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Confronting the Challenges of Participatory Culture

Media Education for the 21st Century (Part Two)

Abstract

The following is excerpted from a white paper produced for the Catherine and John MacArthur Foundation as part of their launch of a new initiative on Youth and Digital Learning. The full report can be read at <http://www.projectnml.org>. In the first part, we established how the opportunities and risks posed by the new participatory culture force us to reassess media education for the 21st century. In this second installment, we will identify a framework of social skills and cultural competencies that we feel should be the foundations for this new media literacy education.

A definition of twenty-first century literacy offered by the New Media Consortium (2005) is «the set of abilities and skills where aural, visual, and digital literacy overlap. These include the ability to understand the power of images and sounds, to recognize and use that power, to manipulate and transform digital media, to distribute them pervasively, and to easily adapt them to new forms» (p. 8). We would modify this definition in two ways. First, textual literacy remains a central skill in the twenty-first century, and second, new media literacies should be considered a social skill.

New media literacies include the traditional literacy that evolved with print culture as well as the newer forms of literacy within mass and digital media. Before students can engage with the new participatory culture, they must be able to read and write. Just as the emergence of written language changed oral traditions and the emergence of printed texts changed our relationship to written language, the emergence of new digital modes of expression changes our relationship to printed texts. Youth must expand their required competencies, not push aside old skills to make room for the new.

Beyond core literacy, students need research skills. Among other things, they need to know how to access books and articles through a library; to take notes on and integrate

secondary sources; to assess the reliability of data; to read maps and charts; to make sense of scientific visualizations; to grasp what kinds of information are being conveyed by various systems of representation; to distinguish between fact and fiction, fact and opinion; to construct arguments and marshal evidence.

Students also need to develop technical skills. They need to know how to log on, to search, to use various programs, to focus a camera, to edit footage, to do some basic programming and so forth. Yet, to reduce the new media literacies to technical skills would be a mistake on the order of confusing penmanship with composition.

As media literacy advocates have claimed during the past several decades, students also must acquire a basic understanding of the ways media representations structure our perceptions of the world; the economic and cultural contexts within which mass media is produced and circulated; the motives and goals that shape the media they consume; and alternative practices that operate outside the commercial mainstream. Such groups have long called for schools to foster a critical understanding of media as one of the most powerful social, economic, political, and cultural institutions of our era. What we are calling here the new media literacies should be taken as an expansion of, rather than a substitution for, the mass media literacies.

What New Skills Matter? New Social Skills and Cultural Competencies

All of these skills are necessary, even essential, but they are not sufficient, which brings us to our second point about the notion of twenty-first century literacy: the new media literacies should be seen as social skills, as ways of interacting within a larger community, and not simply an individualized skill to be used for personal expression.

The social production of meaning is more than individual interpretation multiplied; it represents a qualitative difference in the ways we make sense of cultural experience, and in that sense, it represents a profound change in how we understand literacy. In such a world, youth need skills for working within social networks, for pooling knowledge within a collective intelligence, for negotiating across cultural differences that shape the governing assumptions in different communities, and for reconciling conflicting bits of data to form a coherent picture of the world around them.

We must integrate these new knowledge cultures into our schools, not only through group work but also through long-distance collaborations across different learning communities. Students should discover what it is like to contribute their own expertise to a process that involves many intelligences, a process they encounter readily in their participation in fan discussion lists or blogging. Schools are currently still training autonomous problem-solvers, whereas as students enter the workplace, they are increasingly being asked to work in teams, drawing on different sets of expertise, and collaborating to solve problems.

Changes in the media environment are altering our understanding of literacy and requiring new habits of mind, new ways of processing culture and interacting with the world around us. We are just beginning to identify and assess these emerging sets of social skills and cultural competencies. We have only a broad sense of which competencies are most likely to matter as young people move from the realms of play and education and into the adult world of work and society. What follows, then, is a provisional list of eleven core skills needed to participate within the new media landscape.

Play: the capacity to experiment with one's surroundings as a form of problem-solving

Play, as psychologists and anthropologists have long recognized, is key in shaping children's relationship 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.

Pratt (1991) 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. (pp. 33–34)

Pratt's account suggests this playful activity motivated three very different kinds of learning. First, the activity itself demanded certain skills and practices, which had clear pay-offs 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, which 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 about 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» (Pratt, 1991, p. 34).

While much of the discussion of games and education has considered games as a tool to motivate youth to learn other kinds of content (Pratt's move from baseball cards to geography), 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 (2003) has noted, 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 players move through. Players feel a part of those worlds and have some stake in the events unfolding. Games not only provide a rationale for learning: what players learn is put immediately to use to solve compelling problems with real consequences in the world of the game.

