Video game-based learning: An emerging paradigm for instruction

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Game-based learning: An emerging paradigm for instruction

Abstract

Interactive digital media, or video games, are a powerful new economic, cultural, and perhaps educational force. Games are now a multi-billion dollar industry, with conferences, journals, and research initiatives. Video games provide situated experiences where players are immersed in complex, problem solving tasks. Good games teach players more than just facts, but ways of seeing and understanding problems and opportunities to "become" different kinds of people. "Serious games" coming from business strategy, advergaming, and entertainment gaming embody these situated learning features and point to a future paradigm for eLearning. Building on interviews with leading "serious game" designers, this paper presents case studies of three organizations building serious games, coming from different perspectives but arriving at similar conclusions. The study concludes with emerging trends in game-based online learning. It argues that such games challenge us to rethink assumptions about the role of instructional design in eLearning.

Pull Quotes:

To date, most eLearning is designed along the lines of the old paradigm of instruction – resulting in something akin to a trivia contest – as opposed to the instantiating the kind of experimentation, problem solving, and collaboration that characterizes new the gaming age.

Underlying this move toward game-based learning environments is more than strategic opportunity or marketing; the shift toward games also represents an intellectual recognition among many that they represent experiential learning spaces, spaces where learners have rich, embodied, collaborative and cooperative interactions where they think with complex tools and resources in the service of complex problem-solving (Gee, 2003; Squire, 2003).

Introduction: From eLearning to Experience

Over the past decade, eLearning has been a dominant paradigm for the electronic development, management, and distribution of learning materials. But as many critics have noted most eLearning is nothing more than online lectures or course notes, and the basic organizing metaphors of traditional classroom learning: knowledge as discreet and abstract facts, learning as the "acquisition" of content, and therefore instruction as the organization, dissemination, and management of that content – have gone unchanged (c.f. Bednar, Cunningham, Duffy, & Perry, 1992; Fodor, 2000; Sfard, 1998). The promise of eLearning, to make customized, accessible learning experiences has given way to more mundane pursuits, such as free online content. In the words of Cross and Hamilton (2002),

> Corporate eLearning is a powerful paradigm, but it has strayed from its inspired beginnings. Poised to become a driver of business performance, eLearning lost its way as vendors reached for quick economic gains at the expense of long-term strategic position… eLearning devolved into quick-to-sell IT-only content libraries, bland Web course designs, and unfocused, minimally tailored portal solutions. This was a boon to the training department, but not the business as a whole, and the value of hassle-free turnkey campuses and trainer-empowering LMSs became the low hanging fruit in the marketplace.

In short, many eLearning leaders recognize that publishing content online is not synonymous with improving learning or performance. In fact, so-called content (i.e. declarative knowledge in the form of information bits or facts) is, and always has been, "cheap"; even before the Internet, one need only go to the public library for access to the world's information. What has been more difficult is the effective design of instruction in order to provide the kind of social and material experiences necessary to make sense of that content, to make it meaningful and useful for future action.

As traditional eLearning stands in flux, a new paradigm of digitally mediated learning – commonly called game-based learning is emerging (Aldrich, 2004; Prensky, 2001; Squire,

2003). Recently, research projects, organizations, centers, grants, books, and studies have emerged exploring new visions for game-based technologies in learning (c.f. . Games-to-Teach Team, 2003; Media-X, 2003, Sawyer, 2002; Shaffer, Squire, Halverson, & Gee in press). Driving this change are several factors, including (1) recognition that games are a multi-billion dollar industry, rivaling Hollywood in revenues and cultural influence (ESA, 2004);[*1] (2) Digital games are the one of the only (other than pornography) unambiguously profitable uses of the Internet (Kolbert, 2001); (3) Digital games are routinely listed as the most "important" and influential medium by college students (Games-to-Teach, 2003); (4) games are a powerful socializing force; those who play computer and video games have different attitudes about work, play, and their coworkers than their peers (Beck & Wade, 2004).

