, in turn, a transition zone between friendship-driven 'hanging out' and interest-driven 'geeking out' (Ito et al., 2010). It involves intensive engagement with digital technologies for sharing interests related to sociodigital technologies, for example, playing computer games or sharing and producing media. Different levels of digital participation may be distinguished, ranging from mere observation and follow-up to personal participation in creating and building media (Gee and Hayes, 2011; Ito et al., 2010; Jenkins et al., 2009).

Some adolescent are 'geeking out' (Ito et al., 2010) in terms of diving very deep into the sociodigital world and becoming experts in using sociodigital technologies, often being highly regarded among adolescents (Hakkarainen et al., 2000). They have appropriated sociodigital tools that allow, for example, modifying, remixing, and mashing up artifacts created by selecting, cutting, enhancing, filtering, and transforming media elements (Gee and Hayes, 2011; Ito et al., 2010); this requires new far-reaching network connections with persons who share the same interest. 'Geeking out' may thus involve a trajectory of actively cultivating technological competencies (Gee and Hayes, 2011), for instance, in terms of creating media objects (videos, pictures, music), modifying virtual environments ('modding' game environments), programming (creating new applications), or constructing technological systems (building robots).

Expert knowledge is now accessible to Internet users to an unforeseen extent, without requiring formal credentials (Gee and Hayes, 2011; Rheingold, 2012). Many adolescents cultivate their expertise by meeting more competent peers as well as with adult experts interested in similar issues on the Internet (Shirky, 2010; Rheingold, 2012). They may start functioning as 'passionate interest groups' (Gee and Hayes, 2011) with like-minded participants sharing knowledge and competence. Such learning is likely to emerge when adolescents "organize themselves in the real word and/or via Internet (or a virtual world) to learn something connected to a shared endeavor, interest, or passion" (Gee and Hayes, 2011: 69). Although everybody is allowed to participate in creating, building, and advancing the shared interest, more shallow participation is also acceptable. Social recognition of participants' accomplishments is determined by the depth of their participation rather than directly reflective of their age or social position. Interest groups have similar kinds of tensions as do other human communities, such as social conflicts, occasional 'flaming,' or 'hazing' of newcomers (Gee and Hayes, 2011: 71).

Although 'geeking out' involves positive developmental possibilities, there are also dangers involved. Middle adolescence is argued to be a period of especially heightened vulnerability to risky behavior (Steinberg) because sensation-seeking is high and self-regulation functions are still immature. In some cases, passions related to use of sociodigital technologies are harmonious in nature (Vallerand et al., 2007) in terms of being well-integrated with other life activities and corresponding to the participants' core values and self-concepts. Observations indicate, however, that many adolescents use sociodigital technologies excessively, find it hard to interrupt their activity, and pursue technology use until late in the night. When passions become obsessive in nature, the participants have a hard time controlling them and there emerge various conflicts with neglected areas of personal, social, and educational activities. In some cases, constant use of the sociodigital technologies becomes deleterious and leads to weakening of real-world networking relations, and, thereby, may hinder psychosocial development (Reich et al., 2012; Smahel et al., 2012). Engagement in using sociodigital technologies appears, consequently, to be a double-edged sword because of the benefit and possible harms of high-intensity participation.

Digital Divide: Creative Participation Gap

The above examination indicated that adolescents' engagement in using sociodigital technologies is likely to be extremely heterogeneous. Most adolescents use digital technologies for entertainment, consuming media, and other shallow purposes rather than engage in building their digital skills, creatively working with media, or adapting sociodigital technologies to support academic pursuits (Bennett et al., 2008; Eynon and Malmberg, 2011; Kennedy et al., 2010). Investigators, moreover, have expressed concerns about an emerging *Creative Participation Gap* (Jenkins et al., 2009), i.e., the unequal access to learning opportunities and formative experiences of mastering creative use sociodigital technologies; this is caused, for example, by social class, gender, or socioeconomic hardship. Adolescents coming from advantaged and disadvantaged homes have unequal opportunities of participating in sophisticated and creative use of sociodigital technologies. Because of socioeconomic and cultural factors, adolescents coming from less privileged families tend to have weaker possibilities for accessing sophisticated sociodigital technologies (programmable computers and relevant applications beyond mere game consoles) that would allow them to go beyond recreational use of sociodigital technologies and creatively engage with them (Ito et al., 2010; Eynon and Malmberg, 2011). Because of cultural stereotypes, the development of sophisticated skills of using sociodigital technologies is likely to be facilitated in the cases of male rather than female adolescents (Barron, 2004).

