Motivation and Learning

by

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In 2003, researchers at the Pew Center for Internet Life revealed some startling statistics about the place of games within the American educational system. Surveying students at more than 20 American colleges and universities, they found that all entering students (100%) had played a video, computer, or online game at one time or another; 70% of them played games "at least once in a while"; and 65% described themselves as "regular or occasional" game players. Almost half (42%) agreed that gaming kept them from studying "some" or "a lot" of the time, and about 1 in 10 (9%) said that their main motivation for gaming was to avoid studying. And in what may be the most galling statistic to most educators, one third (32%) admitted playing games during class that were not part of the instructional activities.

Today's college students spend more time playing games than they spend watching movies or television or reading books for pleasure. These recreational preferences are taking shape at a young age, with another recent study by the Kaiser Foundation (2003) finding that 50% of American children will have played games before they reach the first grade. Today's college and high school students are using games to escape from studying and they are even bringing games to class with them. Maybe it's time the professors and teachers got into the game.

I am one of the founders of the Education Arcade, a research collaborative started at MIT that seeks to explore and promote the pedagogical potentials of computer and video games. For the past three years, we have been reviewing the research on games and learning, building prototypes for educational games and testing them in the classroom, developing curricula to support the educational use of existing commercial games, and presenting our findings to parents, educators, game designers, and players. Our work has been based on the assumption that games and learning can go hand-in-hand inside and outside the classroom. We also assume, however, that not all of the learning will take place within the box. Games work best when combined with a range of other instructional materials and activities.

Children will often push to stay up late into the night trying to master a challenging level in a game, but the youngsters are much quicker to abandon problem sets and other homework assignments that they find too frustrating. Educators need to better understand what factors in games motivate this intense engagement and how they can be leveraged to promote education.

Motivating literacy

"Reading for Understanding," a 2002 RAND report (Snow) commissioned by the United States Department of Education, summarizes what we currently know about the literacy problem in our schools. Full participation in the American economy, they argue, requires "a universally higher level of literacy achievement than at any other time in history," (p. 4) yet all signs are that the rate of literacy remains stagnant and, in some cases, is declining. While American third graders rank close to the top in international comparisons, American high school seniors rank near the bottom, behind students from the Philippines, Indonesia, Brazil, and other developing nations. Students are developing basic skills in reading but falter when they need to apply those skills to the domain-specific vocabularies used after third or fourth grade. Again and again, the report returns to the subject of motivation: "Classroom materials are often so difficult to comprehend or uninteresting that many students cannot or will not read them." (p. 5)

A point of entry into literacy

We might contrast the RAND report's concerns about motivation with the story anthropologist Mary Louise Pratt (1991) has shared about her son and his friend's interest in baseball-card collecting. She describes collecting, studying, and playing with cards as the point of entry into literacy:

"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 encydopedias, 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 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, which motivated and shaped his acquisition of other forms of school knowledge. The cards

led Sam to think about the cities where the teams were located and learn map-reading skills, the history of baseball provided a context through which he could understand twentieth century American history, and 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) In other words, the baseball cards did for Sam what the RAND report claims existing school materials do not do—they motivated him to develop basic competencies and enabled him to enter ever more specialized domains of knowledge.

No one who has studied the current research on games, play, and learning will be surprised by Pratt's story. Writing in 1981, in what has been one of the earliest and most influential studies of games and motivation, Thomas Malone concludes, "If students are intrinsically motivated to learn something, they may spend more time and effort learning, feel better about what they learn, and use it more in the future." (p. 335) (By intrinsic motivation, Malone refers to activities with which we engage for their own sake rather than on the basis of an external reward—whether cash or grades.)

Embodying and enacting lessons through game play

As much as Sam improved his reading and comprehension skills by using them to meet his goals as a card collector, most research on games and education suggests that games work best as teachers when the lessons get embodied and enacted through the game play. Unfortunately, most educational games still fall back on a drill and practice model: the same game-play mechanics get reused without regard to the content; the game often functions as a reward for answering questions correctly rather than as context for putting the knowledge into practice. Also, like Sam's baseball-card collecting, good games can motivate other kinds of learning. So, a kid playing a game about pirates may seek additional information about their ships, their geographical environments, their biographies, and so forth. Even if that knowledge does not directly contribute to doing better in the game, it makes the game feel more vivid and immersing. Finally, as with Sam, the mastery of the game can give kids a sense of themselves as experts.

