

2 Customized and Participatory Learning

Customized Learning

“Common culture” is dead, claims *Wired* magazine editor Chris Anderson in *The Long Tail: Why the Future of Business is Selling Less of More*,¹ the smash bestseller of summer 2006.² Anderson argues that the effect of the Internet has been to expose consumers to limitless choices. Remote niche markets and a global range of products are available to anyone with a laptop and a credit card. Social networking sites that develop among consumers with shared interests also communicate the best Web sources providing these goods. The result is a new kind of market. In contrast to the *Pareto tails* of the standard statistical distribution in the common culture regime (where 20 percent of products account for 80 percent of revenue), on the Internet 98 percent of products are chosen by someone, thus skewing the 80:20 ratio.³ Anderson argues that the savvy cultural purveyor, like the smart businessperson, understands that it is now necessary to offer young consumers a plethora of possibilities, including personalized or self-designed products and projects.

This book focuses less on the consumer choices now available through the Internet and more on the customized learning

opportunities offered by the Internet (although, as any parent knows, there is no hard-and-fast boundary between “consumer choices” and “learning opportunities” for kids today). So-called serious games are the most overt educational adaptations of online entertainment, but there is seemingly an endless array of choices, especially if learning is considered to include all forms of new knowledge acquisition and formation.

Consider Pokémon, for example. A five-year-old masters the equivalent of a third-grade reading vocabulary in order to play online and also customizes the game with digital graphic tools that, only a generation ago, would have been considered sophisticated for a professional designer. That five-year-old makes friends online through game play that requires memorizing hundreds (the number expands every day) of characters with different attributes and skills and learns how to fix, customize, program, or hack a computer in order to participate in this compelling online world of play. You do not have to force a child who is interested in Pokémon to practice at the computer. Technical skills, programming, literacy, social life, aesthetics and design, narrative-making, socializing, and fun are all woven together, and, for many preschoolers, the only brake is the parent who worries about the child spending too much time (or money) on Pokémon. Innovation has responded to one parental concern: SoftwareTime has developed a popular program to limit children’s time at the computer.⁴

This multidisciplinary learning world, where play and learning are inseparable, is diametrically opposed to our federal education program and the No Child Left Behind Act of 2001 (NCLB).⁵ With its lockstep national standards and standardized testing, where school districts are penalized with reduced funding if students do not perform to a certain level, NCLB rewards teachers for teaching to the tests. National standards and

assessments have replaced other measures of learning, including those gauged by classroom teachers themselves. Indeed, public education has been privatized to a shocking degree by NCLB, since private testing businesses are now frequently hired, at taxpayer's expense, to construct the tests that purportedly measure outcomes but do not necessarily gauge real learning. It is an intrusive, forced model of education, and it is no surprise that we face a decline in teachers willing to stay in public education.

In an increasingly customized world, we have standardized public education that is far closer to an early nineteenth-century model than a twenty-first century one. If one purpose of formal education is to underscore what modes of learning are valued by our society, we are in an oddly mismatched time, where success and failure of a school district or a student are determined by standardized tests at a time of vast potential for customized, collaborative learning. To return to Anderson's point, public education in America is still in the common culture model; NCLB has a very stubby tail.

What, then, are the implications of the long tail for learning and for learning institutions in this new world where choice and customization seem to prevail? How might we expand learning possibilities within conventional learning institutions to keep pace with our consumer choices? And is such expansion desirable? If people are, in fact, self-educating via the Internet, how are we, as educators, using students' skills to help transform learning practices, both in the classroom and out? The Internet offers unprecedented access to an enormous range of information and the possibility of an extraordinary range of learning modalities, not all of which have been tested. Uninformed choice may be as much a waste of talent (overlooking compelling options) as it is talent-enhancing.

Equally important, what are the implications of not addressing changes in the way young people learn and interact? The United States currently ranks *seventeenth* among industrialized nations in the educational attainment of its populace.⁶ Although social and economic factors correlate strongly with educational dropout rates (with lower income contributing to higher attrition rates), the last decade has also witnessed dropout rates increasing across economic groups, across cities and rural areas, and across all areas of the country, with boys dropping out at notably greater rates than girls.⁷ One reason, some argue, is boredom, and a mismatch between the lively online lives of youth today and the one-size-fits-all national educational agenda. Although more research remains to be done on this topic, many of the current conventional institutions of learning (both K–12 and higher education) do not fully, creatively, or completely address their students' needs and interests. We continue to push old, uniform, and increasingly outdated educational products on young learners at their—and, by implication, society's—peril.

