

# Massively Multiplayer Online Games & Education: An Outline of Research<sup>1</sup>

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**Abstract:** For those with a vested interest in online technologies for learning, the knowledge and skills that constitute successful participation in massively multiplayer online games (MMOs) places them squarely among the most promising new digital technologies to date. In this paper, I broadly outline the qualitative results of a two and a half year cognitive ethnography of the MMO *Lineage* and describe the current trajectory of research we are now pursuing, based on those findings: (a) the empirical investigation of focused research questions in order to document and analyze those core practices that constitute gameplay in virtual worlds, and (b) the development of educational activities for after school clubs that capitalize on those capacities found throughout our research. This essay concludes with a reflection on the multiple relationships between games and education, highlighting the potential for such technologies to transform not only the means of education but also perhaps the goals.

## Videogames?

When people think of “videogames,” what often comes to mind is arcade games like *PacMan* or puzzle games such as *Bejeweled* or first person shooters rife with guns and explosions and twitch-speed antics in titles such as *Doom*. In truth, however, there is a very wide range of successful games on the contemporary market that reveals the immense variability in what and how gamers actually play: sports games such as *Madden NFL* where you can play through the entire season of your favorite football team, adventure games like *Myst* that let you journey into beautiful and mysterious worlds unravel the game’s core story, turn-based strategy games such as the *Civilization* series where you can “replay history” (Squire, 2004) from 4000 BC to the present using accurate real world maps, online games such as *World of Warcraft* that allow you to create a digital version of your corporeal self and inhabit new worlds and new communities, and even music videogames like *Guitar Hero* where you become the rock star using a guitar controller instead of a joystick— all to name a few. Such games constitute a broad array of genres, the variety and complexity of which is often quite surprising to those who do not play. The research outlined herein focuses on one genre of game in particular, *massively multiplayer online games* (MMOs). The remainder of this article is dedicated to convincing other researchers interested in educational technology as to why.

## Massively Multiplayer Online Games

Massively multiplayer online games (MMOs) are highly graphical 2 or 3-D videogames played online (see Figure 1) allowing individuals, through their self-created digital characters or “avatars,” to interact not only with the gaming software (the designed environment of the game and the computer-controlled characters within it) but with *other players’* avatars as well. These virtual worlds are persistent social and material worlds loosely structured by open-ended (fantasy) narratives, where players are largely free to do as they please – slay ogres, siege castles, barter goods in town, or shake the fruit out of trees. They are notorious for their peculiar combination of designed “escapist fantasy” yet emergent “social realism” (Kolbert, 2001): in a setting of wizards and elves, ogres and dragons, people save for homes, create basket indices of the trading market, build relationships of status and solidarity, and worry about crime. For those who have never logged into an MMO, it is hard to believe such virtual worlds are available for the monthly price of a fast food dinner and not some mere fantasy found only in sci-fi novels or television.

Yet, these virtual worlds are significant. If we look at the current global player populations of just those three game titles included in the research described here – *Lineage I* with 1.5 million players, *Lineage II* with 1.4 million, and *World of Warcraft* with 8.0 million (and still growing) – we find a population base of roughly 10.9 million global. Such numbers rival every U.S. metropolis, including even New York. When this line of research into such online play environments was initiated five years ago, virtual worlds were still considered a somewhat “fringe topic” in academics; today, their empirical investigation, while still considered somewhat novel in Education, has generated some of the most cutting edge research in many well-established fields including economics (Castronova, 2001, 2002), law (Balkin & Noveck, 2006; Hunter, 2003; Hunter, & Lastowka, 2005), sociology (Cherny, 1999;

Ducheneaut, Moore, & Nickell, 2004; Taylor & Jakobsson, 2003), anthropology (Taylor, 2006b), and psychology (Turkle, 1994, 1995; Yee, 2005) (for a full review, see Steinkuehler, in press-a).