David Buckingham and Julian Sefton-Green (2004) have studied the informal learning which occurs when children play with Pokémon™ cards and related materials: "Pokémon is centrally about acquiring knowledge . . . successful Pokémon player needs to master a detailed taxonomy of the various species and their unique

characteristics and powers . . . It is difficult to overestimate the amount and complexity of knowledge that is required here. The guidebooks and Web sites that support Pokémon players are immensely detailed and quite incomprehensible to outsiders." (pp. 21–22) Buckingham and Sefton-Green stress the specialized vocabulary Pokémon collectors master and deploy through managing their collections, playing the game, and socially interacting with other enthusiasts. Some may argue that the knowledge, in this case, is less valuable academically than the knowledge which Pratt associates with baseball-card collecting. Buckingham and Sefton-Green counter, "In participating in the culture of Pokémon, children are learning how to learn, which may in itself be much more significant than what they actually learn." (p. 30)

In his book, *What Games Have to Teach Us About Learning and Literacy* (2003), James Paul Gee sees games as modeling an alternative approach to curriculum design that more fully embodies what learning science tells us about how kids master new vocabulary than traditional classroom practices. Elsewhere, Gee (Forthcoming) cites the example of kids learning to read through Pokémon play. Gee stresses the complexity of what kids learn about Pokémon compared to the much more restricted vocabulary they are asked to master at school. The difference in performance reflects the higher degree of personal and social investment kids have in learning about Pokémon. Kids learn vocabulary in Pokémon by putting it into action: abstract concepts and classifications are immediately transformed into elements in the game environment. And kids are motivated to put in the time to master this content because it helps them do something they want to do and because it is valued across their entire peer culture.

Compared to the tedium kids often experience at school, games create memorable moments where learning and emotion merge. Game designer Hal Barwood explains, "Games evoke emotions of struggle, of competition. . . How about the sense of self that develops as you concentrate all your being and the various parts of your body upon the task of overcoming obstacles? How about the dejection you feel, the despair when you fail utterly? And how about the exultation and the sense of triumph you feel when you actually succeed? And sometimes a little bit of awe as you maybe find that path out there. And there's another name for these emotions, and game developers call them fun." (Salens and Zimmerman, 2004, p. 334). How can the abstract and distanced forms of knowledge fostered in the classroom compete with the emotionally intense experience of playing a game?

Explaining motivation in games

While researchers have consistently found games to be deeply motivating activities, they have, as Barwood suggests, not agreed on the vocabulary we should use to explain what makes games so compelling. Here are some of the key concepts that have been proposed:

Flow Anthropologist Mihaly Csikszentmihalyi (1990) cites game playing as one of the primary examples of what he has described as "optimal experience" or "flow." Much of what he writes about flow will sound familiar to anyone who has watched a kid play a video game: Optimal experiences provide "a sense that one's skills are adequate to cope with the challenges at hand, in a goal-directed, rule-bound action system that provides clear clues as to how well one is performing. Concentration is so intense that there is no attention left over to think about anything irrelevant or to worry about problems. Self-consciousness disappears, and the sense of time becomes distorted. An activity that produces such experiences is so gratifying that people are willing to do it for its own sake, with little concern for what they will get out of it, even when it is difficult or dangerous." (p. 71) For Csikszentmihalyi, achieving flow requires the mastery of core skills, the establishment of acknowledged goals, and the ability to get feedback on one's performance—all part of the process of learning. Critics have argued, however, that the loss of self-consciousness means that flow is ill suited to higher-order learning, which depends on some degree of reflection. Others have suggested, though, that games can be designed that create different modes of engagement, moving in and out of flow in order to allow players to assess and analyze what they have experienced. Such reflection is especially apt to surface in discussions surrounding game play rather than through the play experience itself.

Fantasy, Curiosity, and Challenge Thomas Malone (1981) sought to isolate those properties of electronic games which provided intrinsic motivation for players. He found that the best games construct a challenge or set a goal that sparks exploration and experimentation; provide a fantasy that motivates that activity; and spark our curiosity to learn more about the represented world. While not every game fully meets all three criteria, Malone found these basic properties even in the relatively simple games that were produced in the early 1980s, when this research was conducted.

Hard Fun Borrowing from a young participant in one of his studies, Seymour Papert (1998) has used the term "hard fun" to describe what he sees as educationally compelling and valuable about the best commercial games. Papert asks, "Did you ever hear a game advertised as being easy?" Papert urges us to consider why kids find the difficulty of games fun while they are so quickly frustrated at school. Games at their

best put children in charge of their own learning and, at the same time, make them conscious of the learning process itself by presenting challenges they need to work through or around. Papert notes that the social context of game play, especially the competition of other players, provides "a powerful incentive to get good at learning well and quickly."