Innovative and experimental ideas for schools are being fueled by a mix of existing knowledge and cultural institutions, as well as new digitally enabled possibilities (for more information, see the Portfolio of Virtual Learning Environments at the end of this chapter). A Museum School draws on five New York City museums to offer classrooms for the development of interdisciplinary projects, sewing together science and culture, history and natural history. Opening in Fall 2009, the Quest to Learn school in Manhattan will draw on game design and interactive gaming methods and strategies as the basis for an innovative curriculum to teach traditional and nontraditional subjects, practices, and forms of wise decision-making. Computer gaming offers the possibility of developing important skills for the

knowledge economy—computer and information literacy, database development and management, knowledge networks, data analysis—as well as more traditional skills associated with reading, writing, arithmetic, and social interactions.

Collaborative Learning

Anderson's point about the long tail can be customized into an important pedagogical principle for the twenty-first century. Because of the deep cultural shifts of our times to new modes of online learning available especially (but not only) to youth, there is a challenge to identify and comprehend the multiple preferences of dispersed and diverse learning populations. Learning is no longer one size fits all, and we need to learn to appreciate and foster learning in all its sizes and varieties. The hard part—and, arguably, the single most important skill for future educators—is finding ways that individual learners with individual skills and interests can share with others who possess different skill levels and interests.

This model of peer-to-peer information-sharing happens routinely, if casually, on social networking sites such as Facebook and YouTube and is being adopted and developed into a method by an increasing number of innovative educators, on all educational levels and in all institutional environments. The point is not to cannibalize or invade social networking sites that kids use to interact with one another. Many educators have objected to this invasion of privacy. A better model is to study, in a careful ethnographic way, the kinds of interactions that occur on these sites and then to apply that research to new ways of thinking about informal learning and formal education.

Successful social networking sites for youth provide models that educators might productively adopt for educational

purposes.⁸ In addition, social networking sites such as HASTAC on Ning (figure 2.1), Classroom 2.0, Shaping Youth, and many others offer educators their own social networking sites where they can use digital tools for collaborative thinking about pedagogical issues (e.g., privacy) that arise in new digital environments.⁹

Collaboration is another key issue of digital learning. If the first step toward envisioning a model of learning for the twenty-first century is appreciating and cultivating the various and sometimes eccentric skills and learning interests of individual students, the next step is creating learning environments where collaboration across diverse skill sets is rewarding for individuals and groups. Preliminary ethnographic research of social networking sites by a team led by Mizuko (Mimi) Ito suggests that kids socialize online much as they do offline, with the same close network of friends.¹⁰ If this preliminary finding holds, then a challenge for educators is finding ways of extending and diversifying the reach of the individual students by using social networking tools, much as school-sponsored global pen-pal programs (often supported by international study abroad programs) did in an earlier era.

Box 2

HASTAC on Ning: A Synergistic Symposium for the Cybernetic Age

HASTAC on Ning (<http://hastac.ning.com>) is a social network created by secondary school teacher Mechelle De Craene. The network was started as a companion site to HASTAC and is a way for members of the HASTAC community to learn more about each other and share ideas and information. Members of HASTAC on Ning can post videos and links and participate in a group blog in order to promote new models for thinking, teaching, and research.

Box 2

(Continued)



Figure 2.1

Screenshot of HASTAC on Ning (<http://hastac.ning.com>, accessed on July 29, 2009).

Ning is a Palo Alto, California-based company that allows participants to create their own customizable social network (<http://www.ning.com>).

The best way to extend the reach of student networks is to involve youth in the learning process, encouraging them to explore their individual talents and guiding them as they work together to find ways that those talents can contribute to larger projects. This reshaping of learning as a continuing, customized,

and collaborative project is as important for preschoolers as it is for retirees, for K–12 institutions as it is for research universities. Learning has as long a tail as commodity consumption, and we need institutions that recognize and support learning as a life-long process.

