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Confronting the Challenges of Participatory Culture

Media Education for the 21st Century

By: Henry Jenkins

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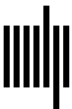
By: Henry Jenkins

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Core Media Literacy Skills

Play: The Capacity to Experiment with the Surroundings as a Form of Problem Solving

Play, as psychologists and anthropologists have long recognized, is key in shaping children's relationships to their bodies, tools, communities, surroundings, and knowledge. Most of children's earliest learning comes through playing with the materials at hand. Through play, children try on roles, experiment with culturally central processes, manipulate core resources, and explore their immediate environments. As they grow older, play can motivate other forms of learning.

Mary Louise Pratt describes what her son and his friend learned through baseball card collecting:

Sam and Willie learned a lot about phonics that year by trying to decipher surnames on baseball cards, and a lot about cities, states, heights, weights, places of birth, stages of life. . . . And baseball cards opened the door to baseball books, shelves and shelves of encyclopedias, magazines, histories, biographies, novels, books of jokes, anecdotes, cartoons, even poems. . . . Literacy began for Sam with the newly pronounceable names

on the picture cards and brought him what has been easily the broadest, most varied, most rewarding, and most integrated experience of his 13-year life.⁴⁰

Pratt's account suggests this playful activity motivated three very different kinds of learning. First, the activity itself demanded certain skills and practices that had clear payoffs for academic subjects. For example, working out batting averages gave Sam an occasion to rehearse his math skills, arranging his cards introduced him to the process of classification, and discussing the cards gave him reason to work on his communication skills. On another level, the cards provided a scaffold that motivated and shaped his acquisition of other forms of school knowledge. The cards inspired Sam to think about the cities where the teams were located and acquire map-reading skills. The history of baseball provided a context through which to understand twentieth-century American history. The interest in stadiums introduced some basics of architecture. Third, Sam developed a sense of himself as a learner: "He learned the meaning of expertise, of knowing about something well enough that you can start a conversation with a stranger and feel sure of holding your own."⁴¹

Game designer Scott Osterweill (*The Logical Journey of the Zoobinis*) has described the mental attitude that surrounds play as highly conducive for learning:

When children are deep at play they engage with the fierce, intense attention that we'd like to see them apply to their schoolwork. Interestingly enough, no matter how intent and focused a child is at that play, maybe even grimly determined they may be at that game play, if you asked them afterwards, they will say that they were having fun. So, the

fun of game play is not non-stop mirth but rather the fun of engaging of attention that demands a lot of you and rewards that effort. I think most good teachers believe that in the best moments, classroom learning can be the same kind of fun. But a game is a moment when the kid gets to have that in spades, when the kid gets to be focused and intent and hardworking and having fun at the same time.⁴²

You will note here a shift in emphasis from fun (which in our sometimes still-puritanical culture gets defined as the opposite of seriousness) to engagement. When individuals play games, a fair amount of what they end up doing is not especially fun at the moment. It can be a grind, not unlike homework. The effort allows the person to master skills, collect materials, or put things in their proper place in anticipation of a payoff down the line. The key is that this activity is deeply motivated. The individual is willing to go through the grind because there is a goal or purpose that matters to the person. When that happens, individuals are engaged, whether that be the engagement in professional lives or the learning process or the engagement that some find through playing games. For the current generation, games may represent the best way of tapping that sense of engagement with learning.

To date, much of the discussion of games and education has considered games as a tool to motivate youths to learn other kinds of content (Pratt's move from baseball cards to geogra-

For the current generation, games may represent the best way of tapping a sense of engagement with learning.

phy), but there is a growing recognition that play itself—as a means of exploring and processing knowledge and of problem solving—may be a valuable skill children should master in preparation for subsequent roles and responsibilities in the adult world.

Part of what makes play valuable as a mode of problem solving and learning is that it lowers the emotional stakes of failing: players are encouraged to suspend some of the real-world consequences of the represented actions, to take risks and learn through trial and error. The underlying logic is one of die and do over. As Gee has noted, children often feel locked out of the worlds described in their textbooks through the depersonalized and abstract prose used to describe them.⁴³ Games construct compelling worlds for players to move through. Players feel a part of those worlds and have some stake in the events unfolding. Games do not only provide a rationale for learning: what players learn is put to use immediately to solve compelling problems with real consequences in the world of the game. Game designer Will Wright (*SimCity*, *The Sims*) has argued:

In some sense, a game is nothing but a set of problems. We're actually selling people problems for 40 bucks a pop. . . . And the more interesting games in my opinion are the ones that have a larger solution space. In other words, there's not one specific way to solve a puzzle, but, in fact, there's an infinite range of solutions. . . . The game world becomes an external artifact of their internal representation of the problem space.⁴⁴

For Wright, the players' hunger for challenge and complexity motivates them to pick up the game in the first place.

Games follow something akin to the scientific process. Players are asked to make their own discoveries and then apply what

Children often feel locked out of the worlds described in their textbooks through the depersonalized and abstract prose used to describe them. Games construct compelling worlds for players to move through. Players feel a part of those worlds and have some stake in the events unfolding.

they learn to new contexts. No sooner does a player enter a game than he or she begins by identifying core conditions and looking for problems that must be addressed. On the basis of the available information, the player poses a certain hypothesis about how the world works and the best ways of bringing its properties under his or her control. The player tests and refines that hypothesis through actions in the game, which either fail or succeed. The player refines the model of the world as he or she goes. More sophisticated games allow the player to do something more, to experiment with the properties of the world, to frame new possibilities, which involves manipulating relevant variables and seeing what happens. Meta-gaming, the discourse that surrounds games, provides a context for players to reflect on and articulate what they have learned through the game. Here, for example, is how Kurt Squire describes the meta-gaming that occurs with *Civilization III*:

Players enroll as advanced players, having spent dozens, if not hundreds, of hours with the game and having mastered its basic rules. As players begin to identify and exploit loopholes, they propose and implement changes to the games' rules, identify superior strategies, and invent new game rule systems, including custom modifications and scenarios.⁴⁵

Some have expressed skepticism that schools should or could teach young people how to play. This resistance reflects the confusion between play as a source of fun and play as a form of engagement. Play in the context argued here is a mode of active engagement, one that encourages experimentation and risk taking, one that views the process of solving a problem as important as finding the answer, one that offers clearly defined goals and roles that encourage strong identifications and emotional investments. This form of play is closely related to two other important skills: simulation and performance.

What Might Be Done

Educators (in school and out) have been tapping into play as a skill by encouraging free-form experimentation and open-ended speculation.

- History teachers ask students to entertain alternative history scenarios, speculating on what might have happened if Germany had won World War II or if Native Americans had colonized Europe. Such questions can lead to productive explorations centering on why and how certain events occurred, and what effects they had. Such questions also have no right and wrong answers: they emphasize creative thinking rather than memorization, they allow diverse levels of engagement, they allow students to feel less intimidated by adult expertise, and they also lend themselves to the construction of arguments and the mobilization of evidence.
- Art and design students are turned loose with a diverse array of everyday materials and encouraged to use them to solve a

specified design problem. Such activities encourage students to revisit familiar materials and everyday objects with fresh perspectives, to think through common problems from multiple directions, and to respect alternative responses to the same challenge. This approach is closely associated with the innovative design work of Ideo, a Palo Alto consultancy, but can also be seen in various reality television programs, such as *Project Runway* or *Iron Chef*, that require contestants to adopt distinctive and multiple approaches to shared problems.

- Games offer the potential for learning through a new form of direct experience. Physics teachers use the game *Supercharged*, which was developed as part of the MIT Games to Teach initiative, to help students better understand core principles of electromagnetism. Using the game as a means for learning the laws of electromagnetism through first-hand experience, students navigate electromagnetic mazes by planting electrical charges that attract or repel their vehicles. Teachers can then build on this intuitive and experiential learning in the classroom, introducing equations, diagrams, or visualizations that help the students better understand the underlying principles that they are deploying before sending them back to play through the levels again and improve their performance.

Simulation: The Ability to Interpret and Construct Dynamic Models of Real-World Processes

New media provides powerful new ways of representing and manipulating information. New forms of simulation expand our cognitive capacities, allowing us to deal with larger bodies

of information, to experiment with more complex configurations of data, and to form hypotheses quickly and test them against different variables in real time. The emergence of systems-based thinking has arisen hand in hand with the development of digital simulations. Across a range of academic and professional fields, simulations can be effective in representing acquired knowledge or in testing emerging theories. Because simulations are dynamic, and because they are governed by the systematic application of grounding assumptions, they can be a tool for discovery as researchers observe the emergent properties of these virtual worlds. We learn through simulations by a process of trial and error: new discoveries lead researchers to refine their models by tweaking particular variables and trying out different contingencies. Educators have always known that students learn more through direct observation and experimentation than from reading about something in a textbook or listening to a lecture. Simulations broaden the kinds of experiences users can have with compelling data, giving them a chance to see and do things that would be impossible in the real world.

Contemporary video games allow youths to play with sophisticated simulations and, in the process, to develop an intuitive understanding of how we might use simulations to test our assumptions about the way the world works. John Seely Brown,

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former head of Xerox Parc, tells the story of sixteen-year-old Colin, whose understanding of the ancient world had been shaped by the game *Caesar III*:

Colin said: “I don’t want to study Rome in high school. Hell, I build Rome every day in my on-line game.” . . . Of course, we could dismiss this narrative construction as not really being a meaningful learning experience, but a bit later he and his dad were engaged in a discussion about the meaningfulness of class distinctions—lower, middle, etc.—and his dad stopped and asked him what class actually means to him. Colin responded:

“Well, it’s how close you are to the Senate.”

“Where did you learn that, Colin?”

“The closer you are physically to the Senate building, the plazas, the gardens, or the Triumphal Arch raises the desirability of the land, makes you upper class and produces plebeians. It’s based on simple rules of location to physical objects in the games [Caesar III].”