The virtual economies of MMO are surprisingly quite significant as well. Each virtual world has its own in-game currency, in-game goods, in-game trading, and therefore in-game economy. Despite the standard terms of the End User License Agreements (EULAs) of the companies who create and own such titles, many people now buy and sell virtual currency and items outside the game on online trading sites such as *eBay*. People pay real dollars for virtual money and goods. In 2001, the economist Castronova set out to measure the financial import of such virtual worlds based on such transactions only to find that the economies of some virtual kingdoms rival the economies many important “real world” countries. Take Norrath, for example, the virtual world of the MMO entitled *EverQuest*. By Castronova’s 2001 calculations, Norrath was the 77th largest economy in the real world with a GNP per capita somewhere between Russia and Bulgaria. One platinum piece, a piece of currency in the virtual kingdom of Norrath, was trading on real world trading markets higher than both the Yen and the Lira. Thus, if the general popularity of virtual worlds fails to impress, perhaps their sheer economic value in terms of the good old American dollar surely might.



Figure 1. Screenshot from the MMO *World of Warcraft* showing the in-game virtual world and interface.

## MMOs & Learning: An Outline of Research

MMOs, however, are important not just in terms of popularity or economics; they are *educationally* important as well. For those of us with a vested interest in online technologies for learning, the kind of individual and collaborative knowledge and skills that constitute successful participation in MMOs is what places them squarely among the most promising new digital technologies to date. In this paper, I outline in very broad strokes the qualitative results of a two and a half year cognitive ethnography of the MMO *Lineage* (both I & II) completed in 2005 and then describe the current research program we are now pursuing based on those findings. With a generous grant from the MacArthur Foundation, our research team is investigating focused research questions, based on previous research and contemporary definitions of digital media literacy, toward the end goal of not only to empirically document and analyze those core practices that constitute gameplay in virtual worlds but also, and ultimately, to build educational activities for after school clubs that capitalizes on those capacities found throughout our research (see Figure 2). This essay concludes with a general reflection on the multiple relationships worth

consideration between games and education, highlighting the potential for such technologies to transform not only the means of education but also perhaps even a few of the goals as well.

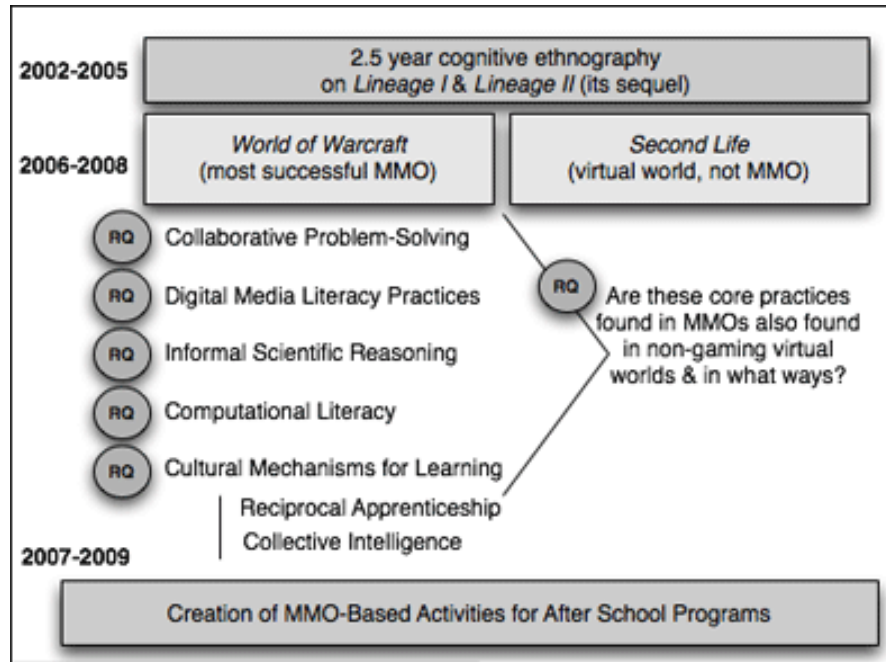


Figure 2. An overall outline of the three phases of this research.