Although this book uses *The Long Tail* as a jumping-off point for a discussion of customized, participatory learning, there are many points with which one could argue in *The Long Tail*, including its commodity emphasis. Educational preferences should not be marketed like new kinds of cola, and some of the corporate attempts to turn education into something “entrepreneurial” begin to resemble capitalist boot camp rather than a moment’s respite from rampant commercialism (see discussion of the School of the Future in Philadelphia in the Portfolio of Virtual Learning Environments at the end of this chapter).

That said, Anderson makes some good assumptions about the effects of interactivity on intellectual choices and on the new kinds of affiliations (by self-defined choice) allowed by the Internet. His insights on the possibilities for learning, social action, and intellectual affiliation as a result of the virtual associations available on the Web are compelling.

Collaboration and Intellectual Property

The Long Tail began as an open-source research project on Anderson’s blog (<http://www.thelongtail.com>). Open-source writing projects raise issues of intellectual property and authorship that exemplify a contradiction or even ambivalence about collaborative thinking that may be characteristic of the present moment.

Anderson began by offering ideas and draft text on the blog, and these ideas were improved and tested by numerous readers. That method is standard for our digital era. However, once that

blog became a book, both traditional and peer-to-peer models of authorship were operating simultaneously. *The Long Tail* thus offers an interesting economic case study. It is, in part, a consumer- or user-designed product. However, it is Anderson and his publisher, in the traditional role of author and producer, who most directly benefited financially from the book's popularity, not the open-source researchers who added to or transformed Anderson's ideas.¹¹ Who owns ideas in a peer-to-peer environment? It is hard to say.

As a model of authorship, leadership, collaboration, originality, intellectual property, profit, and sustainability, *The Long Tail* is both a provocation to experiment with new forms of collective authorship but also a cautionary tale about the necessity of finding ways to give full credit to collaborative contributions. One lesson for learning institutions, then, is that they should be collaborative while also being respectful of individual efforts, and, accordingly, they need to develop reward systems suitable for collaborative efforts.

If collaborative learning challenges the traditional model of authorship, traditional authorship also challenges the assumptions of collaboration. On the Institute for the Future of the Book Web site, Alex Reid has raised some of these related and interrelated issues. "Authorship is fundamental to the operation of the university from the grading of student-authored essays to the granting of tenure for faculty-authored research," Reid notes.¹² "How much time can I devote to this [collaborative] kind of writing when I know no one will validate my work? How can I convince my students to work in this way or convince them of the validity of my evaluation of their labor when their individual work is so difficult to untangle from their peers? In part I think the answer to these challenges begins with recognizing the difference and relationship between the

marketplace function of the author-as-owner and a more material-technological understanding of the networked practices of composition.”

Reid’s point seems exactly right. *Authorship* is not one thing but various things. Anderson’s model of authorship begins in the material-technological world of “networked practices of composition” and ends squarely in the “author-as-owner” model. There are countless examples of faculty taking students’ ideas or products and making them their own. So the challenge, as much institutional as individual, is how to establish and reward interactive, collaborative outputs.

This book recapitulates aspects of this multiple construction of authorship, footnoting contributors where appropriate and listing the names of all participants in the contributors list. In addition, the authors are not profiting materially from this project.

But what if the authors of this book had not established this particular collaborative writing project—with its feedback from online drafts and public forums—as open-source, open-access, and nonprofit? Would that make a difference? What if, like Anderson’s book, this book were to become a surprise bestseller? What are the open-source economics of the conversations and contributions leading to a publication? And are these online and face-to-face contributions different *in kind* than the kind of interchange that happens at conferences or even in the classroom as we make our way from a draft presentation to a final chapter, incorporating feedback and responses and insights along the way? Laws are themselves a form of institutionalization. How do laws around intellectual property support or impede the future of digital learning and virtual institutions for learning?