Games follow something akin to the scientific process. Players are asked to make their own discoveries and then apply what 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 their 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 person to do something more, to experiment with the properties of the world, framing new possibilities, which involves manipulating relevant variables and seeing what happens.

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.

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 capacity, allowing us to deal with larger bodies of information, to experiment with more complex configurations of data, 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 known 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, tweaking particular variables, trying out different contingencies.

Contemporary video games allow youth 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. 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. Students also 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 Tycoons*, for instance—incorporate spreadsheets, maps, graphs and charts, which 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.

Students who use simulations in learning have more flexibility to customize models and manipulate data in 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. Bogost (2005) 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 experience. 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 be given 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.

Performance— the ability to adopt alternative identities for the purpose of improvisation and discovery

In *What Video Games Have to Teach Us About Learning and Literacy* (2003), 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. Testing the educational video game, *Revolution*, with middle-school students, Francis (2006) found several compelling examples in which projected identities had pedagogical payoffs for participants. For example, Margaret, a girl who played a loyalist character in the game, which was set in colonial Williamsburg on the eve of the American Revolution, 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?

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.

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 (1992) 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, even specific turns of phrase, through their sociolinguistic play. Children do not simply read books or listen to stories; they re-enact these narratives in ways that transform them, and in this process, the authors argue, children demonstrate they really 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 develop an analytic framework for thinking about literacy.

Educators have for too long treated role play as a means to an end—a fun way to introduce other kinds of content—yet 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—on how we learn more than what we learn. These learning processes are likely to sustain growth and learning well beyond the school years.

Appropriation — the ability to meaningfully sample and remix media content

The digital remixing of media content makes visible the degree to which all cultural expression builds on what has come before. Appropriation is understood here as a process by which students learn by taking culture apart and putting it back together. Art does not emerge 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 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 talk about creativity in schools, where the tendency is to discuss artists as individuals who rise upon or stand outside any aesthetic tradition.

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 of 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 youth accent this sampling and remixing process, in part because digitization makes it much easier to combine and repurpose media content than ever before. Despite the pervasiveness of these cultural practices, school arts and creative writing programs remain hostile to overt signs of repurposed content, emphasizing the ideal of the autonomous artist. Yet, in doing so, they sacrifice the opportunity to help youth think more deeply about the ethical and legal implications of repurposing existing media content, and they often fail to pro-

vide 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 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 pre-existing 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.

Multi-tasking— the ability to scan one's environment and shift focus onto salient details on an ad hoc basis

Perhaps one of the most alarming changes in adults' view is the perceived decline in young people's attention spans with the rise of digital media. Attention is undoubtedly an important cognitive ability. 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 multi-tasking— scanning for relevant shifts in the information flow while simultaneously taking in multiple stimuli. Multi-tasking 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 multi-taskers seek to reduce demands on short-term memory by mapping where different information is externally stored within their immediate environment.

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 multi-tasking 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 (Jenkins, 2003). 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.

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 their prey may be hiding. For centuries, schools have been designed to create «farmers» (Hartmann, 1999). In such an organization, the ideal is for all students to focus on one thing, and, 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 hunters and farmers, ensuring that each child develops multiple modes of learning, 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.

Multi-tasking often is confused with distraction, but as understood here, multi-tasking 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 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 searching for meaningful data.

Distributed Cognition— the ability to interact meaningfully with tools that expand our 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» (Clark, 1997), looping through an extended technological and sociocultural environment (Clark, 2003). Explaining this idea, Roy Pea (1997) 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» (p. 50). Work in distributed cognition focuses on forms of reasoning which would not be possible without the presence of artifacts or information appliances, which expand and augment human's cognitive capacities. These devices might be forms that externalize memory, such as a data base, or they can be devices that externalize processes, such as the widely used spell checker.

Gamers may be acquiring some of these skills at distributed cognition through their participation in squadron-based videogames. James Paul Gee suggests that in playing such games, one has to form a mental map of what player and non-player characters are doing (non-player characters are characters controlled by the A.I of the game). To plan appropriately, the player 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, one may need to flip through a range of different representations of the state of the game world and of the actions which are occurring within it. Learning to play involves learning to navigate this information environment, understanding the value of each representational technology, knowing when to consult each and how to deploy this knowledge to reshape what is occurring. Humans are able to play much more complex games (and to solve much more complex problems) in a world where keeping track of key data and enacting well-understood computational processes can be trusted to the processing power of the computer, and they can thus focus more attention on strategic decision making.