### Laying the Foundation: Cognitive Ethnography

In 2001, when this research was first conceptualized, there was a paucity of research on MMOs and learning. While previous small studies had focused on specific practices related to cognition and learning such as playstyle (Bartle, 1996), gender (Bruckman, 1993; Danet, 1998; Herring, 1996), race (Nakamura, 1995), communication (Carlstrom, 1992; Clodius, 1996a; Masterson, 1996) ritual (Clodius, 1995, 1996b) & identity (Clodius, 1997; Dibbell, 1998; Ito, 1997; Raybourn, 1998; Suler, 1996; Turkle, 1994, 1995), little could be found in terms specific to education and most consisted of only web-published essays and theses. Yet the question remained: If individuals were engaged in such worlds, oftentimes for extended periods to the detriment of other forms of leisure pursuits (such as television), what were they learning from it, if anything? While there were several ethnographic attempts to document the social customs and mores of such environments, little could be found that might answer the simple question: What, if anything, was the intellectual merit of playing in virtual worlds?

Cognitive ethnography (Hutchins, 1995) – the description of specific cultures in terms of cognitive practices, their basis, and their consequences – was chosen as the primary research methodology during the first phase of this research as a way to build a basic foundation toward answering this seemingly simple question. This “thick description” (Geertz, 1973) included roughly 28 months of participant observation in the game, several thousand lines of recorded and transcribed observations of naturally occurring gameplay, collections of game-related player communications (e.g., discussion board posts, chatroom and instant message conversations, emails) and community documents (e.g., fan websites, community-authored game fictions, company- and community-written player manuals and guidebooks), and interviews with multiple informants. The main focus throughout this initial phase of the research (Steinkuehler, 2005) was to document and analyze the forms of cognition and learning that make up successful MMO gameplay. At the risk of gross simplification, the broad results were that participation in such worlds crucially entails:

- Complex forms of *socially and materially distributed cognition* including the coordination of people, (virtual) tools, artifacts, and text, across multiple multimedia, multimodal “attentional spaces” (Lemke, n.d.) (Steinkuehler, 2006c),
- *Collaborative problem solving practices* in cross-functional teams within the game and distributed fandom communities beyond them, both of which emulate key forms of collaboration espoused in “new capitalist” workplaces (Steinkuehler, 2006a, 2006b, 2006e),

- *Novel literacy practices* including the use of highly specialized forms of language for in-game social interaction and genres of story-telling, fan fiction writing, and discursive argumentation on game-related forums (Squire & Steinkuehler, 2005; Steinkuehler, in press-b),
- *Scientific habits of mind* (American Association for the Advancement of Science, 1993) such as hypothesis testing and revision, and model-based reasoning (Steinkuehler & Chmiel, 2006; Steinkuehler & Duncan, 2007),
- Forms of *computational literacy* (the understanding and use of computational models, such as algorithms or code, to conceptualize a problem, diSessa 2000) represented by player-generated artifacts such as user interface modifications or “mods” (Steinkuehler, 2006d), and
- Mechanisms for learning crucial to success in those above such as *reciprocal apprenticeship* (Steinkuehler, 2004), through which individuals enculturate one other into routine and valued practices and perspectives, and a culture of *collective intelligence* (Levy, 1999; Jenkins, 2006) evidenced in the joint creation, maintenance, and transformation of shared online repositories of community knowledge and skills (Steinkuehler, 2006a).

This list represents most of the core social/intellectual practices that characterize MMO gameplay, although not all (for a full review, see Steinkuehler, 2005); even this partial inventory, however, is non-trivial, including some knowledge and skills that rival those found in many of today’s typical classrooms. As to the question, “is there educational potential for virtual worlds such as those found in standard MMO gameplay,” the answer appeared to be a resounding *yes*.