The music industry, for example, is not monolithic. Some parts of the industry have moved toward a more open-source or pay-what-you-wish model. Currently both Radiohead and Nine Inch Nails are among the bands experimenting with different kinds of downloading options. Yet other parts of the industry are taking a hard line, arresting ten-year-old file-sharers and testing questions of influence, reference, sampling, remix, and citation in the courts.¹³

New digital and collaborative modes of learning, writing, communicating, and publishing inevitably disturb traditional definitions. In transitional moments such as the present one, assumptions become visible and also require serious rethinking. The issues are complex and intertwined. Juries rarely can unravel them, and monetary judgments are often capricious, inconsistent, and offer little in the way of guidelines for future decisions. One part of considering the future of learning institutions in a digital age is to try to understand the connections between and across the array of legal and social arrangements loosely grouped under such seemingly transparent terms as *copyright*, *patent law*, *intellectual property*, *publishing*, and *authorship*. As we see from the history of copyright law in the United States, transitional moments test the boundaries of accepted legal practice because new uses of media cannot be decided by past legal precedents. Seemingly familiar terms such as *author*, *artist*, or *owner* take on complicated and legally contested meanings when, for example, a poster artist is sued by the Associated Press because he downloaded a photograph of a presidential candidate from the Web and colorized it in a style that itself was subsequently imitated, parodied, or commercialized innumerable times by others.¹⁴

Fair Use

Fair use has multiple and often contradictory meanings. Legal organizations such as Creative Commons have tried to argue the importance of fair use, but upheavals in the recording and publishing industries make it difficult, sometimes, to be able to think clearly and productively about what constitutes use that is “fair” versus what constitutes use that exploits someone’s labor without benefit of remuneration for that labor.¹⁵

The issue of fair use for educators can be almost as complex as it is for the music industry, where file-sharing can cut into profits. Since the currency of much of higher education is reputation, the issues of fair use must be configured partly in terms of peer review and citation.

Fair use in education is also in a transitional phase. If someone uses your ideas, does he or she have to pay you for them? What if that person is not making money from them? Is citation sufficient? Where does one draw the line between collaboration and plagiarism, between fair use (as it has long been defined) and theft of someone else’s ideas? If one must pay Kinko’s or another commercial copy center to make a coursepak of published chapters or articles, does one need to have the same respect for copyrighted material in an online resource? What about books and articles on reserve at the library? How about text cited or images used within a specialized scholarly publication?¹⁶ What if the five lines of text in a chapbook is a poem versus the lyrics from a Dylan song? Why does one have to pay for the latter but not the former? What is the relationship between payment and authorship?

Clearly these are complex questions, made more complex by the fact that many universities now require faculty to put course syllabi and lectures up on the Web as a “public good” but will

not support faculty when they wish to use movie clips or snippets of recorded music protected by copyright in their courses. For those in the humanities and media studies, this is a kind of double indemnity. If a faculty member is teaching a film course, his or her ideas (in the form of a syllabus) might be available to anyone, but he or she might be denied the right to include film clips or images in those texts. Henry Jenkins, one of the finest commentators on new media, has written eloquently on this inconsistency. He has testified in public hearings on the contradictions for educators around university policies on intellectual property, open access, and, ultimately, authorship in our digital age.¹⁷

To address these issues in one domain—the use of popular culture images and sounds in not-for-profit documentary filmmaking—the Center for the Public Domain has created a graphic novel designed to exemplify the choices one has, the laws that may apply, and the laws that do not apply (figure 2.2). *Tales from the Public Domain: Bound By Law?* is an activist document, encouraging documentary filmmakers not to censor themselves because of fear of copyright infringement where a case for fair use can be made.¹⁸ The authors of *Bound By Law?* chose the comic format because the visuals illustrate (literally) issues of visual citation confronted by documentary filmmakers. In one segment, a television happens to be on in the background as a subject is being interviewed. Does the filmmaker need to pay for that use or edit it out? Or a kid walks by on a city street with a boom box playing a pop hit in the middle of a protest march. Documentary filmmakers cannot afford to pay for all of the incidental sights and sounds of a culture, sights and sounds that make up the texture of the culture they are documenting.

