



technology, children, schools and families

Blurring the boundaries: connectivity, convergence and communication in the new media ecology

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Introduction

Over the past decade the introduction of networked and digital media has dramatically altered the media ecologies of young people. In North America, Western Europe and East Asia, mobile phones, instant messaging, social network sites and other media now constitute part of the everyday landscape of youth. Even in the developing world the availability of mobile phones, telecentres, internet cafes and a variety of programs designed to facilitate access to a variety of new media and technologies have dramatically altered the media ecologies of youth in a variety of contexts (see OLPC; Castells, 2006; Horst and Miller, 2006; Pertierra et al, 2004; Librero, 2006). While the infrastructures of access and broader societal structures of inequality, such as class, income, gender and other power differentials, continue to shape the possibilities and parameters of participation in the new media ecology, there remains clear evidence that the availability of new and other new media has started to dramatically influence the ways in which young people view, understand, access, share and create knowledge.

While young people's media ecologies have been rapidly changing, sociocultural learning theorists began to explore the ways in which informal learning, or learning outside of the context of the classroom, may help to shed light upon possible new strategies to inspire learning and engagement (see Buckingham, 2008; Cole, 1997; Goldman, 2005; Hull and Schultz, 2002; Lave, 1988; Lave and Wenger, 1991; Mahiri, 2004; Rogoff, 2003). As Eric Klopfer (2008, p7) recently noted in his preface to *Augmented Learning*, the attention to out-of-school contexts and "The synthesis of the constructivist and situated learning paradigms lead us to ... [the examination of] activities that are inherently social, authentic and meaningful, connected to the real world, open-ended so they contain multiple path-ways, intrinsically motivating, and filled with feedback." In this contribution to the Beyond Current Horizon initiative, I consider the implications of digital and networked media in out-of-school settings for conceptualizing models of learning and engagement. Focusing upon the mobile and personalized nature of mobile devices and the mobile learning spaces that digital and networked media enable, I examine how innovations in connectivity, communication, collaboration and convergence create new possibilities for the future of learning and education in the 21st century.

Keywords: new media, mobility, connectivity, collaboration, media, technology, society, inequality

Connectivity and Communication in the New Media Ecology

One of the fundamental questions in the era of the digital age revolves around the extent to which new media and technology contributes to increasing connectedness, or to the atomization of society. New media and technology are used to enhance the level and degree of communication, leading individuals to communicate in an increasing number of ways and with greater frequency using new mediums that enable communication across time and space (Horst and Miller, 2005; Ling, 2008; Matsuda, 2005; Miller and Slater, 2000). Only a few decades ago communication primarily occurred through letters, telegrams and phone calls which connected people located in fixed spaces and geographic locations, such as private, domestic homes (Fischer, 1992). As has been chronicled in the foundational literature on the mobile phone (Katz and Aakhus, 2002; Baron, 2008; Goggin, 2006; Horst and Miller, 2006; Ito, Okabe, and Matsuda, 2005; Katz, 2006; Ling, 2004, 2008; Matsuda, 2005; Miyaki, 2005), recent advances in technology – from the reduction in cost of mobile devices and the development of text messaging, or Short Messaging Services (SMS) to the creation of portable laptops and mobile phones, have drastically transformed the possibilities of interpersonal communication (Brown, Green and Harper, 2001).

The practice of staying in “perpetual contact”, in the words of mobile communication scholars James Katz and Mark Aakhus (2003), can take place as people move through geographical space. Alongside mobile phones (Ling, 2004, pp83-121; Weilenmann and Larsson, 2001; Ito et al, 2005; Kasesniemi and Rautiainen, 2002; Taylor and Harper, 2003; Fortunati, 2002; Fortunati, Katz et al, 2003; Ling and Yuri, 2002; Schejter and Cohen, 2002; Green, 2001; Ito, 2005, Ling, 1998), youth have been particularly attracted to social network sites given the capacity to “hang out” with their friends in spaces which are largely (though not exclusively) outside the purview of adults and parents (Horst, Herr-Stephenson and Robinson, forthcoming). The emergence of ‘social network sites’, or websites and software structured to maximize the possibility and (through use) frequency of connections between classmates, friends, family and others, has altered the ways youth interact and develop relationships (boyd, forthcoming; Pascoe, forthcoming; boyd and Ellison, 2007). Although the connections and interactions between participants varies qualitatively with particular websites, interests and activities, it is clear that a broad spectrum of kids and adults now participate in creating and maintaining a range of connections using these sites that bridge their offline and online contexts.