Then, he added, “I know that in the real world the answer is more likely how close you are to the senators, themselves—that defines class. But it’s kinda the same.”⁴⁶

Colin’s story illustrates two important aspects of simulations for learning. First, students often find simulations far more compelling than more traditional ways of representing knowledge; consequently, they spend more time engaging with them and make more discoveries. Second, students experience what they have learned from a robust simulation as their own discoveries. These simulations expose players to powerful new ways of seeing the world and encourage them to engage in a process of modeling, which is central to the way modern science operates. Many contemporary games—*Railroad Tycoon*, for instance—incorporate spreadsheets, maps, graphs, and charts that students

must learn to use to play the game. Students are thus motivated to move back and forth across this complex and integrated information system, acting on the simulated environment on the basis of information gleaned from a wide range of different representations.

As games researcher Eric Klopfer cautions, however, simulations enhance learning only when we understand how to read them:

As simulations inform us on anything from global warming to hurricane paths to homeland security, we must know how to interpret this information. If we know that simulations give us information on probabilities we can make better decisions. If we understand the assumptions that go into simulations we can better evaluate that evidence and act accordingly. Of course this applies to decision makers who must act upon that information (police, government, insurance, etc.); it also is important that each citizen should be able to make appropriate decisions themselves based on that information. As it is now, such data is either interpreted by the general public as “fact” or on the contrary “contrived data with an agenda.” Neither of these perspectives is useful and instead some ability to analyze and weigh such evidence is critical. Simulations are only as good as their underlying models. In a world of competing simulations, we need to know how to critically assess the reliability and credibility of different models for representing the world around us.⁴⁷

Students who use simulations in learning have more flexibility from customizing models and manipulating data to exploring questions that have captured their own curiosity. There is a thin line between reading a simulation (which may involve changing variables and testing outcomes) and designing simulations. As new modeling technologies become more widely available and as the toolkits needed to construct such models

are simplified, students have the opportunity to construct their own simulations. Ian Bogost argues that computer games foster what he calls *procedural literacy*, a capacity to restructure and reconfigure knowledge to look at problems from multiple vantage points, and through this process to develop a greater systemic understanding of the rules and procedures that shape our everyday experiences. He writes, “Engendering true procedural literacy means creating multiple opportunities for learners—children and adults—to understand and experiment with reconfigurations of basic building blocks of all kinds.”⁴⁸ Young people are learning how to work with simulations through their game play, and schools should build on such knowledge to help them become critical readers and effective designers of simulation and modeling tools. They need to develop a critical vocabulary for understanding the kind of thought experiments performed in simulations and the way these new digital resources inform research across a range of disciplines.

What Might Be Done

Students need to learn how to manipulate and interpret existing simulations and how to construct their own dynamic models of real-world processes.

- Teachers in business classes often ask students to make imaginary investments in the stock market and then monitor actual business reports to track the rise and fall of their “holdings.” This well-established classroom practice mirrors what youths do when they form fantasy sports leagues, tracking the performance of players on the sports page to score their results and engaging in imaginary trades to enhance their team’s overall

standings. Both of these practices share movement between imaginary scenarios (pretend investments or teams) and real-world data. The simulated activities introduce them to the logic by which their real-world counterparts operate and to actual data sets, research processes, and information sources.

- Groups such as OnRampArts in Los Angeles, Urban Games Academy in Baltimore and Atlanta, or Global Kids in New York City involve kids in the design of their own games. These groups see a value in having youths translate a body of knowledge—the history of the settlement of the New World, in the case of OnRampArts’ Tropical America—into the activities and iconography of games. Here, students are encouraged to think of alternative ways of modeling knowledge, and they learn to use the vocabulary of game design to represent central aspects of the world around them.
- Simulation games such as *SimCity* provide a context for learning a skill Andy Clark calls *embracing co-control*.⁴⁹ In *SimCity*, creating and maintaining a city requires exerting various forms of indirect control. Instead of having top-down control to design a happy, thriving city, the player must engage in a bottom-up process, where the player “grows” a city by manipulating such variables as zoning and land prices. It is only through gaining a familiarity with all the parts of the system, and how they interact, that the player is able to nudge the flow in a way that respects the flow. Such a skill can be understood as a process of “com[ing] to grips with decentralized emergent order,”⁵⁰ a mandatory skill for understanding complex systems.
- Students in New Mexico facing a summer of raging forest fires throughout their home state used simulations to understand

how flames spread. Manipulating factors such as density of trees, wind, and rain, they saw how even minute changes to the environmental conditions could have profound effects on fire growth. This helped them understand the efficacy of common techniques such as forest thinning and controlled burns.

Performance: The Ability to Adopt Alternative Identities for the Purpose of Improvisation and Discovery

We have thus far focused on game play as a mode of problem solving that involves modeling the world and acting on those models. Yet, game play also is one of a range of contemporary forms of youth popular culture that encourage young people to assume fictive identities and, through this process, develop a richer understanding of themselves and their social roles. In *What Video Games Have to Teach Us about Learning and Literacy*, Gee coins the term *projective identity* to refer to the fusion that occurs between game players and their avatars, the personas they assume in the game. Gee sees the term as playing on two senses of the word *project*: “to project one’s values and desires onto the virtual character” and “seeing the virtual character as one’s own project in the making.”⁵¹ This projected identity allows the player to strongly identify with the character and thus have an immersive experience within the game, and at the same time to use the character as a mirror to reflect on his or her own values and choices.

Testing the educational video game *Revolution* with middle-school students, Russell Francis found several compelling examples in which projected identities had pedagogical payoffs for

participants. For example, Margaret played a loyalist character in the game, which is set in colonial Williamsburg on the eve of the American Revolution, and was shaken when she was shot by the redcoats in the midst of a street riot:

The townspeople were very mad. They went to the Governor's mansion to attack. I support the red coats, but they started shooting at me, and then they arrested me. I felt horrified that they would do something like that to me. I don't even believe in violence. I wonder what is going to happen to me. I run the tavern and I have no family. Will I get sent back to England or will I be able to stay here?⁵²

She had seen herself as a supporter of the British troops, and at worst an innocent bystander, but she came away from the experience with critical insights about political violence.

Francis built on this process of introspection and projection by asking students to write journals or compose short films reflecting in character on the events that unfolded in the game. In constructing and inhabiting these virtual characters, participants drew together multiple sources of knowledge, mixing things they had read or learned in other educational contexts, information explicitly contained within the game, and their own introspection based on life experiences to create characters that were more compelling to them than the simple digital avatars the designers had constructed. The process closely parallels what actors do when preparing for a role. Here, for example, is how a young African-American girl explained her experiences in playing Hannah, a house slave (an explanation that reaches well beyond anything explicitly present in the game; she even invents actions for the nonplayer characters in order to help her make sense of her place in the social order being depicted):

You don't really have as much support as you would like because being a house slave they call you names, just because most of the time you're lighter skin—you're the master's kid technically. . . . I had to find the ways to get by because, you know, it was hard. On one side, you don't want to get on the Master's bad side because he can beat you. On the other side, the slaves, they ridicule you and are being mean.⁵³

Children acquire basic literacies and competencies by learning to manipulate core cultural materials. In *The Braid of Literature: Children's World of Reading*, Wolf and Heath trace the forms of play that shaped Wolf's two preschool-aged daughters' relationship to the "world of words" and stories. Wolf and Heath are interested in how children embody the characters, situations, generic rules, and even specific turns of phrase through their sociolinguistic play. Children do not simply read books or listen to stories; they reenact these narratives in ways that transform them and in this process, the authors argue, children demonstrate that they understand what they have read. This play helps them to navigate the world of stories and, at the same time, elements of stories help them to navigate real-world social situations. Children learn to verbalize their experiences of reading through these performances, and in the process they develop an analytic framework for thinking about literacy.⁵⁴

Anne Haas Dyson's *Writing Superheroes: Contemporary Childhood, Popular Culture, and Classroom Literacy* extends this analysis of the connection between performance and literacy into the classroom, exploring how educators have used dramatizations to teach children to reflect more deeply on their experiences of stories.⁵⁵ Wolf and Heath describe individualized play in the context of the home; Dyson recounts social play among peers. In both cases, children start with a shared frame of reference—

stories they have in common, genres they all understand—to ensure that they understand the roles they are to play and the rules of their interaction. Performing these shared fantasies (such as the scenarios that emerge in superhero comics) allows children to better understand who they are and how they connect with the other people around them.

Role-play is very popular with contemporary youths, whether it be the cosplay of young anime fans (costume play based on characters from anime), the fusion with a digital avatar in computer gaming or fantasy role-play, or the construction of alternative personas in subculture communities such as the Goths. Such play has long been understood as testing identities, trying on possible selves, and exploring different social spaces. Susannah Stern stresses the forms of self-representation that are evident on teenagers' Web sites and blogs: "The ability to repeatedly reinvent oneself is particularly appealing since home pages and blogs can be updated as often as desired and because they may be produced anonymously."⁵⁶

These more elaborate and complex forms of role-play may also provide a point of entry into larger spheres of knowledge. Consider, for example, this interview with a seventeen-year-old American girl:

I have been really interested in Japanese culture since I was in sixth grade. When I was in the seventh grade, I started studying Japanese on my own. When I got into high school, I started taking Japanese courses at Smith College. I got into costuming through anime, which is actually how I got interested in Japanese. And I taught myself how to sew. . . . I'm a stage hog. I like to get attention and recognition. I love acting and theater. The biggest payoff of cos-play [costume play] is to go to the conventions where there are other people who know who you are dressed as

and can appreciate your effort. At the first convention I ever went to, I must have had fifty people take my picture and at least ten of them came up and hugged me. It's almost like whoever you dress up as, you become that person for a day. . . . People put the pictures up on their websites after the con. So after a con, you can search for pictures of yourself and if you are lucky, you will find five or ten.⁵⁷

For this young girl, assuming the role of a Jpop (Japanese pop) character demonstrates her mastery over favorite texts. Assuming this new identity requires a close analysis of the originating texts, genre conventions, social roles, and linguistic codes. She must go deep inside the story to find her own place within its world. In this case, she also has to step outside the culture that immediately surrounds her to embrace a text from a radically different cultural tradition. She has sought out more information about forms of Asian popular culture. In the process, she has begun to reimagine her relations to the world—as part of an international fan culture that remains deeply rooted in the everyday life of Japan. This search for more information expresses itself across a range of media: the videos or DVDs she watches of Japanese anime, the MP3 or CD recordings of Jpop music, information on the Internet and information she shares with her fellow fans about her own activities, the costumes she generates as well as the photographs of her costumes, the magazines and comics she reads to learn more about Japanese popular culture, and her face-to-face contacts with fellow fans. These activities that center on popular culture in turn translate into other types of learning. As a middle-school student, she began to study Japanese language and culture first on her own and later at a local college.