Probably the most famous case of fair use involves the powerful Public Broadcasting Service documentary of the U.S. civil

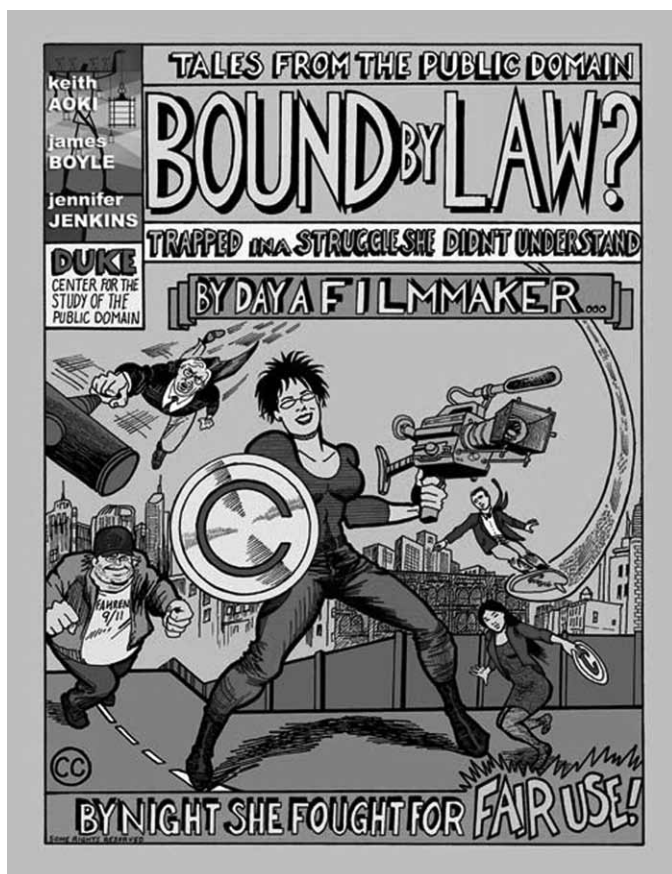


Figure 2.2

Reproduced by permission from Keith Aoki, James Boyle, and Jennifer Jenkins, *Tales from the Public Domain: Bound by Law?* (Durham, NC: Duke University Center for the Study of the Public Domain, 2006, page 1).

rights movement, *Eyes on the Prize: America's Civil Rights Years (1954–1965)*,¹⁹ where expiration of the licenses of the copyright to archival footage prevented the documentary from being shown. Without the intervention of the Ford Foundation, which paid for the renewal of the rights, this documentary would not have been shown. *Bound By Law?* attempts to make these issues visible to all who are trying to figure out the rules of this era.

Digitality and Reputation

These examples of collaborative authorship, open access, and fair use underscore how the digital issues of this era are neither transparent nor trivial. They make good topics for the university classroom, especially for graduate students intending to go into the academy where authorship is a stepping stone to advancement. Academics typically have reputations, not royalties, at stake. But, as Reid's comment suggests, reputations are the currency in our academic realm and hiring, tenure, and promotion are all based on reputation. Single-author contributions are not the only ones, although in some fields, they continue to be the most important contributions to one's career.

As academics, we are a long way from facing the plight of the music business, yet we are clearly at a liminal moment, too. For example, many of the individual fields within the humanities, arts, social, natural, and biological sciences have been based on collaborative work (in labs, at archeological or ethnographic sites, and in published articles and books) and, despite multiple authorship, individual reputations are made and judgments of worth are still possible. Traditional single-author publishing fields can learn how to assess and reward individuals from the reward systems that have been developed in fields where multiply authored contributions are standard.

Learning from one another's expertise and experience is, after all, the theme of this text. Customized, collaborative digital learning cannot apply just to that which we educators deliver to our students. Indeed, we need to not only practice what we preach, but we must also learn to listen to what those more conversant with digital technologies have to tell us. In some cases, that means listening carefully to our students.

This reversal of who is teaching whom, who is learning from whom, and the constantly shifting hierarchies of expertise and the ability to appreciate those shifts when they happen and to value them are central to digital learning. The individuals' desire and need to learn from new collaborators and the shift in knowledge and ignorance can be unfamiliar and, at times, intimidating. And yet defamiliarizing our ways of knowing is also inspirational. It means rethinking not only what knowledge we possess but how we possess it, from what sources, and what that body of knowledge actually means, what it is worth. It means moving beyond our comfortable world of peers and all the tokens of esteem, value, respect, and reward that that world holds.

No one should take such risks on behalf of new ideas without a safety net. Institutions of learning provide the safety net for many of us. What happens if, instead of protecting us, these institutions are so set in older hierarchies of fields, departments, disciplines, divisions, and professional schools—the “silos” of the post-Humboldtian university—that they cannot adapt to the new modes of digital learning?²⁰ If that is the case, then it is important to work toward institutional change, not simply individual change. The cost is too high for individuals to bear alone, and value and esteem are conferred as part of institutions of credit and credentialing.