The continual drive to hang out, or to be “Always On” (Barron 2008) or “link up” (Horst and Miller, 2005), occurs when young people are separated as well as when they are together. Even when teenagers and kids are hanging out in a face-to-face group, many feel the need to stay connected to other teens who are not co-present. Ling (2004) demonstrates the use of new media for micro-coordination and suggests that the constant connectivity that comes with networked media has produced flexibility in schedules which enable people to coordinate and re-adjust, what Ling terms ‘iterative coordination’ (2004, pp70-76). Teens may focus upon playing games, making videos, and listening to music together when they are hanging out; however, networked and digital media may also fade into the background as young people focus upon staying connected. Just as a range of new media have been integrated into teens’ relationships with their peers, families also use new media to stay connected to each other as they move between different contexts – homes, school, afterschool programs, community involvement and friends. In my research in Silicon Valley, California (Horst, forthcoming), parents used online calendars and email to coordinate their children’s after

school and extracurricular schedules (see also English-Lueck, 2007; Horst, forthcoming). Others have revealed the ways in which parents use mobile phones to maintain communication, and monitor and control the movement of their children outside of the home and the institutionalized context of the school (see Lemish and Cohen, 2005; Ling, 2008, 2004; Matsuda, 2006). Whilst these communication practices are tied to broader anxieties about young people's burgeoning sense of autonomy and, from a youth perspective, need for privacy (at least in Western contexts), these practices also signal the ability of new media and technologies to bridge the multiple contexts of kids' everyday lives in ways that differ from previous generations.

Alongside transformations in the quantity and quality of interactions between young people, their peers and parents, for many young people today the connectivity and portability of networked and digital media are tied to broader trends in the changing structures of sociability. From the notion of the "network society" (Castells, 2000; Castells et al, 2006) to the emergence of new social norms, or rituals, for governing interaction in and through new media (Ling, 2008), it is clear that that the increased connectivity and communication among young people and others presents tremendous possibilities. In contexts like the United Kingdom and the United States, it is common to lament young people's lack of participation in formal politics. Yet, throughout the world, we see reports of kids using social network sites to circulate information, upload images and send messages to their friends. We also see new norms of socialization emerging around participation in these sites, with sites such as Twitter and Flickr. These emergent norms and practices tied to coordination, connectivity and constant communication make it clear that engagement and participation is occurring in and through new media. How might different notions of participation – what is public and private, the relationship between membership and citizenship in various forms of community as well as the practice of being networked and 'always on' in everyday life – shape the ways future generations of students view classmates and teachers, as well as the aims of formal schooling? How might innovations in networked and digital media, and the connectivity that will continue to increase through a variety of media, be harnessed on an everyday level to enhance learning and literacy? Having established the important shifts in connectivity and communication, in the following sections I turn to the ways in which convergence as well as the collaborative possibilities of new media are beginning to shape the possibilities of learning in the rapidly changing new media ecology.

Convergence and Personalization

We now live in a media ecology where more-traditional media such as books, television, and radio are intersecting with digital and networked media, a process Henry Jenkins (2006) refers to as "convergence culture". Jenkins defines convergence culture as the "technological, industrial, cultural and social changes in the ways media circulates within our culture" (p282). From the ability to be networked with friends, families, classmates and others to the high resolution screens which enable the integration of television, videos and pictures, networked and digital media have fundamentally transformed the way knowledge, entertainment and information circulates within society. This trend has profound implications for educational content and especially "participatory learning". According to Henry Jenkins, the notion of "participatory media cultures" (1992, 2006) represents a way to conceptualize forms of engagement with new media that cannot be confined to production or consumption or watching. Rather, Jenkins argues that fans and audiences more generally of various media construct their own meanings, narratives and stories in relation to mass mediated products (see also Buckingham and Sefton-Green,

2004). Jenkins suggests that these practices are also characteristic of the skills that emerge through 21st century learning and literacy practices¹.