Role-play should be seen as a fundamental skill used across multiple academic domains. Whether it be children on a playground acting out and deciphering the complex universe of Pokémon, Orville Wright pretending to be a buzzard gliding over sand dunes, or Albert Einstein imagining himself to be a photon speeding over the earth, role-playing enables us to envision and collaboratively theorize about manipulating entirely new worlds.

Role-play, in particular, should be seen as a fundamental skill used across multiple academic domains. So far, we have suggested its relevance to history, language arts, and cultural geography. Yet, this only scratches the surface. Whether it be children on a playground acting out and deciphering the complex universe of Pokémon, Orville Wright pretending to be a buzzard gliding over sand dunes, or Albert Einstein imagining himself to be a photon speeding over the earth, role-playing enables us to envision and collaboratively theorize about manipulating entirely new worlds. Consider, for example, the way role-play informs contemporary design processes. Increasingly, designers construct personae of would-be users, which can serve to illustrate different contexts of use or different interests in the product. These personae are then inserted into fictional scenarios, allowing designers to test the viability of a design and its ability to serve diverse needs. In some cases, this process also involves the designers themselves acting out the different roles and thereby identifying the strengths and limits of their approaches. Improvisational performance, then, represents an important life skill, one that balances problem solving and creative expression, invites a reimagining of self and world,

and allows participants to examine a problem from multiple perspectives.

Educators have for too long treated role-play as a means to an end, a fun way to introduce other kinds of content, but we argue that role-play skills may be valuable in their own right and are increasingly central to the way adult institutions function. Performance brings with it capacities to understand problems from multiple viewpoints, to assimilate information, to exert mastery over core cultural materials, and to improvise in response to a changing environment. As with play and simulation, performance places a new stress on learning processes, more on how we learn rather than on what we learn. These learning processes are likely to sustain growth and learning well beyond the school years.

What Might Be Done

Performance enters into education when students are asked to adopt fictive identities and think through scenarios from those characters' perspectives. These identities may be assumed within the physical world or in the virtual world.

- The Model United Nations, a well-established educational project, brings together students from many different schools, each representing delegations from different member countries. Over the course of a weekend, participants work through current debates in foreign policy and simulate the actual procedures and policies of the international organization. Students prepare for the Model United Nations by conducting library research, listening to lectures, and participating in group discussions; they return from the event to share what they learned with other classmates through presentations and written reports.

- The Savannah Project, created by researchers at the University of Bristol, encourages children to play the parts of lions stalking their prey. As they navigate physical spaces, such as the school playground, they receive fictional data via handheld devices. This approach encourages students to master the complex ecosystem of the veldt from the inside out—learning the conditions that impinge on the lion’s chances of survival and the skills they need to feed on other local wildlife.
- Teachers in a range of subjects can deploy what David Shaffer calls *epistemic games*.⁵⁸ In an epistemic game, the game world is designed to simulate the social context of a profession (say, urban planning), and by working through realistic but simulated problems, players learn the ways of acting, interacting, and interpreting that are necessary for participating in the professional community. In effect, rather than memorizing facts or formulas, through performances of being an urban planner, lawyer, doctor, engineer, carpenter, historian, teacher, or physicist, the player learns these professions’ particular ways of thinking.
- Medieval Space, a MySpace clone created by teachers at Byrd Middle School, asked students to create online profiles for the various historical figures studied in their classes. Rather than seeing figures such as Richard III, Henry VI, and Queen Elizabeth as distinct characters, students explored the complex social relationships among them by imagining how they might have interacted had they had online spaces in the fifteenth and sixteenth centuries. For example, students were asked to imagine what their character’s current song might be, with 2Pac’s “Only God Can Judge Me Now” listed for Richard III.⁵⁹

Appropriation: The Ability to Meaningfully Sample and Remix Media Content

Journalists have frequently used *Napster generation* to describe the young people who have come of age in this era of participatory culture, reducing their complex forms of appropriation and transformation into the simple—arguably illegal—action of ripping and burning someone else’s music and sharing the files. Recall that the Pew study found that almost one-quarter of American teens had sampled and remixed existing media content (music, film clips, images, etc.).⁶⁰ The digital remixing of media content makes visible the degree to which all cultural expression builds on what has come before it. Appropriation is understood here as a process by which students learn by taking culture apart and putting it back together.

Art does not emerge out of whole cloth from individual imaginations. Rather, it emerges through the artist’s engagement with previous cultural materials. Artists build on, are inspired by, appropriate, and transform other artists’ work. They do so by tapping into a cultural tradition or by deploying the conventions of a particular genre. Beginning artists often undergo an apprenticeship, during which they try on for size the styles and techniques of other, more established artists. Even well-established artists work with images and themes that have some currency within the culture. Of course, this is not how we generally

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Homer remixed Greek myths to construct *The Iliad* and *The Odyssey*; Shakespeare sampled his plots and characters from other author's plays; the Sistine Chapel ceiling mashes up stories and images from across the entire biblical tradition.

talk about creativity in schools, where the tendency is to discuss artists as individuals who rise above or stand outside any aesthetic tradition. All artists work within traditions; they all also violate conventions. School discourse, however, focuses on one over the other.

Our focus on autonomous creative expression falsifies the actual process by which meaning is generated and new works produced. Most of the classics we teach in the schools are themselves the product of appropriation and transformation, or what we would now call *sampling* and *remixing*. Homer remixed Greek myths to construct *The Iliad* and *The Odyssey*; Shakespeare sampled his plots and characters from other author's plays; the Sistine Chapel ceiling mashes up stories and images from across the entire biblical tradition. Lewis Carroll spoofs the vocabulary of exemplary verses that were then standard to formal education. Many core works of the Western canon emerged through a process of retelling and elaboration: the figure of King Arthur shifts from an obscure footnote in an early chronicle to the full-blown character in *Le Morte d'Arthur* within a few centuries, as the original story is built on by many generations of storytellers.

Many of the forms of expression that are most important to American youths accent this sampling and remixing process, in part because digitization makes it much easier to combine and

repurpose media content than ever before. Jazz, for example, evolved through improvisation around familiar themes and standard songs, yet the digital remixing of actual sounds that occurs in techno or hip-hop music has raised much greater alarm among those who would insist on strong copyright protection. Fan fiction (stories about characters or settings in original works written by fans of the original work, not by the original authors) clearly involves the transformative use of existing media content, yet it is often treated as if it were simply a new form of piracy. Collage has been a central artistic practice throughout the twentieth century, one closely associated with the kinds of new creative works that youths are generating by manipulating images with software such as Photoshop. Despite the pervasiveness of these cultural practices, arts and creative-writing programs in schools remain hostile to overt signs of repurposed content, emphasizing the ideal of the autonomous artist. In doing so, they sacrifice the opportunity to help youths think more deeply about the ethical and legal implications of repurposing existing media content, and they often fail to provide the conceptual tools students need to analyze and interpret works produced in this appropriative process.

Appropriation may be understood as a process that involves both analysis and commentary. Sampling intelligently from the

Arts and creative-writing programs in schools remain hostile to overt signs of repurposed content, emphasizing the ideal of the autonomous artist. In doing so, they sacrifice the opportunity to help youths think more deeply about the ethical and legal implications of repurposing existing media content.

existing cultural reservoir requires a close analysis of the existing structures and uses of this material; remixing requires an appreciation of emerging structures and latent potential meanings. Often remixing involves the creative juxtaposition of materials that otherwise occupy very different cultural niches. For beginning creators, appropriation provides a scaffolding, allowing them to focus on some dimensions of cultural production and rely on the existing materials to sustain others. They are able, for example, to focus more attention on description or exposition if they can build on existing characters and plots. They learn how to capture the voice of a character by trying to mix borrowed dialog with their own words. Mapping their emotional issues onto preexisting characters allows young writers to reflect on their own lives from a certain critical distance and work through issues, such as their emerging sexualities, without facing the stigma that might surround confessing such feelings in an autobiographical essay. These students learn to use small details in the original works as probes for their own imagination, overcoming some of the anxiety of staring at a blank computer screen. Building on existing stories attracts wider interest in their work, allowing it to circulate far beyond the community of family and friends. In turn, because they are working with a shared narrative and many others have a stake in what happens to these characters, they receive more feedback on their writing.

Sampling intelligently from the existing cultural reservoir requires a close analysis of the existing structures and uses of this material; remixing requires an appreciation of emerging structures and latent potential meanings.

What Might Be Done

Appropriation enters education when learners are encouraged to dissect, transform, sample, or remix existing cultural materials.