For those working within learning institutions, these are challenges. In fact, our institutions *are* changing. We see that

all around us. Catalyzing and defining those changes are complex processes, but our digital era holds promise only if we are prepared to work toward transforming our learning institutions. Such transformation is not just part of this book's aspirations for digital learning but, at the same time, fulfills its aspirations for the future of learning institutions.²¹

Portfolio of Virtual Learning Environments

Innovative and experimental ideas for schools are being fueled by new digitally enabled possibilities (see figures 2.3–2.11).

Box 3

Gaming and Virtual Environments in Education

Not only is educational gaming starting to be perceived as a viable alternative to formal education, other types of virtual environments and massively multiplayer online games are being recognized for their educational components. Some of the most popular examples of these educational alternatives are described below.

Virtual Worlds

An undergraduate course, "Field Research Methods in Second Life," conducted entirely in the virtual world of Second Life, was taught by Ed Lamoureux of Bradley College in January 2007. Due to the success of this class, Lamoureux, known as Professor Believeau in Second Life, created two courses based on the same principles, "Introduction to Field Research in Virtual Worlds" and "Field Research in Virtual Worlds."

Box 3

(Continued)



Figure 2.3

Bradley College professor Ed Lamoureux with his avatar, Professor Beliveau. (<http://www.bradley.edu/hilltopics/07spring/campusview>, accessed May 2, 2009)



Figure 2.4

Ryan Cult with his avatar, Judge Canned. (<http://www.bradley.edu/hilltopics/07spring/campusview>, accessed May 2, 2009)

Box 3

(Continued)

Single Player Computer Games

Classic computer games such as *SimCity* and *Civilization* are being given a new life through their use in the classroom because of their ability to simulate complete environments. These games are often used to teach students about building and maintaining social and physical institutions.



Figures 2.5
Screenshot of *SimCity*.

Box 3

(Continued)



Figures 2.6
Screenshot of *Civilization*.

Massively Multiplayer Online Games

Massively multiplayer online games are attracting scholarly attention as an important social phenomenon. Games such as *World of Warcraft* offer alternative worlds where social functions, learning, and the development of social, tactical, and work skills can be practiced in a virtual environment. Researchers are also beginning to look at these games as a way to model societies and social interactions.

Box 3

(Continued)



Figure 2.7
Screenshot of *World of Warcraft*.

Serious (or Educational) Games

The Gamelab Institute of Play (<http://www.instituteofplay.com>) promotes gaming literacy (which it defines as “the play, analysis, and creation of games”) as a foundation for learning, innovation, and change in a digital society. Although the Institute has been involved in several initiatives that target teenagers, such as the Quest to Learn school (see p. 24), it offers programs for all ages and technical abilities. In fact, one of its primary goals is to foster collaboration and an exchange of ideas between students, educators, and professionals. Through gaming, the Gamelab Institute of Play hopes to explore new ways to think, act, and create.

Box 3

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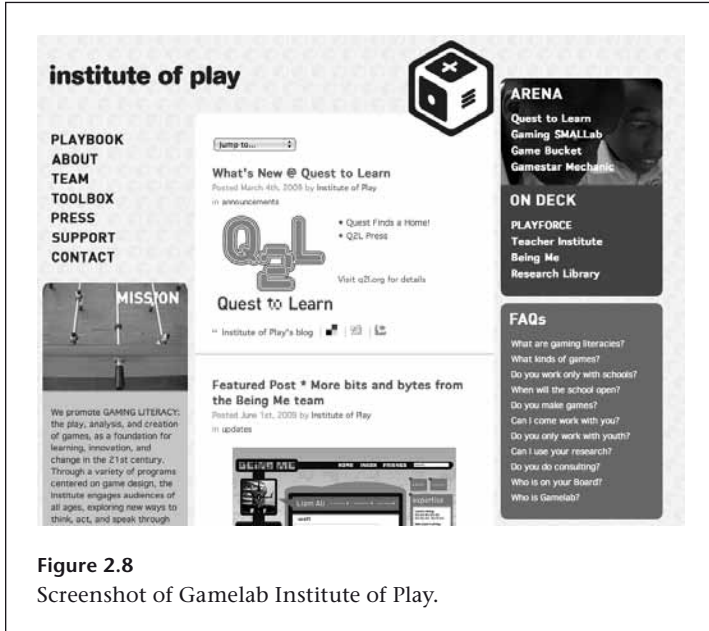


Figure 2.8
Screenshot of Gamelab Institute of Play.