In studies of changing new media practices as well as informal learning, we see young people using social network sites as well as photography sites like Flickr to share and circulate images (see Van House, 2006). In addition, and as Dan Perkel (2008) has argued with respect to MySpace profiles as well as tutorials (Perkel and Herr-Stephenson, 2008), young people are using social resources (eg friends) as well as distributed resources such as videos and html code, what Perkel (2008) terms 'copy and paste literacy' to learn how to make profile pages. Through these practices, participants on these sites are also using these spaces to create new norms of circulation as well as the evaluation of credibility and content (Lange and Ito, forthcoming; Perkel, 2008) With the arrival of 3G, or Third Generation, mobile phones, mobile devices began to move beyond voice and text to incorporate the ability to gather, store data and record on a single device as well as the use of locative media that enable individuals to locate themselves in time and space.

From the emergence of media catering to specialized interests (Anderson, 2006), the ability to customize media (Livingstone, 2002), the ability to stay in contact with a select group of people ("selective sociality", see Matsuda, 2005; Wellman and Hogan, 2004), what is particularly exciting about convergence culture is the extent to which the personalization or customization of learning becomes possible. We see this in Gerard Goggin's (2007) attention to recent shifts with the increasingly intimate, personalization of news and everyday life events in photojournalism, blogging and video blogging (vlogging). In Ito et al's recent work on informal learning with digital media with young people in the United States, the authors found that personal, or individualized, interests were one of the primary motivators for using digital media for learning. One of the genres of participation the authors describe is "messaging around", a practice where young people used media, particularly search engines, to find information about their interests. These often involved social resources, such as friends who became designated experts regarding certain practices, as well as online resources that provide access to web forums, chat channels, self-help pages and a variety of other resources. Through trial and error, a practice that interactive technologies such as games encourage through design (Gee, 2003; Salen, 2007), young people in their study used a range of tools and resources to experiment with digital media in the pursuit of their own interests, questions and queries. Due to the ease of copying, pasting, and undoing changes to media works, there are few consequences to making mistakes. As Horst, Herr-Stephenson and Robinson (forthcoming) note, "Although messing around can be seen as a challenge to traditional ways of finding and sharing information, solving problems, or consuming media, it also represents a highly productive space for young people in which they can begin to explore specific interests and to connect with other people outside of their local friendship groups." The authors also note that "messaging around" sometimes leads to more passionate engagements, as we see through the "geeking out" practices the authors describe, such as fan fiction, video mashups, and fan art. As the possibilities of media such as 'mobi-sodes', or serial novels which circulate on mobile phones in Japan (Ito, Okabe and Matsuda, 2005), expands, and video sharing and downloading improves, students and educators will be able to utilize media in the times and locations that suit their lifestyles or the ideal locations of use, be they in a classroom or a gathering among peers. This access to digital and networked media, and the improvement of the platforms to enhance their use, present new possibilities for the

¹ Jenkins (2006) outlines eleven skills which he contends will be necessary skills for 21st century learning: play, performance, networking, negotiation, simulation, appropriation, multitasking, judgment, distributed cognition, collective intelligence and transmedia navigation.

personalization of learning even in the age of standardization legislation, such as No Child Left Behind² in the United States (see Herr-Stephenson, 2008)