- The MIT Comparative Media Studies Program hosts a workshop each year asking students to work in teams to think through what would be involved in transforming an existing media property (a book, film, television series, or comic book) into a video or computer game and then preparing a “pitch” presentation for their game. Beginning with a preexisting property allows students to start quickly and more or less on equal footing because they are able to build on a text they have in common as readers rather than one created by an individual student author. The process of identifying core properties of the original work teaches students important skills in narrative and formal analysis, while the development of an alternative version of the story in another medium emphasizes the creative expansion of the original content.⁶¹
- The crew of Public Radio International’s program *Sound & Spirit* has encouraged students in the greater Boston area to develop scripts and record radio broadcasts that use critical commentary of existing songs to explore a common theme or topic. They have found that this process of sampling and remixing music motivates youths to think more deeply about the sounds they hear around them and motivates them to approach school-related topics from a fresh perspective.
- Artist and filmmaker Juan Devis has been working with the University of Southern California Film School, the Institute for Media Literacy, and the Los Angeles Leadership Academy on a project with minority youths. The youths will develop an online

game based on Mark Twain's *Huckleberry Finn*. Devis drew a number of strong parallels between the experiences of minority youths in Los Angeles and the world depicted in Twain's novel—including parallels between "crews" of taggers and the gang of youths that surrounds Huck and Tom, the use of slang as a means of separating themselves from their parents' culture, the complex experience of race in a society undergoing social transitions, and the sense of mobility and "escape" from adult supervision.⁶²

▪ Ricardo Pitts-Wiley, the artistic director of Mixed Magic Theatre, has been working with students from high schools in Pawtucket, Rhode Island, to develop his "urban Moby Dick" project. Students have worked closely with mentors—artists, law enforcement officers, and business leaders from the local community—to explore Herman Melville's classic novel together. Through a process of reading, discussion, improvisation, and writing, they are scripting and staging a modern version of the classic whaling story, one that acknowledges the realities of contemporary urban America. In their version, the "Great White" turns out not to be a whale but an international drug cartel. Ish and Quay are two members of Ahab's posse as he goes after the vicious force that took his leg and killed his wife. Through reimagining and reworking Melville's story, they have come to a deeper understanding of the relationships between the characters and of some of the core themes of male bonding and obsession that run through the book.⁶³

▪ Renee Hobbs, a twenty-year veteran of the media literacy movement, recently launched a new Web site—*My Pop Studio*—that encourages middle-school and early-high-school girls to reflect more deeply about some of the media they consume—

pop music, reality television, celebrity magazines—by stepping into the roles of media producers. The site offers a range of engaging activities, including designing an animated pop star and scripting their next sensation, reediting footage for a reality television show, and designing the layout for a teen magazine. They are asked to reflect on the messages the media offers on what it is like to be a teen girl in America today and to think about the economic factors shaping the culture that has become so much a part of their everyday interactions with their friends.⁶⁴

Multitasking: The Ability to Scan the Environment and Shift Focus onto Salient Details

Perhaps one of the most alarming changes, in adults' view, is the perceived decline of young people's attention span with the rise of digital media. Attention is undoubtedly an important cognitive ability. All information to be processed by our brains is temporarily held in short-term memory, and the capacity of our short-term memory is sharply limited.⁶⁵ Attention is critical. Learners must filter out extraneous information and sharpen their focus on the most salient details of their environment. Instead of focusing on narrowing attention, young people often respond to a rich media environment by multitasking—scanning for relevant shifts in the information flow while simultaneously taking in multiple stimuli. Multitasking and attention should not be seen as oppositional forces. Rather, we should think of them as two complementary skills, both strategically employed by the brain to intelligently manage constraints on short-term memory. Whereas attention seeks to prevent information overload by controlling what information

enters short-term memory, successful multitaskers seek to reduce demands on short-term memory by mapping where different information is externally stored within their immediate environment.

In “Growing up Digital,” John Seely Brown describes an encounter he had:

Recently I was with a young twenty-something who had actually wired a Web browser into his eyeglasses. As he talked with me, he had his left hand in his pocket to cord in keystrokes to bring up my Web page and read about me, all the while carrying on with his part of the conversation! I was astonished that he could do all this in parallel and so unobtrusively. . . . People my age tend to think that youths who are multiprocessing can't be concentrating. That may not be true. Indeed, one of the things we noticed is that the attention span of the teens at PARC—often between 30 seconds and five minutes—parallels that of top managers, who operate in a world of fast context-switching. So the short attention spans of today's youth may turn out to be far from dysfunctional for future work worlds.⁶⁶

Currently, young people are playing with these skills as they engage with games or social activities that reward the ability to maintain a mental picture of complex sets of relationships and to adjust quickly to shifts in perceptual cues. The multitasking process is already evident in the “scrawl” on television news: the screen is a series of information surfaces, each containing a relevant bit of data, none of which offers the complete picture.⁶⁷ Our eyes scan across electoral maps and ticker tapes, moving images and headlines, trying to complete a coherent picture of the day's events and to understand the relationship between the visuals. Similarly, as Gunther Kress notes, the contemporary textbook increasingly deploys a broader array of different

modalities as it represents information students need to know about a given topic.⁶⁸ Here, again, readers are being taught to scan the informational environment rather than fix attention on a single element.

Historically, we might have distinguished between the skills required of farmers and those expected of hunters. The farmer must complete a sequence of tasks that require localized attention; the hunter must scan a complex landscape in search of signs and cues of where prey may be hiding. For centuries, schools have been designed to create “farmers.”⁶⁹ In such an organization, the ideal is for all students to focus on one thing; indeed, attention is conceived of as the ability to concentrate on one thing for an extended period of time, while the inability or refusal to maintain such a narrow focus is characterized as a “disorder.” Yet, fixed attention would be maladjusted to the needs of hunters, who must search high and low for their game. Schools adapted to the needs of “hunters” would have very different practices and might well value the ability to identify the relationship between seemingly unrelated developments within a complex visual field. As we look to the future, one possibility is that schools will be designed to support both styles, ensuring that each child develops multiple modes of learning and multiple strategies for processing information. In such a world, neither attentional style is viewed as superior, but both are assessed in terms of their relative value within a given context.

Multitasking often is confused with distraction, but, as understood here, multitasking involves a method of monitoring and responding to the sea of information around us. Students need help distinguishing between being off task and handling multiple tasks simultaneously. They must learn to recognize the rela-

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relationship between information coming at them from multiple directions and making reasonable hypotheses and models based on partial, fragmented, or intermittent information (all part of the world they will confront in the workplace). They need to know when and how to pay close attention to a specific input as well as when and how to scan the environment to search for meaningful data.

What Might Be Done

Multitasking enters pedagogical practice when teachers recognize the desires of contemporary students to come at topics from multiple directions all at the same time or to maintain what some have called “continuous partial attention,” interacting with homework materials while engaged in other activities.

- A teacher’s assistant blogs in real time in response to the classroom instructor’s lectures, directing students’ attentions to relevant links that illustrate and enhance the content being discussed, rather than providing distractions from the core activity. Students are encouraged to draw on this related material as they engage in classroom discussion, grounding their comments in specific examples and quotations from relevant documents.

- At the Brearley School in Manhattan, foreign-language class materials are transferred directly from the school's computer servers to students' iPods. Rather than needing to set aside dedicated study time to practice a foreign language, students can access their homework and foreign songs while walking home from classes or engaging in other activities.⁷⁰
- The online game *Cyber Nations*, a simulation that helps players learn about nation building and international diplomacy, breaks player actions down into distinct choices that can be made at the player's own pace. This encourages players to keep a browser window open to periodically check for updates from their nation throughout the day while working on other tasks, rather than playing the game only during a dedicated play time. Homework assignments in the form of online games could be designed in a similar manner to facilitate patterns of multi-tasking.

Distributed Cognition: The Ability to Interact Meaningfully with Tools That Expand Mental Capacities

Challenging the traditional view that intelligence is an attribute of individuals, the distributed cognition perspective holds that intelligence is distributed across "brain, body, and world,"⁷¹ looping through an extended technological and sociocultural environment.⁷² Explaining this idea, Roy Pea notes, "When I say that intelligence is distributed, I mean that the resources that shape and enable activity are distributed in configurations across people, environments, and situations. In other words, intelligence is accomplished rather than possessed."⁷³ Work in distributed cognition focuses on forms of reasoning that would

not be possible without the presence of artifacts or information appliances and that expand and augment human cognitive capacities. These devices might be forms that externalize memory, such as a database, or they can be devices that externalize processes, such as the widely used spell-checker.⁷⁴ The more we rely on the capacities of technologies as a part of our work, the more it may seem that cognition is distributed.

Teachers have long encouraged students to bring scratch paper with them into math examinations, realizing that the ability to construct representations and record processes is vital in solving complex problems. If, as Clark notes, technologies are inextricably interwoven with thinking, it makes no sense to “factor out” what the human brain is doing as the “real” part of thinking and to view what the technology is doing as a “cheat” or “crutch.”⁷⁵ Rather, we can understand cognitive activity as shared among a number of people and artifacts, and cognitive acts as learning to think with other people and artifacts. Following this theory, students need to know how to think with and through their tools as much as they need to record information in their heads.

Gamers may be acquiring some of these distributed cognition skills through their participation in squadron-based video games. Gee suggests that playing such games requires a mental map of what player and nonplayer characters are doing (nonplayer characters are characters controlled by the artificial intelligence of the game).⁷⁶ To plan appropriately, players may not need to know what other participants know, but they do need to know what it is those participants are likely to do. Moreover, in playing the games, a player may need to flip through a range

of different representations of the state of the game world and of the actions that are occurring within it. Learning to play involves learning to navigate this information environment, understanding the value of each representational technology, and knowing when to consult each and how to deploy this knowledge to reshape what is occurring. Instead of thinking as an autonomous problem solver, the player becomes part of a social and technological system that is generating and deploying information at a rapid pace. Humans are able to play much more complex games (and to solve much more complex problems) in a world in which keeping track of key data and enacting well-understood computational processes can be trusted to the processing power of the computer; the human can thus focus more attention on strategic decision making.

Distributed cognition is not simply about technologies; it is also about tapping social institutions and practices or remote experts whose knowledge may be useful in solving a particular problem. According to this understanding, expertise comes in many shapes and sizes (both human and nonhuman). Experts can be expert practitioners, who can be consulted through such technologies as video conferencing, instant messaging, or email;

Distributed intelligence is not simply a technical skill. Rather, it is a cognitive skill that involves thinking across “brain, body, and world.” The term *distributed intelligence* emphasizes the role that technologies play in this process, but it is closely related to the social production of knowledge that we are calling *collective intelligence*.

Students need to learn the affordance of different tools and information technologies, to know what the technologies can do and in what contexts they can be trusted. Students need to acquire patterns of thought that regularly cycle through available sources of information as they make sense of developments in the world around them.

some knowledge can emerge from technologies such as calculators, spread sheets, and expert systems; and new insights can originate from the teacher or students or both. The key is having expertise somewhere within the distributed learning environment and making sure students understand how to access and deploy it.

Applications of the distributed cognition perspective to education suggest that students must learn the affordances of different tools and information technologies and know which functions tools and technologies excel at and in what contexts they can be trusted. Students need to acquire patterns of thought that regularly cycle through available sources of information as they make sense of developments in the world around them. Distributed intelligence is not simply a technical skill, although it depends on knowing how to use tools effectively; it is also a cognitive skill that involves thinking across “brain, body, and world.” The term *distributed intelligence* emphasizes the role that technologies play in this process, but it is closely related to the social production of knowledge that we are calling *collective intelligence*.