Engagement Another early researcher, Brenda Laurel (1991), sought models from theater and drama to identify the design principles that best create an active engagement with digital media. She explains that "engagement is what happens when we are able to give ourselves over to a representational action, comfortably and unambiguously. . . We agree to think and feel in terms of both the content and conventions of a mimetic context. In return, we gain a plethora of new possibilities for action and a kind of emotional guarantee." (p. 115) Laurel cites games as a primary example of kinds of digital media that make good on this contract with the consumer. She argues that the first-person perspective of games that insert us directly in the action offers more valuable educational experiences than can be found through forms of media that encourage us to contemplate from a greater distance. She explains, "Direct, multisensory representations have the capacity to engage people intellectually as well as emotionally, to enhance the contextual aspects of information, and to encourage integrated, holistic responses." (p. 119)

Projective Identity Gee (2003) seems to be describing something akin to Laurel's concept of engagement: "Good video games involve the player in a compelling world of action and interaction, a world to which the learner has made an identity commitment . . . The player's sights are set on his or her aspirations and goals in the virtual world of the game, not on the level of practicing skills outside meaningful, goal-driven contexts." (p. 68) Gee argues that games are effective not simply at prescribing goals for the player but also at setting up roles, which the player assumes in the process of achieving those goals. Gee argues that this process involves three distinct identities—our real life identities, the virtual identities we assume within the game, and what he calls the "projective identity," which is a sense we have about ourselves as a player of the game. The best games use all three identities to motivate our activities, and in this way we remain engaged even if one or another of the identifications wavers in the course of the action. We learn best, he (Forthcoming) argues, when we "can relate that content to possible activities, decisions, talk and dialogue."

What we know about games and learning

Each of these researchers has contributed a vital term or concept to our understanding of the relationship between games, motivation, and learning. Individually and collectively, they have suggested that all games involve and encourage learning—even if it is only learning how to play the game itself. Gee, Papert, and others who are experts on education confirm that games teach in ways that are consistent with the best available research on cognitive development and learning science. In many cases, games are far more effective than current schoolroom practices at deploying that research to shape learning experiences. Reviewing this literature, it is possible to identify some of the primary ways that games facilitate learning:

1. Games lower the threat of failure. While students in classes often face considerable anxiety and sometimes harsh penalties if they make mistakes while mastering content, the gamer knows that the best way to learn a game is to plunge in, make mistakes, lose your life, and then reboot so you can try again. Games thus encourage exploration and experimentation. As we play games, we frame a tentative hypothesis about the nature of the world or the rules governing our actions; we test that hypothesis by taking risks; and then we reformulate that hypothesis based on what we learn through this experimentation. Game playing, in that sense, is very much like the scientific process. We are not so much given answers and asked to memorize them as we are asked to make our own discoveries and then apply what we learn to new contexts.

2. Games foster a sense of engagement through immersion. 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 we move through. We feel a part of those worlds and have some stake in the events that unfold there. This is what Laurel meant by engagement and what Gee meant by projective identity. Games achieve this by constructing microworlds, worlds that mirror some specific aspects of real-world processes and institutions. The player can manipulate variables and see the consequences of his or her choices. Games, in that sense, closely parallel other kinds of simulations that may be used in classroom instruction. They differ insofar as they put the player into the action.

3. Games sequence tasks to allow early success and to keep players at a threshold where their skills are being challenged but they are not feeling overwhelmed. The aesthetics of current game design first emerged when games were coin-operated arcade attractions. The prevailing wisdom was that the game should allow you to score an initial victory which pumped you up and then present you with a slightly bigger challenge that would motivate you to keep putting in quarters because you always felt on the verge of success. As it happens, this sense of always being challenged and on the verge of succeeding is also a powerful motivation for learning.

4. Games link learning to goals and roles. When we approach designing educational games, the first question we ask the content experts is: What does the information allow you to do? Most textbooks never address this question, expecting the student to master content without having a clear sense of its usefulness. Games motivate learning by setting clear goals or increasingly allowing the players to set their own goals. And games often define for us what kind of person would want to meet these goals and thus what kind of person needs to master these skills or this knowledge. Games not only provide a rationale for learning: they create a context in which what we learn is put immediately to use to solve a compelling problem that has real consequences in the world of the game.

5. Games create a social context that connects learners to others who share their interests. Game scholars use the term meta-gaming to talk about the kinds of discussions that occur as players share evaluations, experiences, tips, and knowledge with each other. Meta-gaming parallels what educators tell us about peer-to-peer teaching: the act of putting what you know into language that can be shared with someone else solidifies one's own understanding and also provides a sense of empowerment and expertise.

6. Games are multimodal. Gunther Kress (2003) has demonstrated the importance of embedding multiple modes of representation (such as text, photographs, graphics, or moving images) within any learning experience both because different learners respond better to different ways of depicting the world and conceptual understanding gets solidified as we process different modes of representation. Thomas Malone (1981) makes a similar point when he suggests that the ideal learning tool constructs many different perspectives on the content. For example, he writes, "Learning to read may be facilitated by concurrently learning to write messages, both to yourself and to others, and to read similar messages." (p. 338) Most games offer multiple perspectives on the action, which can be represented with varied degrees of graphic realism, and often ask the player to assume multiple roles in the course of the game play.