Collaboration and Collaborative Learning

From work on distributed workforces and collaboration and the creation of “open source culture” and Wikipedia to more esoteric visions of “collective intelligence” (see MIT Center for Collective intelligence, MIT5 Conference, 2007), collaboration has become a ‘buzzword’ which defines the ethos, if not the ideology, of the ‘digital age’. Characterized by the mutual sharing of knowledge or learning by two or more people working towards a common goal or activities, collaboration revolves around a generalized commitment to equality, democracy, solidarity and a sentiment of cooperation, qualities which many of its adherents hope will counteract traditional structures of hierarchy and hierarchical knowledge production³. Digital media and technology, ranging from videocassettes and recorders, ipods, music and film editing software, digital cameras and so on, are often viewed as the ‘tools’ of this collaborative age because they provide what are traditionally seen as ‘consumers’ the possibility to become producers. In this *discursive* terrain⁴, youth whose seemingly endless knowledge of and enthusiasm for new media and technologies astound their parents, teachers and others who feel left behind in a haze of confusion as they try to ‘keep pace’ with their kids, their students and the changing world (eg Montgomery, 2007; Palfrey and Gasser, 2008). Indeed, empirical studies of technology in domestic spaces suggest that technology empowers children in the home since their learning and competence usually supersedes that of their parents (see Holloway and Valentine, 2001; Lally, 2002). Although there is increasing evidence that discourse may not follow practice and parents may indeed possess more technical proficiency than their younger, but seemingly fluent children (see Livingstone, 2007), where technology and media are concerned, this ‘generation gap’, or the acknowledgement of the differences and disparities between the experiences and worldviews of older and younger generations, represents a somewhat unique space where power appears to rein in the hands of youth.

Jean Lave and Etienne Wenger (1991) argue that individuals within a shared setting, institution or enterprise ‘come to develop and share ways of doing things, ways of talking, beliefs, values—in short, practices—as a function of their joint involvement in mutual activity’⁵. Social relations form around the activities, the activities form around relationships, and particular kinds of knowledge and expertise become part of individuals’ identities and places in the community; knowledge and expertise is integrated within the process of being in the social group to complete a joint activity (Eckert and Wenger, 1994; see also Wenger, 1988). These moments involve coming together and sharing knowledge and information, and involve a certain degree of

² No Child Left Behind was enacted in by the George W. Bush administration in 2001 an effort to address inequality in education. Structured to address the “achievement gap” in American education, the act (effectively an unfunded mandate) advocates implementing standards for curricula and instruction.

³ Lange and Ito (Forthcoming) find that communities, such as Anime music video makers and fansubbers, often create elaborate hierarchies where roles and reputations are strictly delineated and barriers to entry may be quite strict.

⁴ I distinguish here between the discursive terrain, such as popular discourse which posits youth as technically savvy and adults as novices, with the actual practices which may or may not reflect this wider discourse (see Livingstone 2007).

⁵ See also James Paul Gee’s (2003) discussion of gaming and affinity groups.

suspension of the normal parent-child dynamics. In effect, the extent to which students' and teachers' collaborative engagements with media to do things like make a video of an event, build a computer and create, remix and disseminate music, may be viewed as a moment of collaboration wherein the power structures which permeate daily life - where adults hold all the power and knowledge - may be temporarily subsumed to the acts involved with creation and production.

In their study of youth in the United States, Ito et al (forthcoming) identify two motivations which structure young people's engagement with new media that correspond to different genres of youth culture, social network structure, and ways of learning: friendship-driven and interest-driven genres of participation. "Friendship-driven genres of participation" is a dominant mode of participation by most teens and characterizes their communication with their friends and peers who they know primarily from school, but also through religious activities and organizations, sports and other place-based groups. By contrast, "interest-driven genres of participation" practices (see also Gee's notion of Affinity Spaces), involves young people's engagements with others with whom they share specialized activities, interests, or niche and marginalized interests which may or may not be recognized by mainstream social practices. The primary difference is that "Kids find a different network of peers and develop deep friendships through these interest-driven engagements, but in these cases the interests come first, and structure the peer network and friendships, rather than vice versa ... It is not about the given social relations that structure kids' school lives but about both focusing and expanding an individual's social circle based on interests." (Ito et al, forthcoming).