What Might Be Done

The theory of distributed cognition informs educational research and practice when it provides a perspective for envisioning new learning contexts, tools, curricula and pedagogy, participant structures, and goals for schooling.

- Augmented-reality games represent one potential application of distributed intelligence to the learning process. Klopfer and Squire developed a range of games in which students use location-aware, GPS-enabled handheld computers to solve fictional problems in real spaces. For example, in *Environmental Detectives*, students determine the source of an imaginary chemical leak that is causing environmental hazards on the MIT campus. Students can use their handhelds to drill imaginary wells and take readings on the soil conditions, but to do so they must travel to the actual location. Data drawn from the computer is read against their actual physical surroundings—the distance between locations, the slope of the land, its proximity to the Charles River—and multiple players compare notes as they seek to resolve the game scenario.⁷⁷
- Students in MIT's Comparative Media Studies Program have experimented with the use of handhelds to allow tourists to access old photographs of historic neighborhoods and compare them with what they are seeing on location.⁷⁸ Elsewhere, students travel across the battlefield at Lexington conducting interviews with historical personages to better understand their perspective on what happened there in 1775.⁷⁹ In each case, direct perceptions of the real world and information drawn from information appliances are mutually reinforcing. The players combine multiple information sources in completing the tasks at hand.

- *Byline* is an Internet-based publishing and editing tool designed to focus attention on the organizational and structural features of journalism. By providing a space for the body of the story, the byline, and the lead, this “smart tool” is scaffolding for students’ learning process as they write a journalistic story. By cueing students into what to write, where to write it, and even into such journalistic values as the need to catch the reader’s attention, this specially designed program helps students to learn the conventions and values of journalism.⁸⁰
- A classroom designed to foster distributed cognition encourages students to participate with a range of people, artifacts, and devices. The various forms of participation composing such cognitive activity might be understood more generally as the skill of knowing how to act within distributed knowledge systems. Interested in designing learning environments that would foster such a skill, Bell and Winn describe a classroom in which participation requires active collaborations not only with people and tools that are physically present but also with people and tools that are virtually present through, for example, video conferencing with a science practitioner, using the Web to connect to a database in Japan, and using Excel spreadsheets to simulate a mass spectrometer. In such classrooms, knowing how to act within the distributed knowledge system is more important than learning content. Because content is something that can be “held” by technologies—databases, Web sites, wikis, and so forth—the curricular focus is on learning how to generate, evaluate, interpret, and deploy data.⁸¹
- With new technologies, new cognitive possibilities arise. Educators need to create new activities when new technologies are

introduced into the classroom. If the calculator is used to add $2+2$, it is the capacities of the calculator that are solving the problem; when calculation is “off-loaded” onto the calculator, the student is free to solve more complex problems.⁸² The proliferation of digital technologies requires a concerted effort to envision activities that enable students to engage in more complex problem domains. For example, as a vehicle for assessing the various ways e-commerce affects the environment, students could be given the problem of comparing the environmental impact of shipping 250,000 copies of *Harry Potter and the Goblet of Fire* directly to individual customers rather than to bookstores. Reflecting on the intended outcome for such a comparison, Robert Yagelski notes, “The click of the computer mouse to order a copy of *Harry Potter* from Amazon.com can seem a simple and almost natural act, yet it represents participation in this bewilderingly complex web of material connections that is anything but simple. And that participation contributes to the condition of our planet.”⁸³

Collective Intelligence: The Ability to Pool Knowledge and Compare Notes with Others toward a Common Goal

As users learn to exploit the potential of networked communication, they participate in a process that Pierre Lévy calls *collective intelligence*. Like-minded individuals gather online to embrace common enterprises, which often involve accessing and processing information. In such a world, Lévy argues, everyone knows something, nobody knows everything, and what any one person knows can be tapped by the group as a

whole. We are still experimenting with how to work within these knowledge cultures and what they can accomplish when we pool knowledge. Lévy argues that as a society we are currently in an apprenticeship phase, during which we try out and refine skills and institutions that will sustain the social production of knowledge. Lévy sees collective intelligence as an alternative source of power, one that allows grassroots communities to respond effectively to government institutions that emerge from the nation-state or to corporate interests that sustain multinational commerce.⁸⁴ Already we are seeing governments and industries seek ways to “harness collective intelligence,” which has become the driving force behind what people are calling Web 2.0.

Currently, children and adults are acquiring the skills to operate within knowledge communities in order to interact with popular culture. As has often been the case, what we learn through play we later apply to more serious tasks. So, for example, the young Pokémon fans, who each know some crucial detail about the various species, constitute a collective intelligence whose knowledge is extended each time two youths on the playground share something about the franchise.

Such knowledge sharing can assume more sophisticated functions as it moves online. For example, *Matrix* fans have created

Collective intelligence . . . in such a world, everyone knows something, nobody knows everything, and what any one person knows can be tapped by the group as a whole.

elaborate guides to help them track information about the fictional Zion resistance movement featured in the film. Young people are playing with collective intelligence as they participate in the vast knowledge communities that emerged from the online game *I Love Bees*. Some estimate that as many as 3 million players participated in *I Love Bees*, history's most challenging scavenger hunt. After working through puzzles so complicated that they mandated the effective collaboration of massive numbers of people with expertise across a variety of domains and geographic locations, players gathered clues by answering more than 40,000 pay-phone calls across all fifty U.S. states and eight countries.⁸⁵ They then fed those clues back into online tools designed to support large-scale collaboration for all players to deconstruct and analyze. If players were unfamiliar with how to participate in the community, other players would train them in the necessary skills. In another example, fans of the television show *Survivor* have used the Internet to track down information and identify the names of contestants before they were announced by the network. Fans also have used satellite photographs to identify the location of the *Survivor* base camp despite the producer's "no flyover" agreements with local governments. These knowledge communities change the very nature of media consumption—a shift from the personalized media that was central to the idea of the digital revolution toward socialized or communalized media that is central to the culture of media convergence.⁸⁶

As players learn to work and play in such knowledge cultures, they come to think of problem solving as an exercise in teamwork. Consider the following postings made by members of the Cloudmakers, a team formed in a game similar to *I Love Bees*:

These knowledge communities change the very nature of media consumption—a shift from the personalized media that was central to the idea of the digital revolution toward socialized or communalized media that is central to the culture of media convergence.

The solutions do not lie in the puzzles we are presented with, they lie in the connections we make, between the ideas and between one another. These are what will last. I look down at myself and see that I, too, have been incorporated into the whole, connections flowing to me and from me, ideas flowing freely as we work together, as individuals and as a group, to solve the challenges we are presented with. The solution, however, does not lie in the story. We are the solution.

* * *

The 7500+ people in this group . . . we are all one. We have made manifest the idea of an unbelievably intricate intelligence. We are one mind, one voice . . . made of 7500+ neurons. . . . We are not one person secluded from the rest of the world. . . . We have become a part of something greater than ourselves.⁸⁷

Indeed, these groups have been drawn from playing games to confronting real-world social problems, such as tracking campaign finances or trying to solve local crimes, as they develop a new sense of self-confidence in their ability to tackle challenges collectively, challenges that, as individuals, they would be unable to face.

This focus on teamwork and collaboration is also, not coincidentally, how the modern workplace is structured—around ad hoc configurations of employees, brought together because

their diverse skills and knowledge are needed to confront a specific challenge and then dispersed into different clusters of workers when new needs arise. Cory Doctorow has called such systems *ad-hocracies*, suggesting that they contrast in every possible way with prior hierarchies and bureaucracies. Our schools do an excellent job, consciously or unconsciously, of teaching youths how to function within bureaucracies. They do almost nothing to help youths learn how to operate within an ad-hocracy.⁸⁸

Collective intelligence is increasingly shaping how we respond to real-world problems. On August 29, 2005, Hurricane Katrina tore apart the levee that protected New Orleans from Lake Pontchartrain and the Mississippi River. Not only was the ability of ordinary citizens to share self-produced media and information pivotal in shaping the view of the situation for the outside world (thereby bringing in more relief funds), but it allowed for those affected by the disaster to effectively assist one another. After Jonathan Mendez's parents evacuated from Louisiana to his home in Austin, Texas, he was eager to find out if the floods had destroyed their home in Louisiana. Unfortunately for him, media coverage of the event was focused exclusively on the most devastated parts of New Orleans, with little information about the neighborhood where his parents had lived. With some help from his coworker, they were able, within a matter of hours, to modify the popular Google Maps Web service to allow users to overlay any information they had about the devastation directly onto a satellite map of New Orleans. Shortly after making their modification public, more than 14,000 submissions covered their map. This allowed victims

scattered throughout the United States to find information about any specific location—including verifying that the Mendez’s house was still intact.⁸⁹

Unfortunately, most contemporary education focuses on training autonomous problem solvers and is not well suited to equip students with these skills. Collective intelligence communities encourage ownership of work as a group, but schools grade individuals. Although Jonathan Mendez was admired for having appropriated Google’s Internet mapping service, students in school are often asked to swear that what they turn in is their “own work.”

Leadership within a knowledge community requires the ability to identify specific functions for each member of the team based on his or her expertise and to interact with the team members in an appropriate fashion. Teamwork involves a high degree of interdisciplinarity—reconfiguring knowledge across traditional categories of expertise. In early February 2004, Eric Klopfer, an MIT professor of urban studies and planning, and a team of researchers from the Education Arcade conducted “a hi-tech whodunit” for middle-school students and their parents inside the Boston Museum of Science. Teams of three adult-child pairs were given handhelds to search for clues of the whereabouts and identities of the notorious Pink Flamingo Gang, who had stolen an artifact and substituted it with a fake. Thanks to the museum’s newly installed Wi-Fi network and the players’ location-aware handhelds, each gallery offered the opportunity to interview cyber-suspects, download objects, examine them with virtual equipment, and trade findings. Each parent-child unit was assigned a different role—biologists,

detectives, or technologists—enabling them to use different tools on the evidence they gathered.⁹⁰ This is simply one of many recent cooperative games assigning distinct roles to each player, giving each access to a different set of information, and thus creating strong incentives for them to pool resources with other players.