Underlying this move toward game-based learning environments is more than strategic opportunity or marketing; the shift toward games also represents an intellectual recognition among many that they represent experiential learning spaces, spaces where learners have rich, embodied, collaborative and cooperative interactions where they think with complex tools and resources in the service of complex problem-solving (Gee, 2003; Squire, 2003). As Gee argues (2004), as games become more complex, they have begun using intelligent tutors, scaffolding, and affinity groups for learning in order to help players understand their increasingly sophisticated interfaces and systems. Rapid iterations in a highly competitive market has resulted in highly evolved interfaces and learning systems designed to teach players to play them. In short, many game designers have developed an expertise in (some) fundamental principles of instructional design, in particular, the idea of experience design, which Wilson and Myers (2000) and others have argued is fundamental to situated views of cognition.

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[*] Entertainment Software Association. (2004). Top ten industry facts. Retrieved 8/1/2004 from: http://www.theesa.com/pressroom.html. In fact, the relationship between Hollywood and games is much more complex.

As a result, game-based training has gone from a relatively niche market to a roughly $30 to $75 million market (Erwin, 2004). The games industry is transitioning into big business, and many small developers are facing difficult financial times (GDC, 2005). As this study shows, a number of developers such as Breakaway games are taking the interactive design expertise honed in the games industry and applying it to advertising, training, and marketing. The military in particular is hiring game designers for their knowledge of how to create compelling user experiences which can be the basis for changing understandings, behavior, beliefs, and even identities (Swartout, 2005). As these game players, designers, and even entire companies migrate into the training space, traditional eLearning developers may have to rethink how they conceptualize their practice. This case study investigates:

1. What new models of learning and training are emerging?
2. What kinds of institutional changes are accompanying this change?
3. What implications does game-based learning present for instructional designers and performance technologists?

Drawing on a critical review of existing game-based learning literature, a content analysis and review of game-based learning products, and interviews with game-based learning designers it shows how digital and video games are emerging as a new model for situated learning environments. I argue that games problematize contemporary work in eLearning which focuses on providing, organizing, and repackaging content, offering new models that put a primacy on *experience*.[*] Game-based learning can be understood as a particular kind of designed experience, where players participate in ideological worlds, worlds designed to support a particular kind of

[*] Pedagogical models like "learning through experience" are common in educational research, although they have been underspecified and undertheorized (e.g. Gredler, 1996; Squire, 2002).

reactions, feelings, emotions, and at times, thoughts and identities, which game-based learning designers are leveraging for education and training.

Methodology: Comparative Case Study

This study uses comparative case study techniques to build a framework for game-based learning. Consistent with Stake's (1995) case methodology, it employs a combination of historical research methods, document analysis, interviews with trainers and game developers, and critical study of game artifacts, to theorize contemporary serious games as an emerging model of eLearning. The detailed cases were reported elsewhere in greater detail (c.f. author, 2005). This study analyzes the cases for emergent themes toward understanding serious games as a model for situated learning and their implications for instructional and performance technologists.

Preliminary Review

The initial review of existing work examined the Serious Games archive, the emerging literature in games studies on eLearning, advergaming, and ubiquitous gaming, and situated learning literature. Several successful programs were identified and contacted for further exploratory study. The researchers conducted eighteen informal interviews with representatives from ten learning organizations, ranging from small independent contractors to Fortune 500 companies (gamelab, Root Learning, Digital Mill, E.I. Lilly, Breakaway Games, Ya Ya Media, Simulearn, Simquest, Desq, and U.S. Army).

Data Sources

Based on these initial interviews, three game-based learning companies (YaYa Media, Breakaway Games, and Root Learning) doing game-based learning work were selected (See

Table 1). They were selected for their relation to four themes that emerged from preliminary interviews and analysis: (1) Games as spaces for experiential learning, (2) games as contexts for discussion, (3) games as tools to think with, and (4) games as spaces for exploring new identities. Each of these four themes have also emerged within the research literature on games and education, and therefore were worth examining further (c.f Gredler, 1996; author, 2003). These cases are not necessarily representative of the field as a whole; rather they were selected as purposive samples to probe theoretical issues in game-based learning and generate a productive framework for game-based learning.