In all of these cases the shared project or interest is key, and the digital or networked media mediates the relationships between people. In a similar vein, Ame Elliot (2005) focuses upon the salience of objects in collaborative design projects in workplaces. As she notes "Persona posters, hats and bags, and everyday objects were effective in avoiding loss of momentum and self-censorship because they allowed non-verbal ways to participate and encouraged candid exchange of ideas by relaxing participants." Bradley (2004) also argues in her description of on the job training of child care workers, "Collaborating with experienced members of the community through talk can be part of the learning process, but cannot replace learning by observing them" (p350). Learning by observing, learning by doing and learning by talking are intertwined, and central to participatory learning. The question that remains is the extent to which we can create collaborative classrooms where personalized learning environments which are flexible enough to accommodate different interests and learning needs are cultivated and where, much like many workplaces, tasks are problem-focused. And, like many contemporary work places, the series of expertise varies in relation to the project. In the following section I focus upon the implications of these collaborations within and between different social and institutional contexts which are shaping the future of learning.

Implications for the Future of Learning

Research on mobile phones as well as social network sites suggest that the division between public and private contexts may be dissolving in an age of networked public culture (see Russell et al, 2008; Licoppe and Heurtin, 2002; Ling, 2008). For example, the practice of being connected, or "always on" (Barron, 2008), means that young people seek out and take advantage of the spaces, places and media available to them in a range of contexts -- at home, at friends' homes, and at after-school programmes and other institutional contexts. Youth *and* adults across the world are also using mobile devices (laptops, mobile phones, iPods, portable gaming and other media) to appropriate and create "personalized media environments". Ito, Okabe and Anderson (2008) suggest that three practices currently characterize the mobility of technology: cocooning, camping and footprinting. In the case of cocooning, an individual creates a media environment around themselves and use media to create this personalized space. Camping involves bringing portable media into public spaces, a preferred environment

where one can work. Finally, in the case of footprinting, individuals use media to keep track of information and to mark their presence in particular spaces and times. These practices thus signal some of the ways in which the drive to be connected occurs as individuals move throughout their everyday lives, and across public and private spaces.

This blurring of public and private space, and the in-school and out-of-school learning, also occurs in institutional contexts. For example, the prevalence of after-school programmes as well as media literacy programs designed as semi-formal play spaces for learning enable informal social environments which, in turn, facilitate alternative interactions for teachers and students (Hull and Schultz, 2002). These less formal spaces often create a bridge between the popular culture of non-school environments and school environments in that their integration of new media and technology often seeks to capitalize on the enthusiasm that young people have for popular culture and media, such as hip hop culture, for the acquisition of skills and media literacy (Herr-Stephenson, 2008; Gee, 2004; Jenkins, 2006). Similarly, new media and technology represent ways through which 'education' is integrated into the home contexts. Whether it be the purchase of computers for educational purposes in working and low-income families (Horst, forthcoming), the creation of office space in the home (Horst, 2008) or the purchase of Leapsters and other games and toys designed for edutainment (see Ito, 2007; Seiter, 2005, 1993), there are definite signals that the strict division between in school and out of school learning may also be becoming less rigid or defined.

We also see more lateral institutional collaborations at the formal and informal levels. For example, while museums have always had relationships with schools, such as through the annual class fieldtrip to the local museum (see Hecht, 2004; Macdonald, 2002), there appears to be a renewed emphasis upon collaborative projects between schools and external institutions such as museums and civic organizations. Hawkey (2006) argues that digital technologies and the use of digital spaces have enhanced these collaborations through the ability of these sites to be accessed remotely. In addition, the ability to coordinate in and through online venues and resources has created the possibility for greater coordination and outreach. Similarly, Stern suggests that museums' reframing of their role as the 'keepers' of culture to "a more expansive idea of museum as public institution—one that emphasizes stewardship and service within the context of living traditions" also suggests a broadening definition of institutions within a learning (and, increasingly, media) ecology may also be changing the way knowledge is produced, exchanged and circulated within and between schools and museums.