Schools, on the other hand, often seek to develop generalists rather than allowing students to assume different roles based on their emerging expertise. The ideal of the Renaissance man is someone who knows everything, or at least a great deal about a wide range of different topics. The ideal of a collective intelligence is a community that knows everything, with individuals who know how to tap the community to acquire knowledge on a just-in-time basis. Minimally, schools should be teaching students to thrive in both worlds: having a broad background on a range of topics but also knowing when to turn to a larger community for relevant expertise. They must know how to solve problems on their own but also how to expand their intellectual capacity by working on a problem within a social community. To be meaningful participants in such a knowledge culture, students must acquire greater skills for assessing the reliability of information, which may come from multiple sources, some of which are governed by traditional gatekeepers and others of which must be cross-checked and vetted within a collective intelligence.

What Might Be Done

Schools can deploy aspects of collective intelligence when students pool observations and work through interpretations with

others studying the same problems at scattered locations. Such knowledge communities can confront problems of greater scale and complexity than any given student might be able to handle.

- Scientists in fields requiring simple yet extensive data-analysis tasks could partner with middle-school teachers to have students help collect or analyze real data. Eelgrass is both the most abundant sea grass in Massachusetts and one of the most ecologically valuable marine and estuarine habitats in North American coastal waters. The MIT Sea Grant College Program developed a project where students in different schools learn to cultivate eelgrass and collaboratively share data regarding the levels of nitrates, oxygen, and so forth in affected habitats through the project Web site.⁹¹
- Sites such as Ning offer nonprogrammers tools for rapidly creating social Web applications that allow users to interact and share information with one another. For example, a Mandarin teacher could easily create an online travel guide in which students (potentially nationwide) would each contribute write-ups of interesting sites in their local areas that would be of interest to visitors from China.
- Students taking civics classes might be encouraged to map their local governments using a Wikipedia-like program, bringing together names of government officials, reports on government meetings, and key policy debates. The information would be accessible to others in their own communities. They might also compare notes with students living in other parts of the country to identify policy alternatives that might address problems or concerns in their communities.

Judgment: The Ability to Evaluate the Reliability and Credibility of Different Information Sources

Although it is exciting to see players harness collective intelligence to successfully solve problems of unprecedented complexity, this process also involves a large number of errors. Misinformation emerges and is worked over, refined, or dismissed before a new consensus emerges. We are taught to think of knowledge as a product, but within a collective intelligence, knowledge is also always in process. As such, understanding the current placement within the vetting process helps determine how much trust to place in any given piece of information. In a game such as *I Love Bees*, mistakes are generally of little consequence and often serve as much as a source of amusement as anything else. As these same technologies are employed in understanding world events, though, we must better understand the strengths and limitations of these new practices of knowledge production.

For example, one key technology in online collective intelligence communities is the wiki. Although it may be possible for a small group of individuals to contribute erroneous information, wiki enthusiasts argue that giving all members of a larger community the ability to correct any mistakes will ultimately lead to more accurate information. In many cases, this concept has proved surprisingly effective. In one study, *Nature* magazine compared the accuracy of articles in Wikipedia, an enormous online encyclopedia constructed entirely through the efforts of volunteers using wiki technologies, with equivalent articles in *Encyclopedia Britannica*. The study determined the accuracy

levels of the two to be roughly the same. Wikipedia is not flawless, but rather even sources such as *Encyclopedia Britannica* are flawed.⁹² Students must be taught to read both sources from a critical perspective.

The *Nature* article also points out that wikis perform best when a large number of participants are actively using the technology to correct mistakes. Whereas the Wikipedia article on global warming enjoys more than 10,000 authors, each passionately committed to ensuring the accuracy of its content, the biographical article on John Seigenthaler cited him as having a possible involvement in the assassinations of Robert F. Kennedy and John F. Kennedy for a period of 132 days before someone corrected it.⁹³ Given the disparity in the accuracy of different articles, students need to develop an intuitive understanding of how the contents of a wiki are produced by participating in their construction and then actively reflecting on the different possibilities for inaccuracies.

In truth, schools should always teach students critical thinking skills for “sussing out” the quality of information, yet historically schools have had a tendency to fall back on the gatekeeping functions of professional editors and journalists, not to mention those of textbook selection committees and librarians, to ensure that the information is generally reliable. Once students enter cyberspace, where anyone can post anything, they need skills in evaluating the quality of different sources, the probability of perspectives and interests coloring representations, and the likely mechanisms by which misinformation is perpetuated or corrected. We need to balance a trust of traditional gatekeeping organizations (public television,

Smithsonian, National Geographic, for example) with the self-correcting potential of grassroots knowledge communities. Traditional logic would suggest, for example, that *60 Minutes*, a long-standing network news show, would be more accurate than a partisan blog, but in fall 2004, bloggers working together recognized flaws in evidence that had been vetted by the established news agency. As Dan Gillmor notes, we are entering a world in which citizen journalists often challenge and sometimes correct the work of established journalists, even as journalists debunk the urban folklore circulated in the blogging community.⁹⁴

Misinformation abounds online, but so do mechanisms for self-correction. In such a world, we can only trust established institutions so far. We all must learn how to read one source of information against another, to understand the contexts within which information is produced and circulated, to identify the mechanisms that ensure the accuracy of information, and to realize under which circumstances those mechanisms work best. Confronted with a world in which information is unreliable, many of us fall back on cynicism, distrusting everything we read. Rather, we should foster a climate of healthy skepti-

The new mediated landscape of mainstream news sources, collaborative blog projects, unsourced news sites, and increasingly sophisticated marketing techniques aimed at ever-younger consumers demands that students be taught how to distinguish fact from fiction, argument from documentation, real from fake, and marketing from enlightenment.

cism in which all truth claims are weighed carefully, but in which there is an ethical commitment to identifying and reporting the truth.

Students are theoretically taught in school how to critically assess the pros and cons of an argument. In an increasingly pervasive media environment, they also must be able to recognize when arguments are not explicitly identified as such. The new mediated landscape of mainstream news sources, collaborative blog projects, unsourced news sites, and increasingly sophisticated marketing techniques aimed at ever-younger consumers demands that students be taught how to distinguish fact from fiction, argument from documentation, real from fake, and marketing from enlightenment.

“To be a functioning adult in a mediated society, one needs to be able to distinguish between different media forms and know how to ask basic questions about everything we watch, read, or hear,” say Share, Jolls, and Thoman. “Although most adults learned through English classes to distinguish a poem from an essay, it is amazing how many people do not understand the difference between a daily newspaper and a supermarket tabloid, what makes one website legitimate and another one a hoax, or how advertisers package products to entice us to buy.”⁹⁵

Even when media content has been determined credible, it is vital for students to also identify and analyze the perspective of the producer: who is presenting what to whom, and why. Existing media literacy materials excel in examining the forces behind controversial media properties, particularly provocative visuals, their intentions, and their effects.

As Buckingham notes, children may lack some of the core life experiences and basic knowledge that might help them to discriminate between accurate and inaccurate accounts:

[T]here is as yet relatively little research about how children make judgments about the reliability of information on the Internet, or how they learn to deal with unwelcome or potentially upsetting content. Children may have more experience of these media than many adults, but they mostly lack the real-world experience with which media representations can be compared; and this may make it harder for them to detect inaccuracy and bias.⁹⁶

Reviewing the literature on how children make sense of online resources, Buckingham found that students lack both knowledge and interest in assessing how information was produced for and within digital environments: “Digital content was ‘often seen as originating not from people, organisations, and businesses with particular cultural inclinations or objectives, but as a universal repository that simply existed ‘out there.’”⁹⁷ Other studies found that children remain unaware of the motives behind the creation of Web sites, have difficulty separating commercial from noncommercial sites, and lack the background to identify the sources of authority behind claims made by Web authors.

As this discussion has suggested, judgment might be seen as part of our existing conception of literacy—a core research skill of the kind that has long been fundamental to the school curriculum. Yet this discussion also underscores that judgment operates differently in an era of distributed cognition and collective intelligence. Judgment requires not simply logic but also an understanding of how different media institutions and cul-

tural communities operate. Judgment works not simply on knowledge as the product of traditional expertise but also on the process by which grassroots communities work together to generate and authenticate new information.

What Might Be Done

Judgment has long been the focus of media literacy education in the United States and around the world as students are encouraged to ask critical questions about the information they are consuming.

- The Boston-based Youth Voice Collaborative has developed an exercise that gives students a range of news stories and asks them to rank the stories according to traditional news standards. The process is designed to encourage students to understand what criteria journalists use to determine the “news value” of different events and to encourage students to express their own priorities about what information matters to them and why.
- Google aggregates articles from thousands of news sources worldwide at news.google.com. This allows users to compare and contrast the framing of a single issue from different media sources. Students are encouraged to read several articles closely, underlining words they believe might shape how readers understand and feel about what they are reading.
- The New Media Literacies project at MIT has developed a set of activities to involve students in understanding how representations of “truth” and “fiction” vary in different media forms and, therefore, how different techniques must be learned, and choices made, when seeking to manipulate meanings by alter-

ing representations. For example, in an image-manipulation activity, students search for an image of an event (such as the March on Washington or the Kennedy assassination) and are taught how to change the picture in ways that change the meaning. By manipulating images, students become familiar with the ways images may be altered to persuade and influence. In developing this manipulation skill, students are encouraged to think about why an image, sound, or textual representation might be altered and what that means to them as consumers, voters, and citizens.

- A growing number of teachers are using the Talk Pages for contested Wikipedia entries as illustrations of the types of questions to ask about any information and the processes and criteria by which disputes about knowledge might be resolved.
- Tools such as the Ligit site allow readers of a Web site to alert friends who subsequently read the same Web site that its content may be suspect. Students might also be encouraged to take advantage of sites such as Snopes that regularly report on frauds and misinformation circulating online and provide good illustrations of the ways to test the credibility of information.