Adolescents need role models and concrete support for starting to use sociodigital technologies for creative purposes; in this regard, their parents are likely to have a very crucial role. Many adolescents do not have encouragement and parental guidance needed for taking part in pursuing challenging technology-mediated interests (Barron, 2004; Jenkins et al., 2009; Palfrey and Gasser, 2011). Simultaneously, however, an adolescent's own interests, motivation, and sustained efforts play a crucial role affecting the level and impact of parental support. Adolescents who are 'geeking' out may receive their initial inspiration from home, school, or the Internet and, subsequently, distribute their learning across many fields of activity (Barron, 2006). Participants may start sharing their interests or passions with their peers, join Internet-based interest groups, cultivate their interest in entrepreneurial activities (including summer jobs and internships), or utilize Internet-based information sources and network communities. In order to start cultivating sophisticated digital competencies, an adolescent needs to have someone who recognizes his or her interests, and spurs the development of his or her capabilities, in interaction with the adolescent's own agency and effort. From a developmental perspective, social recognition of one's human strengths and contributions to shared efforts is vital (Kindermann, 2007, Larson et al., 2004); digital environments are often very generous in socially recognizing one's achievements and efforts (Shirky, 2010). A special advantage of sociodigital technologies is that passive observation may more or less quickly phase-transform to active engagement in sharing one's experiences and contributions.

An essential aspect of the digital divide is the extent to which sociodigital technologies are used to support academic studies. Although young people may themselves be able to engage in using computers and the Internet to support their social activity, they are much more dependent on parental and teacher guidance when using sociodigital technologies to facilitate academic learning. Heikkilä and Lonka (2006) showed that even many first-year university students appear to have difficulties in self-regulatory skills. They are anxious about not being capable of systematic learning across subject domains beyond their immediate interests. It is crucial to learn to productive use Internet-based knowledge resources as well as various productivity tools, such as text processing, image processing, and presentation software as personal instruments for pursuing various aspects of academic studies. Educational use of sociodigital technologies is still concentrated among students coming from socioeconomically well-to-do families and families with good academic background. Systematic educational support is needed because students coming from disadvantaged homes are not likely to spontaneously cultivate associated skills and competencies.

The investigation of Laursen et al. (2010) indicates that it matters with whom one is 'hanging out.' 'Hanging out' with adolescents oriented toward school and academic activity can provide a protective belt, especially in the case of females, whereas hanging out with adolescents engaged in problem behaviors, such as drinking, is a risk (Kiuru et al., 2009). Networks may lead to either a positive (orientation toward school and academic development) or a negative (exclusion and reification from school) trajectory. Learning is facilitated by hanging out with other adolescents oriented toward studying; this is likely to reduce negative effects of risk behavior. More or less continuous real-time presence of peers when encountering challenges and frustration may make the adolescents overdependent on their peers' support. Adolescents' need, however, to have an ability to invest sustained intellectual efforts in pursuing their school studies, in spite of being temporarily isolated from their peers (Csikszentmihalyi et al., 1996).

Discussion

This article has presented evidence from research literature which indicates that adolescents' ways of using sociodigital technologies are very heterogeneous; although most Western adolescents intensively use sociodigital technologies, only some of them are adept technology users. Thus, we researchers should focus on studying *what* the engagements are of specific subgroups of digital natives rather than consider them as a homogeneous generational population. Social media have affected most strongly the second-generation digital natives born in 1995 or later; these cohorts of adolescents appear to use sociodigital technologies more intensively than earlier ones. Findings of Ito et al. (2010) indicate that most adolescents use sociodigital technologies for friendship-driven practices of 'hanging out,' in terms of being in a constant connection with their extended network of friends by using phone calls, instant messages, text

messages, and social networking services. Such hyperintensive interaction makes social networks a part of adolescents' social operating system (Rainie and Wellman, 2012) and enables them to coregulate their motivation an unforeseen extent. The sociodigital technologies provide affordances for sharing engagement and frustrations and appear to offer significant support to adolescents' activity and development. Adolescents who are 'hanging out' with peers oriented toward school and solving age-relevant developmental challenges have an advantage over those spending time with peers who exhibit various problem behaviors. Although social sharing of one's socioemotional experiences may be developmentally beneficial, adolescents also have to be able to show a certain level of emotional independence that concentrated academic efforts call for (Csikszentmihalyi et al., 1996).