7. Games support early steps into a domain. As we suggested above in terms of baseball cards, games provide not only a virtual environment for rehearsing skills and mastering knowledge but also a catalyst for additional research and learning. Players seek out additional information that helps them flesh out the microworld. Even if the game doesn't provide an opportunity to deploy that information through play, this knowledge helps to make the game play a more immersing experience.

Some case studies

Writers like Gee argue that all sufficiently challenging and engaging games have educational value. Those of us working on the Education Arcade project agree, but we also believe that it is possible to use games specifically to facilitate the learning of content that is central to our current curricular goals. Some of the projects and research we have done through the Education Arcade already point to ways that we can harness these aspects of gaming to help children expand their conceptual framework and vocabulary. Here are a few examples:

Kurt Squire (2004), one of the codirectors of the Education Arcade, assessed the value of using *Civilization III* to teach global history. The game allows students to shape the growth and development of a historical civilization, negotiating trade agreements or plunging it into war. Squire found that the students playing the game developed a strong conceptual framework for understanding the logic of historical change by, for example, thinking about the role of resources or geographic location in determining the rate at which different civilizations developed. He also found that a broad array of vocabulary words often used on standardized social-science tests—from Monarchy to Monotheism—emerged spontaneously as players tried to understand and articulate their experiences. Squire discussed ways that teachers could use just-in-time lectures and other classroom activities to build upon the learning that was occurring through game play, and he records instances of students turning—*gasp!*—to their textbooks in search of information useful for shaping the development of their civilizations.

Working with Colonial Williamsburg, we (Jenkins and Squire, 2004) are developing a game, *Revolution*, that allows students to assume the role of townsfolk as they go about their business and make political decisions on the eve of the American Revolution. Most of the major incidents and characters in the game are drawn from news reports in the Virginia *Gazette*, the major newspaper in Williamsburg in the 1770s. Teachers are encouraged to have students read stories from the paper in

preparation for playing the game and then, following their game play, to read additional news accounts to see how the historic community responded to those same situations. Many state social-science standards require that students learn to assess and interpret primary-source materials. This game provides a solid context for kids to encounter and work through the challenges presented by such documents. At the same time, each student will have a distinctive experience, seeing the events through the eyes of characters with different class, gender, racial, and political identities. This role-play, we hope, will make students more likely to participate in class discussion and thus provide an incentive to learn core vocabulary in order to share their perspectives.

The construction of imaginary microworlds that motivate learning through play may seem like a radical concept, one our schools may have difficulty accepting. Yet, in fact, it pulls us back to some of the earliest resources developed for education in America. Shirley Teresa Wajda (2003) writes about eighteenth and nineteenth century "cabinets of curiosities." In some cases, these collections were made by children as they explored the world around them. In other cases, they were put together by adults with specific pedagogical goals and were designed to model on a small scale the natural world or some specific cultural or historical context. Wajda notes that over time, manufacturers offered ceramic or glass figurines that could be incorporated into these collections, and even created toys that tied directly into the textbooks they were reading at school. In engaging with these materials, in shaping or reorganizing the collections, kids developed a sense of immediate connection to the concepts they embodied, a sensation that was assumed to ultimately foster deeper levels of understanding and appreciation. Children got together to talk about and trade the materials of their collections, providing a context for shared learning and reflection.

Whether we are talking about games that involve collecting or exchanging cards, such as Pokémon or baseball-card collecting, or games that are played on the computer, our modern games can be understood as continuing an age-old practice. Rather than collecting material objects, modern kids collect representations of those objects. Rather than playing within a physical microworld of ceramic animals, they enter into a virtual world of digital characters. Perhaps, as they say, everything old is new again.

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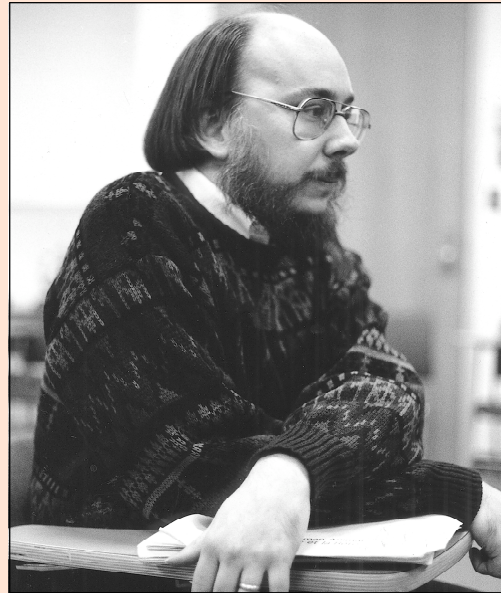
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