### **Focused Empirical Investigations in Two Virtual World Contexts**

The second phase of this research program, now currently underway, is comprised of focused and specific research questions pursued using a mix of both qualitative and quantitative methods in two contexts: (a) the MMO *World of Warcraft*, now the single best-selling computer game on the market with over eight million players worldwide, and (b) *Second Life*, a popular virtual but non-game online environment. In effect, we are comparing a “gaming” context for play to a “virtual frontier” context more ostensibly focused on recognizable and consequential entrepreneurship based on the premise that, in order for us to successfully design informal learning activities based on virtual worlds, we need to understand which patterns of practice are game-specific and which can be generalized to virtual world communities more broadly. Our goal is to go beyond mere plausibility argument for the *potential* of virtual worlds for learning to look more systemically at what knowledge and skills they foster and in what ways. Based on ethnographic findings (outlined above) and a contemporary definition of digital media literacy that crucially includes not just *critical consumption* of media but also and as importantly *production* (Gee, 2003), our research group is targeting five main areas for research selected as those most fruitful for further exploration: (1) collaborative problem-solving, (2) digital media literacy practices, (3) informal scientific reasoning, (4) computational literacy, and (5) cultural mechanisms for learning (see Figure 2). Given space constraints, I will describe three of these five strands of research in order to illustrate the shape and texture of such activities and demonstrate why they are particularly worth further study: (1) collaborative problem-solving, (2) digital media literacy practices, and (4) computational literacy.

### **Collaborative Problem-Solving**

In MMOs, individuals engage in collaborative problem solving as a key component of regular gameplay. Here, groups of five or more players join together to tackle problems more challenging than one person alone could typically solve. For example, in *World of Warcraft*, players regularly enter “instances” or “raids” together to battle monsters of various sorts while making their way through, say, a dungeon or a jungle outpost (see Figure 3). Such gameplay is called “instancing” or “raiding” since, as the game is designed, the software renders the chosen area of the world as a single instance that only those members of the group can access, thereby allowing them to proceed through the game content without interruption from other players within the game space. What is curious about such activities is not the software’s rendering of the content per se but rather the way in which such groups function in order to succeed. Specifically, in such endeavors, a core group *takes the given task or project through completion* from planning through to follow-up, functioning only on a *semi-permanent basis* by dissolving once the goal is completed. The group is comprised of individuals from *different functional areas* (for example, a healer versus a damage-dealer) yet *redundancy or overlap* is built into such configurations so that, should any one person need assistance, another group member is able to take up the proverbial slack. Instancing groups (or raid parties) are *self-managed*, with a *group goal* (e.g., completion of the given dungeon area) yet *individual accountability* (e.g., the healer must successfully heal or risk policing of their behaviors if not outright removal from the group).



Figure 3. Screenshot from the MMO *World of Warcraft* showing an in-game collaborative problem-solving “raid”.

Such structural features are important, as they not only describe collaborative problem solving within the game but also, as luck might have it, collaborative problem-solving within many contemporary workplace settings. They are, in fact, *cross-functional teams* (Fredericks, & De Lia, 2005; Lindborg, 1997; Michalski, 2005; Parker, 2002) – a key feature of many of today’s “new capitalist” corporate workplaces such as those found in global financing or technology. In effect, the structures of collaboration found in online games parallels the structure of collaboration that increasingly marks high-end workplaces. While it seems counter-intuitive that running instances with joint problem-solving groups in the context of a game might train an individual for teamwork in today’s workplace, the similarities between the two forms of collaboration are quite striking and therefore warrant further research.