Transmedia Navigation: The Ability to Follow the Flow of Stories and Information across Multiple Modalities

In an era of convergence, consumers become hunters and gatherers, pulling together information from multiple sources to form a new synthesis.⁹⁸ Storytellers exploit this potential for transmedia storytelling, advertisers talk about branding as depending on multiple touch points, and networks seek to exploit their intellectual properties across many different chan-

nels. As they do so, we encounter the same information, the same stories, the same characters and worlds across multiple modes of representation. Transmedia stories at the most basic level are stories told across multiple media. At the present time, the most significant stories tend to flow across multiple media platforms.

Consider, for example, the Pokémon phenomenon. As Buckingham and Sefton-Green explain, “Pokémon is something you do, not just something you read or watch or consume.” Several hundred different Pokémon exist, each with multiple evolutionary forms and a complex set of rivalries and attachments. There is no one text for information about these various species. Rather, the child assembles information from various media, with the result that each child knows something his or her friends do not. As a result, the child can share his or her expertise with others. As Buckingham and Sefton-Green explain, “Children may watch the television cartoon, for example, as a way of gathering knowledge that they can later utilize in playing the computer game or in trading cards, and vice versa. The fact that information can be transferred between media (or platforms) of course adds to the sense that Pokémon is unavoidable. In order to be a master, it is necessary to ‘catch’ all its various manifestations.”⁹⁹

Such information feeds back into social interactions, including face-to-face contact within local communities and mediated

Transmedia stories at the most basic level are stories told across multiple media.

contact online with a more dispersed population. These children's properties offer multiple points of entry, enable many different forms of participation, and facilitate the interests of multiple consumers.¹⁰⁰

One dimension of this phenomenon points us back to collective intelligence, given that what Ito calls *hypersociability* emerges as children trade notes on and exchange artifacts associated with their favorite television shows. A second dimension of this phenomenon points us to what Kress calls *multimodality*.¹⁰¹ Consider a simple example: the same character (say, Spider-Man) may look different when featured in an animated video than in a video game, in a printed comic book, as a molded plastic action figure, or in a live-action movie. How then do fans recognize a character across all of these different media? How do they link what they have learned about the character in one context to what they learned in a completely different media channel? How do they determine which of these representations are linked (part of the same interpretation of the character) and which are separate (separate versions of the character that are meant to be understood autonomously)? These are the kinds of conceptual problems youths encounter regularly in their participation in contemporary media franchises.

Kress stresses that modern literacy requires the ability to express ideas across a broad range of different systems of representation and signification (including "words, spoken or written; image, still and moving; musical . . . 3D models . . ."). Each medium has its own affordances, its own systems of representation, its own strategies for producing and organizing knowledge. Participants in the new media landscape learn to navigate these

different and sometimes conflicting modes of representation and to make meaningful choices about the best ways to express their ideas in each context.¹⁰² All of this sounds more complicated than it is. As the New Media Consortium's report on twenty-first century literacy suggests, "Young people adept at interpreting meaning in sound, music, still and moving images, and interactive components not only seem quite able to cope with messages that engage several of these pathways at once, but in many cases prefer them."¹⁰³

Kress argues that this tendency toward multimodality changes how we teach composition because students must learn to sort through a range of different possible modes of expression, determine which is most effective in reaching their audience and communicating their message, and grasp which techniques work best in conveying information through this channel. Kress advocates moving beyond teaching written composition to teaching design literacy as the basic expressive competency of the modern era. This shift does not displace printed texts with images, as some advocates of visual literacy have suggested.

This tendency toward multimodality changes how we teach composition because students must learn to sort through a range of different possible modes of expression, determine which is most effective in reaching their audience, and grasp which techniques work best in conveying information through this channel. This shift does not displace printed texts with images. Rather, it requires students to be equally adept at reading and writing through images, texts, sounds, and simulations.

Rather, it develops a more complex vocabulary for communicating ideas, a vocabulary that requires students to be equally adept at reading and writing through images, texts, sounds, and simulations. The filmmaker George Lucas offers an equally expansive understanding of what literacy might mean today:

We must teach communication comprehensively in all its forms. Today we work with the written or spoken word as the primary form of communication. But we also need to understand the importance of graphics, music, and cinema, which are just as powerful and in some ways more deeply intertwined with young people's culture. We live and work in a visually sophisticated world, so we must be sophisticated in using all the forms of communication, not just the written word.¹⁰⁴

In short, new media literacies involve the ability to think across media, whether understood at the level of simple recognition (identifying the same content as it is translated across different modes of representation), at the level of narrative logic (understanding the connections among one story communicated through different media), or at the level of rhetoric (learning to express an idea within a single medium or across the media spectrum). Transmedia navigation involves both processing new types of stories and arguments that are emerging within a convergence culture and expressing ideas in ways that exploit the opportunities and affordances represented by the new media landscape. In other words, it involves the ability to both read and write across all available modes of expression.

What Might Be Done

Students learn about multimodality and transmedia navigation when they take time to focus on how stories change as they

move across different contexts of production and reception, as they give consideration to the affordances and conventions of different media, and as they learn to create using a range of different media tools.

- Students in literature classes are asked to take a familiar fairy tale, myth, or legend and identify how this story has been retold across different media, different historical periods, and different national contexts. Students search for recurring elements as well as signs of the changes that occur as the story is retold in a new context.
- French-language students in New York recreate characters from various French literary works in the best-selling video game *The Sims 2*. Students then tell new stories by playing out the interactions between different characters inside the game world. Characters are projected onto a screen in front of the class for students to do live performances with their characters.¹⁰⁵
- An exercise developed by MIT's New Media Literacies project asks students to tell the same story across a range of different media. For example, they script dialogue using instant messenger; they storyboard using PowerPoint software and images appropriated from the Internet; later they might reenact their story and record it using a camera or video camera; they might illustrate it by drawing pictures. As they do so, they are encouraged to think about what each new tool contributes to their overall experience of the story as well as what needs to remain the same for viewers to recognize the same characters and situations across these various media.¹⁰⁶

Networking: The Ability to Search for, Synthesize, and Disseminate Information

In a world in which knowledge production is collective and communication occurs across an array of different media, the capacity to network emerges as a core social skill and cultural competency. A resourceful student is no longer one who personally possesses a wide palette of resources and information from which to choose, but rather one who is able to successfully navigate an already abundant and continually changing world of information. Increasingly, students achieve this by tapping into a myriad of socially based search systems, including the following popular sites:

- **Google.com:** At the core of the now ubiquitous Google search engine, an algorithm analyzes the links between Web sites to measure which sites different Web site creators consider valuable or relevant to particular topics.
- **Amazon.com:** Suggests books a customer may like on the basis of patterns gleaned from analyzing similar customers.
- **Movielens.org:** Predicts if a particular user will like a given movie based on preferences from similar users.
- **eBay.com:** Creates a complex reputation system among users to establish trust for a given seller.
- **Epinions.com:** Establishes reliability of a given product on the basis of previous consumer experiences.
- **Last.fm:** Generates personalized radio stations on the basis of correlations between similar listeners' music preferences.
- **Del.icio.us:** Suggests relevant Web sites for a given term on the basis of other users' bookmarking habits.

- Answers.google.com: Offers a mass collective-intelligence marketplace in which users can offer money to anyone worldwide who may have answers to their questions.
- Citeulike.org: This academic citation manager helps users locate relevant articles on the basis of other users' citation management and allows users to flag important information about given articles, such as inaccuracies.
- Getoutfoxed.com: Allows trusted friends and users to provide annotations and metadiscussion about a given Web site that a user might be browsing, such as warnings about inaccurate content.
- RSS: Intelligently aggregates and consolidates content produced by friends and trusted sources to help efficiently share resources across networks.

Business guru Tim O'Reilly has coined the term *Web 2.0* to refer to how the value of these new networks depends not on the hardware or the content, but on how they tap the participation of large-scale social communities that become invested in collecting and annotating data for other users. Some of these platforms require the active participation of consumers, relying on a social ethos based on knowledge sharing. Others depend on automated analysis of collective behavior. In both cases, though, the value of the information depends on understanding how the knowledge is generated and analyzing the social and psychological factors that shape collective behavior.

In such a world, students no longer can rely on expert gatekeepers to tell them what is worth knowing. Instead, they must become more reflective about how individuals know what they know and how they assess the motives and knowledge of differ-

ent communities. Students must be able to identify which group is most aware of relevant resources and choose a search system matched to the appropriate criteria: people with similar tastes; similar viewpoints; divergent viewpoints; similar goals; general popularity; trusted, unbiased, third-party assessment; and so forth. If transmedia navigation involves learning to understand the relations between different media systems, networking involves the ability to navigate across different social communities.

Schools are beginning to teach youths how to search out valuable resources through such activities as Webquests. The past ten years have seen an explosion in the popularity of these activities, designed by teachers, “in which some or all of the information that learners interact with comes from resources on the Internet.”¹⁰⁷ In a typical Webquest, students are given a scenario that requires them to extract information or images from a series of Web sites and then compile their findings into a final report. For example, students might be told they are part of a team of experts brought in to determine the most appropriate method for disposing of a canister of nuclear waste. They are provided a series of Web sites relevant to waste disposal and asked to present a final proposal to the teacher. For many educators, Webquests provide a practical means for using new

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media to broaden students' exposure to different perspectives and provide fresh curricular materials. Rather than requiring textbook authors to develop "neutral" accounts of facts, teachers develop and share Webquests by simply referencing existing Web content. This both exposes students to a variety of opinions and trains them to synthesize their own perspectives. Yet critics argue that most existing Webquests fall short of fully exploring the potential of social networks—both in terms of teaching students how to exploit networking to track down information and in terms of using networks to distribute the byproducts of their research.

Networking is only partially about identifying potential resources; it also involves a process of synthesis, during which multiple resources are combined to produce new knowledge. In discussing "The Wisdom of Crowds," James Surowiecki describes the conditions needed to receive the maximum benefit from collective intelligence:

There are four key qualities that make a crowd smart. It needs to be diverse, so that people are bringing different pieces of information to the table. It needs to be decentralized, so that no one at the top is dictating the crowd's answer. It needs a way of summarizing people's opinions into one collective verdict. And the people in the crowd need to be independent, so that they pay attention mostly to their own information, and not worrying about what everyone around them thinks.¹⁰⁸

Because new research processes depend on young people's resourcefulness as networkers, students must understand how to sample and distill multiple, independent perspectives. Guinee and Eagleton have been researching how students take notes in the digital environment, discovering, to their dismay, that

young people tend to copy large blocks of text rather than paraphrasing it for future reference. In the process, they often lose track of the distinction between their own words and material borrowed from other sources.¹⁰⁹ They also skip over the need to assess any contradictions that might exist in the information they have copied. In short, they show only a minimal ability to create a meaningful synthesis from the resources they have gathered.