For each case, we interviewed company CEOs, developers, and trainers, reviewed games and other materials, and interviewed clients and vendors to triangulate data. Based on these data, researchers generated profiles of each company. It is worth noting that none of the featured companies started in instructional design, technology or eLearning; they come from business strategy, marketing, and the games industry.

Data Analysis

For each case, the author compiled all notes for each case, which numbered approximately 30 pages each. These were condensed into vignettes, which are provided here for context. Next, a team of three researchers examined these notes, and began coding interactions for themes, using a database application. Multiple passes were made at the data in an attempt to generate assertions that were concise, not overlapping, and as strong as possible while still being "true" to the data. The researchers then outlined four conclusions, which are detailed in the findings and implications section of this paper. These conclusions, or assertions draw from all three cases and attempt to synthesize the findings so as to build a more general theory of game-based learning. Researchers shared these findings in draft form with participants, in order to

understand whether they accurately reflected participants' beliefs. After sharing the results, another round of edits were made to clarify misleading assertions and ensure and accuracy of participants' comments.

Limitations of Study

Underlying this approach is an interpretivist epistemology, a way of knowing that assumes that the researcher brings his or her own questions, values, and assumptions to the study and is thereby an integral part of the research study. Whereas most traditional case study research has relied on an objectivist epistemological stance whereby cases or other sets of qualitative data are used to develop "grounded" findings, the interpretivist tradition assumes makes no claims that the assertions are inherently "in" the data, but rather, that the findings are co-constructed among the interpreter, the phenomena at hand, and the reader (Cresswell *; Merriam, *; Glaser & Strauss 1967; Stake, 1995). From the interpretivist perspective, it is assumed that no findings are (or could) be made outside of the theoretical traditions and language in which they are situated. Further, compared to traditional grounded theory approaches, it assumes that in many instances, better progress can be made by targeting research to extend particular theoretical notions than by relying exclusively on data to guide the research. Thus, the reader might regard these findings and assertions as interpretive – as a design theory of what directions the field may go (Reigeluth & Frick, 1999).

Results: Cases of game-based learning

Organization	*Background*	*Size*	*Offices*
Breakaway Games	Entertainment games, military consulting	100	Baltimore MD
Root Learning	Business strategy / consulting	75	Toledo, Chicago, London, and Zurich
Ya Ya Media	Business Strategy, Marketing / Advertising	50	Los Angeles New York

Table 1: Overview of case contexts

Breakaway Games

Breakaway games is one of the many games companies that spun off of the legendary Baltimore, Maryland –based game developer Microprose after its breakup. Breakaway's positioning near Washington, DC allowed it to develop learning simulations, particularly war games and support tools in addition to its traditional game line-up. Most of Breakaway's early experience was with 2D war games, including *Peloponnesian War* (a game still used in the Army college to teach about ancient warfare), and Breakaway continued making entertainment games, including *Waterloo, Austerlitz*, and expansion packs for the *Tropico, Cleopatra*, and the *Civilization* series. Breakaway soon found that their expertise in creating emotionally compelling media that provides particular kinds of experiences was directly applicable to other endeavors, including marketing and training with the U.S. military and defense contractors.

Currently, Breakaway is developing a number of proprietary systems and technologies such as Entropy Based Warfare (campaign analysis and war game assessments) and Integrated Gaming System (supporting war gaming). In addition, they have a number of trademarked technologies for 3D terrain generation, multi-user support tools, and simulation tools. Ironically, they are also preparing to launch a game for *A Force More Powerful*, a group dedicated to using nonviolent conflict to achieve democracy and human rights (Figure 1). One normally does not think of non-violent peace activists as funding million dollar games, but the challenges behind training such activists – for example, that it must enable a globally distributed workforce to espouse a particular ideology for solving problems – means that game-based solutions are

especially attractive.* Homeland security is an arena with similar constraints, and Breakaway, like many companies also has a game-based solution for training emergency responders.