### Literacy practices

MMO gaming is participation in a constellation of literacy practices (Steinkuehler, in press-a, in press-b), one with fuzzy boundaries that expand with continued play: What is at first confined to the game alone soon spills over into the virtual world beyond it (e.g., websites, chatrooms, email) and even life off-screen (e.g., telephone calls, face-to-face meetings). The online fandom that surrounds successful game titles is a rich yet nebulous sphere of multimodal multimedia including websites, blogs, threaded discussion boards, fan fictions, fan art, annotated game screenshots, cartoons, chatrooms, instant messaging, in-character emails, and even voice over IP (VoIP). In order to succeed in the game over time, participants must increasingly engage with the online fandom beyond the virtual world itself in order, for example, to research strategies for success against various in-game challenges, or to develop deeper understandings of the class of character they play not only by using their own in-game experiences to better understand fandom texts (such as those listed above) about their given class but also by using such texts to better understand their own experiences.

Like all interpretive communities, MMO gamers take up the symbolic, cultural materials offered them by media to collectively create the form and substance of their own cultural worlds (Squire & Steinkuehler, in press; Taylor, 2002, in press). As such, they are no different from the folk cultures of old (Jenkins, 1998), except that, now, the consumers have increasingly user-friendly tools at their disposal to work with, including online access to

sociotechnical networks that enable their easy distribution, such as fan groups and guilds. Consider, for example, the fan fiction excerpt shown below that circulated through much of *Lineage* fandom in 2003.

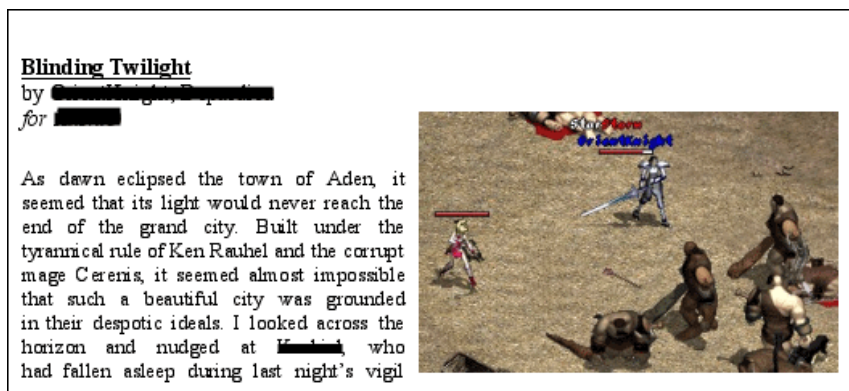


Figure 4. Excerpt from a *Lineage* fan fiction story.

In it, the author writes about a pseudo-fictional adventure – partially based on an actual occurrence, partially based on the genre conventions of medieval fantasy stories. The story is written at a grade level appropriate to the author’s age; however, what is most interesting here is the purpose for which he purportedly wrote it. The story is dedicated to the second main characters appearing in its pages – a girl gamer roughly the author’s age. In one email distribution of the story, the author writes, “I included a new story if you would like to read or post up, its awesome ^^ [raised eyebrows] even though I just used it to hit on this girl...”

It is difficult to imagine another cultural space in contemporary American youth culture at least in which writing a short story might be viewed as a recognizable way to court girls. In the context of MMOs, however, such writing is a central and highly valued practice. Here, adeptness with the pen, so to speak, carries a certain social status such that those who show exceptional skill in the creation of content oftentimes develop a rather large following. Moreover, in these contexts, such writing is typically not considered ancillary to normative gaming but rather a central part of what it means to participate. The following in-game social exchange illustrates:

SharpPaw	oh yea! to celebrate me coming back to pledge &
SharpPaw	being rank ive decided to write another story!
SharpPaw	for site!
Adeleide	omg do it! We need more stories!
SharpPaw	^^ o’course
SharpPaw	in fact ive planned it
SharpPaw	I got the PERFECT story idea the other day when
...	...
SharpPaw	its called An Old Knight’s Tale
SharpPaw	youll see it within the next 2-3 months
Adeleide	wow! Do u like to write in ur spare time?
SharpPaw	well na I like to play this in my spare time

In this exchange, a beginning high school student who is on summer break discusses the short story he has recently decided to author in commemoration of rejoining the guild and being promoted in rank (after being grounded from gaming for a while until he raised his grade to his mother’s satisfaction). When asked whether he likes to write in his spare time, he responds, somewhat baffled, “well na i like to play this in my spare time.” In the context of MMOs at least, adolescents appear perfectly willing to engage in long, thoughtful writing projects – “2-3 months” planning, not including the initial work done prior to this exchange – in their own spare time, not as isolated literary “assignment” but as part and parcel of what it means to game online. Our current undertaking, then, is to better articulate the forms of literacy practice fostered in MMOs, who engages in them, to what extent, and why.