Students need to learn the affordances of different tools and information technologies, to know what they can do well and in what contexts they can be trusted; they need to acquire patterns of thought which regularly cycle through available sources of information as they make sense of developments in the world around them. The term «distributed intelligence» emphasizes the role that technologies play in this process but it is closely related to the social production of knowledge which we are calling collective intelligence.

Collective Intelligence— the ability to pool knowledge and compare notes with others towards a common goal

As users learn to exploit the potential of networked communication, they participate in a process that Levy (2000) calls «collective intelligence.» Like-minded individuals gather online to embrace common enterprises, which often involve access and processing information. In such a world, Levy 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. Levy argues that as a society, we are currently at an

apprenticeship phase, during which we try out and refine skills and institutions that will sustain the social production of knowledge. Levy 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.

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 history's most challenging scavenger hunt. After working through puzzles so complicated 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 payphone calls across all 50 U.S. states and eight countries (McGonigal, 2005). 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.

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, then dispersed into different clusters of workers when new needs arise. Doctorow (2005) 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, teaching youth how to function within bureaucracies. They do almost nothing to help youth learn how to operate within an ad-hocracy.

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—the ability to reconfigure knowledge across traditional categories of expertise. 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 was someone who knew everything or at least knew a great deal about a range of different topics. The ideal of a collective intelligence is a community that knows everything and 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 they should 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.

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, 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, one must understand where one is in the vetting process to know how much trust to place in any given piece of information.

For example, one key technology in online collective intelligence communities is a 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 (Giles, 2005), *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*. They concluded the accuracy levels of the two to be roughly the same. Students must be taught to read both sources from a critical perspective.

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 (Seigenthaler, 2005). It turned out that the misinformation was produced by a friend as a kind of practical joke. 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 of textbook selection committee 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, how perspectives and interests can color representations, and the likely mechanisms by which misinformation is perpetuated or corrected.

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 informa-

tion is produced and circulated; to identify the mechanisms that ensure the accuracy of information as well as realizing under which circumstances those mechanisms work best.

Transmedia Navigation — the ability to deal with 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. Storytellers exploit this potential for transmedia storytelling; advertisers talk about branding as depending on multiple touch points; networks seek to exploit their intellectual properties across many different channels. As they do so, we encounter the same information, the same stories, the same characters and worlds across multiple modes of representation.

Consider, for example, the Pokémon phenomenon. As Buckingham and Sefton-Green (2004) 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.» (p. 22). Such information feeds back into social interactions (Ito, 2005b), including face-to-face contact within local communities and mediated 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.

One dimension of this phenomenon points us back to collective intelligence, given that what Ito calls «hypersociability» emerges as children trade notes and exchange artifacts associated with their favorite television shows. A second dimension of this phenomenon points us to what Kress (2003) calls multimodality. Kress (2003) 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. All of this sounds more complicated than it is. As the New Media Consortium's 2005 report on twenty-first century literacy suggests, «Young people adept at interpreting meaning in sound, music, still and moving images, and inte-

ractive components not only seem quite able to cope with messages that engage several of these pathways at once, but in many cases prefer them.» 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 to grasp which techniques work best in conveying information through this channel.

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. 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.

Networking also implies the ability to effectively tap social networks to disperse one's own ideas and media products. Many youth are creating independent media productions, but only some learn how to be heard by large audiences. Increasingly, young artists (Bertozzi and Jenkins, forthcoming) are tapping networks of fans or gamers with the goal of reaching a broader readership for their work. 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 websites 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.

Learning in a networked society involves understanding how networks work and how to deploy them for one's own 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 one's own work out into the world and in front of a relevant and, with hope, appreciative public.

Negotiation— the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative sets of norms

The fluid communication within the new media environment brings together groups who otherwise might have lived segregated lives. Culture flows easily from one community to another. People online encounter conflicting values and assumptions, 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 youth consume hip hop or Western youth 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.

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 between conflicting opinions. Traditionally, media literacy has addressed these concerns by teaching children to read through media-constructed stereotypes about race, class, sex, ethnic, religious, 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, which may perpetuate stereotypes or contribute to misunderstandings. If, as writers such as Surowiecki (2004) and Levy (2000) suggest, the wisdom of the crowd depends on the opportunity for diverse and independent insights and other inputs, then these new knowledge cultures require participants to master new social skills that allow them to listen to and respond to a range of different perspectives. We are defining this skill 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 depend on the development of skills in active listening and 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 agreeing to disagree. In either case, such an approach seems essential if we are going 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.

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 between diverse communities and the ability to move easily across different media platforms and social networks. Many of the skills schools have been teaching all along, although the emergence of digital media creates new pressure on schools 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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