Networking also implies the youths' ability to effectively tap social networks to disperse their own ideas and media products. Many youths are creating independent media productions, but only some learn how to be heard by large audiences. Increasingly, young artists are tapping networks of fans or gamers with the goal of reaching a broader readership for their work.¹¹⁰ They create within existing cultural communities not because they were inspired by a particular media property but because they want to reach that property's audience of loyal consumers. Young people are learning to link their Web sites together into Web rings in part to increase the visibility of any given site and also to increase the profile of the group. Teachers are finding that students are often more motivated if they can share what they create with a larger community. As students make their work accessible to a larger public, they face public consequences for what they write, and thus they face the kind of ethical dilemmas we identified earlier in this document.

At the present time, social networking software is under fire from adult authorities, and federal law makes it increasingly difficult to access and deploy these tools in the classroom. Yet we would argue that schools have a different obligation—to help

Schools have a different obligation—to help all children learn to use such tools effectively and to understand the value of networking as a means of acquiring knowledge and distributing information.

all children learn to use such tools effectively and to understand the value of networking as a means of acquiring knowledge and distributing information. Learning in a networked society involves understanding how networks work and how to deploy them to achieve particular ends. It involves understanding the social and cultural contexts within which different information emerges, when to trust and when not to trust others to filter and prioritize relevant data, and how to use networks to get individual work out into the world and in front of a relevant and, with hope, appreciative public.

What Might Be Done

Educators take advantage of social networking when they link learners with others who might share their interests or when educators encourage students to publish their works to a larger public.

- Noel Jenkins, a British junior-high teacher, created a geography unit in which students play the roles of city planners and determine the most appropriate location for a new hospital in San Francisco. First, students familiarize themselves with the city layout by exploring satellite imagery of the city, navigating through three-dimensional maps and watching webcam streams

from different parts of the city. Next, students learn how to layer the data that is most relevant to their decision atop their city maps. Finally, students must select a final location for the hospital and illustrate their maps with annotations justifying their decision.¹¹¹

- Students use online storefront services such as CafePress and Zazzle to share their artistic creations and personal hobbies with the general public. In many cases, young entrepreneurs are able to make up to \$18,000 per year doing so.¹¹²
- Educational technology enthusiast Will Richardson used the community news application CrispyNews to create www.edbloggernews.crispynews.com, an online nexus for teachers to share educational resources with one another. Each participant helps to rank the different curricular suggestions using collaborative filtering technologies.
- Students at Grandview Elementary School publish an online newspaper and podcast their works.¹¹³
- Outraged by a U.S. House of Representatives bill that would make illegal immigration a felony, more than 15,000 high school students in Los Angeles staged a protest coordinated primarily through MySpace.

Negotiation: The Ability to Travel across Diverse Communities, Discerning and Respecting Multiple Perspectives, and Grasping and Following Alternative Norms

The fluid communication within the new media environment brings together groups that otherwise might have segregated lives. Culture flows easily from one community to another. People online encounter conflicting values and assumptions

and come to grips with competing claims about the meanings of shared artifacts and experiences. Everything about this process ensures that we will be provoked by cultural difference. Little about this process ensures that we will develop an understanding of the contexts within which these different cultural communities operate. When white suburban youths consume hip-hop or Western youths consume Japanese manga, new kinds of cultural understanding can emerge. Yet, just as often, the new experiences are read through existing prejudices and assumptions. Culture travels easily, but the individuals who initially produced and consumed such culture are not always welcome everywhere it circulates.

Cybercommunities often bring together groups that would have no direct contact in the physical world, resulting in heated conflicts about values or norms. Increasingly, critics are focusing on attempts to segregate membership or participation within online social groups. The massively multiplayer game *World of Warcraft* has faced controversies about whether the formation of groups for gay, lesbian, and bisexual players increased or decreased the likelihood of sexual harassment or whether the formation of groups based on English competency

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reflected the importance of communication skills in games or constituted a form of discrimination motivated by stereotypes about the ethics and actions of Asian players. The social networking software that has become so central to youth culture can function as a vehicle for expressing and strengthening a sense of affiliation, but it also can be deployed as a weapon of exclusion and, as a consequence, as a tool for enforcing conformity to peer expectations.

In such a world, it becomes increasingly critical to help students acquire skills in understanding multiple perspectives, respecting and even embracing diversity of views, understanding a variety of social norms, and negotiating among conflicting opinions. Traditionally, media literacy has addressed these concerns by teaching children to read through media-constructed stereotypes about race, class, sex, ethnicity, religion, and other forms of cultural differences. Such work remains valuable in that it helps students to understand the preconceptions that may shape their interactions, but it takes on added importance as young people themselves create media content that may perpetuate stereotypes or contribute to misunderstandings. If, as writers such as Surowiecki and Lévy suggest, the wisdom of the crowd depends on the opportunity for diverse and independent insights and other inputs,¹¹⁴ then these new knowledge cultures require participants to master new social skills that allow them to listen and respond to a range of different perspectives. We are defining this skill of negotiation in two ways: first, as the ability to negotiate between dissenting perspectives, and second, as the ability to negotiate through diverse communities.

The most meaningful interventions will start from a commitment to the process of deliberation and negotiation across dif-

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ferences. They depend on the development of skills in active listening and of ethical principles designed to ensure mutual respect. Participants agree to some rules of conduct that allow them to talk through similarities and differences in perspective in ways that may allow for compromise, or at least an agreement to disagree. In either case, such an approach seems essential if we are to learn to share knowledge and collaborate within an increasingly multicultural society. Such an approach does not ignore differences—diversity of perspective is essential if the collective intelligence process is to work well—rather, it helps us to appreciate and value differences in background, experience, and resources as contributing to a richer pool of knowledge.

What Might Be Done

Educators can foster negotiation skills when they bring together groups from diverse backgrounds and provide them with resources and processes that ensure careful listening and deeper communication.

- Researchers at Stanford University's Center for Deliberative Democracy have been experimenting with new forms of civic engagement that depend on bringing people together from multiple backgrounds, exposing them to a broad array of per-

spectives, encouraging them to closely examine underlying claims and the evidence to support them, and creating a context in which they can learn from one another. Their initial reports suggest that this process generates powerful new perspectives on complex public-policy issues, which gain the support of all parties involved. For some participants, the process strengthens their commitment to core beliefs and values. For others, it creates a context in which they are more open to alternative points of view and are able to find middle-ground positions. The project's focus on the process of deliberation—and not simply on the outcome—represents a useful model to incorporate into the classroom. Rather than having traditional pro/con debates that depend on a fixed and adversarial relationship between participants, schools should focus more attention on group deliberation and decision-making processes and on mechanisms that ensure that all parties listen to and learn from one another's arguments.¹¹⁵

- *The Cultura Project*, developed by Gilberte Furstenberg, links students in classrooms in North America and France. In the first phases, they are asked to complete a series of sentences (“A good parent is someone who . . .”), address a series of questions (“What do you do if you see a mother strike a child in the grocery store?”), and define a range of core terms and concepts (“individualism”). The French students write in French and the American students in English, allowing both classes to practice their language skills and understand the links between linguistic and cultural practices. Students then are asked to compare the different ways that people living in different parts of the world responded to these questions, seeking insights into differences in values and lifestyles. For example, individualism in

France is seen as a vice, equated with selfishness, whereas for Americans individualism is seen as a virtue, closely linked with freedom. These interpretations unfold in online forums, where students from both countries can respond to and critique attempts to characterize their attitudes. As the process continues, students are encouraged to upload their own media texts, which capture important aspects of their everyday lives, as artifacts they believe speak to the larger cultural questions at the center of their discussions. In this way, they learn to see themselves and one another more clearly, and they come away with a greater appreciation of cultural difference.¹¹⁶

- Rev. Denis Haak of the Ransom Fellowship has developed a series of probing questions and exercises intended to help Christians work through their responses to popular culture. Rejecting a culture-war rhetoric based on sharp divisions, these exercises are intended to help Christians to identify and preserve their own values even as they come to understand “what non-believers believe.” The Discernment movement sees discussing popular culture as a means of making sense of competing and contradictory value systems that interact in contemporary society. For this process to work, the program encourages participants to learn how to “disagree agreeably,” to stake out competing positions without personalizing the conflict.¹¹⁷

- Schools historically have used the adversarial process of formal debate to encourage students to conduct research, construct arguments, and mobilize evidence. Yet there is a danger that this process forces students to adopt fixed and opposing positions on complex problems. A better approach might be to adopt a deliberative process in the classroom that encourages

Literacy skills for the twenty-first century are skills that enable participation in the new communities emerging within a networked society. They enable students to exploit new simulation tools, information appliances, and social networks; they facilitate the exchange of information among diverse communities and the ability to move easily across different media platforms and social networks.

collaboration and discussion across different positions and thus creates a context for opposing parties to learn from one another and reformulate their positions accordingly.

- Sites such as Wikipedia and Wikinews include a tab labeled *discussion* above each article or news entry. Here readers can view or participate in an online discussion with people of different viewpoints to arrive at a neutral-point-of-view framing of the issue to be displayed on the main page.

We began this discussion by suggesting that literacy in the twenty-first century be understood as a social rather than individual skill and that what students must acquire should be understood as skills and cultural competencies. Each of the skills we have identified above represents modes of thought, ways of processing information, and ways of interacting with others to produce and circulate knowledge. These are skills that enable participation in the new communities emerging within a networked society. They enable students to exploit new simulation tools, information appliances, and social networks; they facilitate the exchange of information among diverse commu-

nities and the ability to move easily across different media platforms and social networks. Many of these skills schools have been teaching all along, although the emergence of digital media creates new pressure to prepare students for their future roles as citizens and workers. Others are skills that emerge from the affordances of these new communications technologies and the social communities and cultural practices that have grown up around them.

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