Given the convergence of media, technology, people and knowledge, the challenge is to harness these practices, and the connectivity they represent, so that learners may take advantage of the potential possibilities. Is it possible to take advantage of the ability of interests to move to, from and between school, homes and the other contexts in their lives? Can we create a networked classroom, while carrying out a collaborative project in the city, where we take advantage of the context of young people's lives and work together to solve problems? Can the school, or the classroom, be networked, its organization driven from a flexible location one or two days during the week in order to facilitate participatory learning? To what extent can different students' interests help to drive the content of the processes that may be learned in the classroom? And, finally, how can we transform schools and other educational institutions into mobile, portable and personalized entities?

Julian Sefton-Green (2004) argued in his literature review *Informal Learning with Technology outside School* that educators must recognize that much of young people's learning with ICTs (information and communication technologies) which happens outside of school in contexts such as schools, homes, libraries, museums and other contexts reflects a broader notion of education. "This recognition requires us to acknowledge a wider 'ecology' of education where schools, homes, playtime, and library and the

museum all play their part." Building upon work in California and Barbuda, Brigid Barron (2004) also proposes looking more closely at a learning ecologies framework which takes into account peer spaces, home spaces, work spaces, school spaces, community spaces as well as distributed sites of information. As Barron (2004, p195) notes, "A learning ecology is defined as the set of contexts found in physical or virtual spaces that provide opportunities for learning. Each context is comprised of a unique configuration of activities, material resources, relationships, and the interactions that emerge from them." It is clear that there are new possibilities for educators to mobilize learning within, between and outside of the classroom, particularly in spaces such as museums, homes and afterschool spaces in and through the use of new media and technologies. Recent and ongoing research on mobile gaming (see Klopfer, 2008; Squire, 2008) as well as alternate reality gaming continue to demonstrate the ways in which learning in informal environments can be augmented by the use of new media and technology (McGonigal, 2008). There are tremendous opportunities to integrate these devices into subjects ranging from geography, history, economics, communication, art and music. In addition, the economic dimensions of mobile phones, such as the navigation of plans, minutes and phone cards as well as innovations in digital money and forms of exchange (see Horst and Miller, 2006), introduce new possibilities for learning about maths through applying young people's own engagements in and with digital money.

Yet, while these possibilities are there, a number of factors remain which may act as constraints. For example, the creation and cultivation of connections between the institutional silos that characterize schools, museums, homes and other learning contexts are considerable and, for the moment, there are few incentives for teachers and museum workers to add to their workloads for such collaborative endeavours. In addition, and as we have seen with the integration of media literacy programmes into educational contexts, teachers' competency and comfort levels with these new technologies can make or break their use as a communication tool between school and home as well as between schools and other institutions. Parents and teachers must be versed enough in the new media to understand that certain spaces need to remain peer spaces if their participation in the broader learning ecologies in their children's lives are to be enhanced. Finally, while it is clear that technology and media may enhance learning, there remain considerable differences in access to specific devices as well as the sociotechnical resources necessary to participate in the new media ecology. Such sociotechnical and economic barriers to access outside of formal institutional contexts must be bridged either through continuous access across these learning environments (eg provisioning a laptop or portable device to facilitate communication) by youth or, alternatively, by the teachers and adults who work with youth to navigate these spaces. In effect, new media and technology will only be as effective as the teachers, parents, organizers and institutions make them.

Yet, whilst there exist considerable constraints, Katie Salen's new collaboration with the City of New York to design a curriculum and develop a school called Institute of Play (<http://www.instituteofplay.com/>) that merges the teaching of gaming principles of design with standardized curriculum represents one nascent, but important development in the effort to transform institutions. Notably, the school (which is ethnically and economically diverse) requires a broad commitment from teachers, students and parents to communicate and collaborate around their child's education. Other school and after-school programmes, such as those at a private school in San Francisco as well as University of Chicago's Institute for Education, experiment with sending students home with laptops which they are expected to share with their siblings and parents. While these innovative programmes are often supported by external funding in their nascent stages (and thus will eventually need to focus upon long-term sustainability), the collaborative and boundary blurring nature of these efforts harness the possibilities of new media and technology to reshape the nature of our institutions and the learning ecologies which they support.

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