We started this article by discussing the discontinuity between digital natives and digital immigrants, highlighting the distinctive orientation of the young generation to socially share their engagement. Digital adolescents appear to be motivated by activities that provide experiences of autonomy, a sense of competence, and a sense of belonging similar to those that previous adolescents have found outside of digital contexts (Deci and Ryan, 2004). A great deal of present-day creative activity takes place through the Internet, which allows peers to peripherally observe others' activities, to comment on and discuss them as well as to obtain social recognition. Such activity relies on an extended social network and provides multiple possibilities for engaging in more serious 'messing around' with sociodigital technologies, for instance, in making, sharing, and remixing media. Even if only a small percentage of adolescents take very active part in creative activities facilitated by sociodigital technologies, the sociodigital technologies provide affordances for persons to engage in such activities with a very low threshold of effort. Although sociodigital technologies provide all adolescents possibilities to pursue their interests, they are dependent on support of parents, teachers, and other adults (Barron, 2006). Adolescents coming from disadvantaged homes may not have access to sophisticated technology and parental facilitation of creative activity and guidance for learning how to use sociodigital technologies to support school work (Jenkins et al., 2009).

In spite of the radical transformation of adolescents' personal, social, and cultural environments by the sociodigital revolution, there is a lack of systematic longitudinal studies concerning the impact of sociodigital technologies on motivation, learning, and development. In order to overcome such limitations, the present authors' *Mind the Gap* project (www.wiredminds.fi) integrates research on educational psychology, developmental science, technology-mediated learning, and neuroscience to investigate the development of minds of digital natives at multiple levels (personal, family, peer, school class, school, neighborhood). It is possible that the digital natives' extensive technology use, including demands for multitasking and frequent task switching, improves their executive cognitive skills and the related brain functions (cf Patel et al., 2013). However, this issue has not yet been properly studied. In future studies, controlled experimental setups and evolved brain imaging techniques, such as functional magnetic resonance imaging are needed. These studies should be done urgently because it will be soon difficult to find participants for control groups who have still not had extensive exposure to sociodigital technologies.

See also: Computer Games and Academic Achievement; Computer Mediated Communication; Internet and Culture; Internet and Privacy; Internet and Social Media: Anthropological Aspects; New Media and the Digital Divide; Oversharing: The Eclipse of Privacy in the Internet Age; Sexuality and the Internet; Social Media; Teens, Gender, and Self-Presentation in Social Media.

Bibliography

Barron, B., 2004. Learning ecologies for technological fluency: gender and experience differences. Journal of Educational Computing Research 31, 1–36.

Barron, B., 2006. Interest and self-sustained learning as catalyst of development: a learning ecology perspective. Human Development 49, 193–224.

Bennett, S., Maton, K., Kervin, L., 2008. The 'digital natives' debate: a critical review of the evidence. British Journal of Educational Technology 39, 775–786.

Clark, A., 2003. Natural-Born Cyborgs: Minds, Technologies, and the Future of Human Intelligence. Oxford University Press, Oxford.

Csikszentmihalyi, M., 1996. Creativity: Flow and the Psychology of Discovery and Invention. HarperCollins, New York.

Csikszentmihalyi, M., Rathunde, K., Whalen, S., 1996. Talented Teenagers: The Roots of Success and Failure. Cambridge University Press, Cambridge, MA.

Deci, E.L., Ryan, R.M., 2004. Handbook of Self-determination Research. The University of Rochester Press, Rochester, NY.

Donald, M., 1991. Origins of the Modern Mind. Harvard University Press, Cambridge, MA.

Eynon, R., Malmberg, L., 2011. A typology of young people's internet use: implications for education. Computers and Education 56, 585–595.

Gee, J.P., Hayes, E.R., 2011. Language and Learning in the Digital Age. Routledge, London.

Hakkarainen, K., Ilomäki, L., Lipponen, L., Muukkonen, H., Rahikainen, M., Tuominen, T., Lakkala, M., Lehtinen, E., 2000. Students' skills and practices of using ICT: results of a national assessment in Finland. Computers & Education 34, 103–117.

Heikkilä, A., Lonka, K., 2006. Studying in higher education: students' approaches to learning, self-regulation, and cognitive strategies. Studies in Higher Education 31, 99–117.

Helsper, E., Enyon, R., 2011. Digital natives: where is the evidence? British Educational Research Journal 36, 503–520.

Inkinen, M., Lonka, K., Hakkarainen K., Muukkonen, H., Litmanen, T., Salmela-Aro, K., 2014. The interface between core affects and the challenge-skill relationship. Journal of Happiness Studies. doi:10.1007/s10902-013-9455-6, 15, 891-913.

Ito, M., Baumer, S., Bittandi, M., Boud, D., Cody, R., et al., 2010. Hanging Out, Messing Around, and Geeking Out. The MIT Press, Cambridge, MA.