Box 4

Quest to Learn School: New York, New York

Scheduled to open in Fall 2009, the Gaming School is a joint venture between the Gamelab Institute of Play (<http://www.instituteofplay.com>) and the nonprofit organization New Visions for Public Schools (<http://www.newvisions.org/index.asp>). This innovative middle and high school, conceptualized by Katie Salen, director of graduate studies in the digital design depart-

Box 4

(Continued)

ment at Parsons School of Design, redefines the learning paradigm. The school actively seeks to blur the traditional line between learning and play. It aims to prepare students for a digitally mediated future through a curriculum structured around the creation and execution of alternate reality games. The project will also act as a demonstration and research site for alternative trends in education funded in part by the MacArthur Foundation Digital Media and Learning Initiative.

**Figure 2.9**

Students of the Institute of Play (<http://www.flickr.com/photos/instituteofplay/2902732252/in/set-72157607611770213>, accessed June 29, 2009).

Box 4

(Continued)

**Figure 2.10**

Students of the NYC Museum School, New York (<http://www.southstreetseaportmuseum.org/index1.aspx?BD=9079>, accessed June 29, 2009).

The 400 high-school students at the NYC Museum School (<http://schools.nyc.gov/SchoolPortals/02/M414/default.htm>) spend up to three days a week at a chosen museum (either the American Museum of Natural History, the Metropolitan Museum of Art, the Children's Museum of Manhattan, or the South Street Seaport Museum) studying with specialists and museum educators. Students work on different projects depending on which museum they choose (i.e., geometry and computer animation at the Children's Museum or navigation at the South Street Seaport Museum). At the end of their senior year, students share a thesis-like project on a chosen theme. The NYC Museum

Box 4

(Continued)

School was founded in 1994 by a former Brooklyn Museum assistant director in partnership with a former teacher with the Lab School in New York. It has been featured in the Bill and Melinda Gates Foundation “High Schools for the New Millennium” report.

Box 5

The School of the Future, Philadelphia

The School of the Future in Philadelphia is unique in that it is the first urban high school to be built in a working partnership with a leading software company, Microsoft Corporation. The school opened in September 2006 and serves approximately 750 students in a state-of-the-art, high-tech, and ‘green’ facility. Microsoft’s Partners in Learning initiative played an integral part in the design and conceptualization of the school, not through a monetary donation (the School of the Future is funded by the School District of Philadelphia) but through the development of new technologies for both teaching and administrative purposes. Among the most innovative, and controversial, of these technologies is a smart card that allows access to digital lockers and that tracks calories consumed during school meals (breakfast and dinner are also served before and after school). Class schedules and locations change every day (the goal is to break down our culture’s dependency on time and place), and all rooms are designed with flexible floor plans to foster teamwork and project-based learning. Instead of a library and textbooks, all students are given a laptop with wireless access to the Interactive Learning Center, the

Box 5

(Continued)

**Figure 2.11**

Screenshot of the School of the Future, Philadelphia, Pennsylvania (<http://www.westparkcultural.org/?q=node/246>, accessed June 29, 2009).

school's hub for interactive educational material. These laptops are linked to smartboards in every classroom and networked so that assignments and notes can be accessed even from home. The building itself is also unique in its holistic approach. Rainwater is caught and repurposed for use in toilets, the roof is covered with vegetation to shield it from ultraviolet rays, panels embedded within the windows capture light and transform it into energy, room settings auto-adjust based on natural lighting and atmo-

Box 5

(Continued)

spheric conditions, and sensors in the rooms turn lights on and off depending on whether the space is being used. In short, the School of the Future incorporates many innovations but also has high-tech interactivity that borders on extreme surveillance that makes it a questionable model for future digital learning initiatives. For more information, see <http://www.microsoft.com/presspass/press/2006/sep06/09-06MSPhiladelphiaSOFPR.mspx> and <http://www.microsoft.com/education/SchoolofFuture.mspx>.