One explanation for this willingness to engage in such intellectual labor has to do with the way in which virtual worlds function as a new “third place” (Steinkuehler & Williams, 2006; cf. Oldenburg, 1999). By providing spaces for social interaction and relationships beyond the workplace and home, MMOGs have the capacity to function as one novel form of a new “third place” for informal sociability much like the pubs, coffee shops, and other hangouts of old. Moreover, participation in such virtual “third places” appears particularly well suited to the formation of bridging social capital – social relationships that, while not usually providing deep emotional support, do typically function to expose the individual to a diversity of worldviews (Steinkuehler, 2006d). Given the unfortunate rise of fundamentalism in the face of globalization (Giddens, 2006), such exposure to diversity is a valuable thing indeed.

### Computational literacy

As a final example of the specific areas of investigation currently underway, consider the creation, adaptation, and use of game “mods” (short for modifications), which are derivatives of a given, professionally released game title into something new. In *World of Warcraft*, for example, modding practices take the form of so-called user interface (UI) “add ons” created by and for the community of players themselves. UI add-ons are essentially patches to the game software that change the user interface in some way –improving the structure and function of the interface by increasing the number of action buttons available, or diagnostic tools that increase the game’s functionality by allowing the user to access information on their own performance in game and/or the performance of others. UI Mods play a vital role in the gaming community, providing the tools and functions crucial to in-game success. Some UI add-on’s have developed such a following that not only do some guilds no longer allow their members to run instances without them (Taylor, 2006a) but also, in some cases, they are incorporated by the company who owns the title (Blizzard) directly into the original gaming software itself.

Such creations are *computational literacy artifacts* (diSessa, 2000): made objects that evidence not merely computer literacy (such as the ability to burn digital files to a CD) but rather the ability to understand and use computational models, such as code or a mathematical equation of some form, to conceptualize and solve a given problem. In interviews with those community members who create such software, an interesting pattern emerges: *Users of mods become critics/analysts of mods become creators of mods*. For some, modding replaces gaming entirely, with “building software” becoming the ultimate “end game” (Steinkuehler, 2006f). To be sure, the modding community of *World of Warcraft* represents only a small minority of actual players (which raises the research question of what gateways and barriers to such practices exist); however few such add-on creators may be, however, their products function as hubs in the socio-technical network, calibrating the gameplay of others’ in tangible ways. For example, at last check, the number of downloads for “Titan Panel” mod was over six million, for “Recap” mod over 285,000. Compared to the average number of readers of an academic journal article (five), such large followings give pause for thought.

### **Designing MMO-Based Activities for After School Programs**

Our current phase of research (outlined above) aims to better understand the form and structure of naturally-occurring, informal communities in virtual environments across two contrasting contexts; however, such an understanding is not the end goal in and of itself. Instead, it is our belief that such basic research can then be leveraged toward the development of intentional learning environments, specifically those designed around virtual worlds. Innovative NSF projects such as Harvard University’s *River City* (e.g., Dede, Ketelhut, & Ruess, 2003) and Indiana University-Bloomington’s *Quest Atlantis* (e.g., Barab, Arcici, & Jackson, 2005) have begun to tackle the complexities of designing virtual worlds in the service of learning, yet to date such work has been done largely outside the purview of emerging research on such technologies out “in the wild” (Hutchins, 1995). In contrast, our goal is to build prototype after-school activities based on a more robust understanding of what educationally valued practices arise out in virtual worlds in natural contexts. In so doing, we hope to build a better bridge between kid’s media literacy practices outside of school and those promoted within them. By putting pressure on schools to reform through the promotion and viral spread of innovative after-school programs while, at the same time, opening up access to such worlds of practice to students who might not have such access otherwise, this research hopes to address the current digital disconnect (Levin & Arafah, (2002) between the use of online technologies in and out of classrooms.