Jenkins, H., Clinton, K., Purushotma, R., Robison, A., Wiegel, M., 2009. Confronting the Challenges of Participatory Culture: Media Education for 21st Century. MacArthur Foundation. Retrieved 28.08.12 from www.newmedialiteracies.org/files/working/NMLWhitePaper.pdf.

Kennedy, G., Judd, T., Dalgarno, B., Waycott, J., 2010. Beyond natives and immigrants: exploring types of net generation students. Journal of Computer Assisted Learning 26, 332–343.

Kindermann, T.A., 2007. Effects of naturally-existing peer groups on changes in academic engagement in a cohort of sixth graders. Child Development 78, 1186–1203.

Kiuru, N., Nurmi, J.-E., Aunola, K., Salmela-Aro, K., 2009. Peer group homogeneity in adolescents' school adjustment varies according to peer group type and gender. International Journal of Behavioral Development 33, 65–76. http://dx.doi.org/10.1177/0165025408098014.

Larson, R., Eccles, J., Gootman, J.A., 2004. Features of positive developmental setting. The Prevention Researchers 11, 8–13.

Laursen, B.P., Hoff, E., 2006. Person-oriented and variable-oriented approaches to longitudinal data. Merrill-Palmer Quarterly 52, 377–389.

Laursen, B., Bukowski, W.M., Nurmi, J.-E., Marion, D., Salmela-Aro, K., Kiuru, N., 2010. Opposites detract: middle school peer group antipathies. Journal of Experimental Child Psychology 106, 240–256.

Lenhart, A., Madden, M., November 2, 2005. Teen Content Creators and Consumers. Pew Internet & American Life Project, Washington DC. Available online at: http://www.pewInternet.org/PPF/r/166/report_display.asp.

Lenhart, A., Purcell, K., Smith, A., Zickuhr, K., 2010. Social Media and Mobile Internet Use among Teens and Young Adults. Pew Internet & American Life Project. Available at: http://web.pewinternet.org/~/media/Files/Reports/2010/PIP_Social_Media_and_Young_Adults_Report_Final_with_toplines.pdf.

Madden, M., Lenhart, A., Cortesi, S., Gasser, U., Duggan, M., Smith, A., Beaton, M., 2013. Teens, Social Media, and Privacy. Pew Internet and American Life Project Report. Available at: http://www.pewinternet.org/~/media/Files/Reports/2013/PIP_TeensSocialMediaandPrivacy_ FINAL.pdf.

Nadkarni, A., Hofmann, S.G., 2012. Why do people use Facebook? Personality and Individual Differences 52, 243–249.

Palfrey, J., Gasser, U., 2011. Reclaiming an awkward term: what we might learn from "digital natives". In: Thomas, M. (Ed.), Deconstructing Digital Natives. Routledge, London, UK, pp. 186–204.

Patel, R., Spreng, R.N., Turner, G.R., 2013. Functional brain changes following cognitive and motor skills training: a quantitative meta-analysis. Neurorehabilitation and Neural Repair 27, 187–199.

Prensky, M., 2001. Digital natives, digital immigrants. On the New Horizon 9 (5), 1–6.

Prensky, M., 2012. From Digital Natives to Digital Wisdom: Hopeful Essays from 21st Century Learning. Sage (Corwin), Thousand Oaks, CA.

Rainie, L., Wellman, B., 2012. Networked: The New Social Operating System. The MIT Press, Cambridge, MA.

Reich, S.M., Subrahmayan, K., Espinosa, G., 2012. Friending, iming, and hanging out face-to-face: Overlap in adolescents' online and offline social networks. Developmental Psychology 48, 356–368.

Rheingold, H., 2012. Net Smart. The MIT Press, Cambridge, MA.

Ritella, G., Hakkarainen, K., 2012. Instrument genesis in technology mediated learning. International Journal of Computer-Supported Collaborative Learning 7, 239–258.

Shirky, C., 2010. Cognitive Surplus. Penguin, New York, NY.

Smahel, D., Brown, B.B., Blinka, L., 2012. Associations between online friendship and Internet addiction among adolescents and emerging adults. Developmental Psychology 48, 381–388.

Thomas, M., 2011. Technology, education, and the discourse of digital natives. In: Thomas, M. (Ed.), Deconstructing Digital Natives. Routledge, London, UK, pp. 1–11.

Vallerand, R.J., Salvy, S.-J., Mageau, G.A., Elliot, A.J., Denis, P.L., Grouzet, F.M., Blanchard, C., 2007. On the role of passion in performance. Journal of Personality 75, 505–533.

Wexler, B., 2006. Brain and Culture. The MIT Press, Cambridge: MA.