Toward these ends, the final phase of this project focuses on the development of educational activities, to be implemented in the after-school incubators established here at University of Wisconsin-Madison, that take what we have learned about digital media literacy communities in the context of virtual worlds and, building on those

findings, recreate similar communities of practice in informal contexts for learning. Because the structure of these activities is contingent on findings from the second phase of research currently underway, their form and structure will, in effect, provide a context for conducting design experiments that test theories about what mechanisms (both technical and social) foster which intellectual practices and how (i.e., for testing the claims generated through empirical analysis throughout the current phase of research). By demonstrating the potential of such online worlds/cultures, first out “in the wild” and then in informal after-school contexts, we hope to maybe one day change the very culture of schooling into something more relevant, promising, and transformative for all.

## Conclusions

While the research outlined herein ultimately focuses on games *in* classrooms – specifically, using off-the-shelf virtual worlds such as *World of Warcraft* or *Second Life* in after school contexts – in truth there are multiple relationships between games and (in)formal classrooms worth consideration. Oftentimes, when the issue of “games and learning” is raised, there is a tendency to focus solely on the relationship between games *and* classrooms to the exclusion of all others – a fixation whose symptoms include a near obsessive focus on the question of what game-related knowledge and skills “transfer” to formal classrooms, despite the grand irony that it was always *classrooms* that were supposed to teach things that might transfer to life beyond them, not the other way around. Other relationships between games and classrooms can and do exist, however; for example, the relationship of games *as* classrooms. By thinking of games as learning environments in and of themselves, we can discern design principles in games that might be fruitfully applied to the design of other learning environments, be they classrooms, after school clubs, or corporate training retreats. In fact, it is this fundamental relationship that underlies much of the seminal work of James Paul Gee (2003). And too, of course, there is the notion of games *for* classrooms, exemplified in the development of *River City*, of *Quest Atlantis*, and the entire Serious Games movement to date. One relationship that often gets lost, however, is the simple fact of games *despite* classrooms. With more than eight out of every ten kids in America having a videogame console in the home, and over half having two or more (Rideout, Roberts, & Foehr, 2005), it becomes increasingly clear that games are *the new literacy*, whether those of us in education are willing to recognize them as such or not. From this perspective, we need to research and understand games for the sheer reason that they are, much to the chagrin of an older generation, one of the most important new cultural media to date.

In my own research, however, I have come to think of games as a new *gateway drug*. Based on our ongoing research, I find the most apt rhetorical framing of the question to be: How can games provide entrée into other intellectual practices outside the game that we, as a community, value? How and when and for whom might virtual games be a bridge to worlds beyond them? We know that games are a push technology, moving into the home and dragging computers, for example, in their wake (Williams, 2004), but we would be mistaken to think this merely a hardware or software issue. They bring with them important social and intellectual practices and dispositions as well. In these ways, MMO communities are push communities, functioning as our proverbial canaries in the coalmine when it comes to the life in the globalized online world. And, from this perspective, their empirical investigation now can only better prepare us for the radical changes to come, whether schools respond in efficacious ways or ultimately render themselves increasingly obsolete.

## Endnotes

(1) This paper has been adapted for publication in *Educational Technology* magazine.

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## **Acknowledgments**

This work was supported by the GLS [Games, Learning & Society] Group, a cooperative agreement between the Academic ADL Co-Lab and the University of Wisconsin-Madison, and by a generous grant from the MacArthur Foundation. Constance Steinkuehler is principal investigator. The ideas expressed herein are not endorsed by and may not be representative of positions endorsed by the sponsoring agencies.