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Root Learning

Root learning is "strategic learning company" with roots in business strategy. Instructively, their mission is not to "deliver content" or "train new knowledge, skills, attitudes, and beliefs," but rather to "engage and connect people to create results in a context that respects their humanity, intelligence, and capacity to grow." Crucial to Root's identity is that the company perceives themselves as both scientists and artists, educators and business people. Root learning's core products include their learning maps, planning documents generated by holding strategic discussions with company leaders and participants (see figure 2). In brief, a learning map is a document generated through a type of needs analysis. An interdisciplinary team of technologists, artists, and designers observe and interview participants to generate a metaphor describing the training / strategy problem.

These metaphors help stakeholders understand the problem in broad terms, understanding *why* training may be needed before ever introducing content. Participants do interact with content via the learning maps by reading index cards of information, discussing problems, and playing mini-games where they consolidate or apply information they have encountered. Critically, information in learning maps is not the goal of the exercise, but secondary to supporting the particular message or world view. Interaction among participants is critical to this model, and in fact, the gameboard might be seen as a framework for facilitating discussion.

* See http://nationaldefense.ndia.org/issues/2005/Feb/UF-Strategists_Learn.htm for more information.

---------- Insert figures 2 and 3 about here.----------

Although Root learning's background is in interactive, participatory learning environments, it is only now branding its approach as a games company. Root's current work in eLearning, which includes simulations such as the Blockbuster simulation draw more obviously from digital gaming metaphors, tropes, and interfaces (see figure 3).

YaYa Media

YaYa media's roots are in both the games industry and business strategy. YaYa has carved out a niche in advergaming, and entering training as well (Pfeffer & Chan, 2003).[*] Founded with funding from Michael Milken as a "leading interactive technology company," YaYa's initial business charge was to invent new ways for marketing and advertising a digital economy where consumers' attention is increasingly scarce and technologies such as Tivo threaten the future of traditional broadcast advertising. As such, YaYa is most famous for branding "advergaming" a genre of advertising based on gaming principles that simultaneously advertises and gathers marketing data. An early game, *Chrysler Get Up and Go*, typifies the YaYa approach (see figure 4). Users login to the game, try to match their personality to one another (and the Chrysler vehicle) and win a free vacation to a location best suited to match their personality based on a Cosmo magazine - style quiz. Other games include an accounting game "Bizzfun", and a Jeep driving game for the Chrysler / Jeep sales force (see figure 5).

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[*] Keith Ferrazzi. Stanford Business case OB-44 written by Jeffrey Pfeffer and Victoria Chang 11/15/03.

Originally designed for advertising, these games are now being used for training as well. Critical to understanding YaYa's approach is that their engine not only presents users content; it also collects data on users' choices, preferences and habits. In such a constrained environment, it is relatively simple to track players' progress and identify patterns (such as which color is most popular with the 18-24 year old age group). Thus, YaYa has found that some of the core questions behind advergaming - -how to entice users, provide customized content based on player's choices, how to aggregate and respond to this data, and how to encourage customers to build allegiance to the brand – are all problems that instructional and performance technologists deal with as well. YaYa's Chrysler game has been used to train sales employees about user preferences, their fashion game is used to change teens' attitudes toward accounting, and their basic game engine has been used in other training scenarios.

Findings: A situated framework for understanding game-based learning

The move toward game-based learning represents more than a shift to a new medium; it is a shift toward a new model of eLearning that focuses less on content and more on designing experiences to stimulate new ways of thinking, acting and being in the world. Movements such as the MIT Open Courseware project show that "good" online content is cheap; powerful learning experiences are harder to produce. The emergent paradigm of game-based learning is built on the following principles. (1) Create emotionally compelling contexts for learning (2) situate learners in complex information management and decision making situations where facts and knowledge are drawn upon for the purpose of *doing*; (3) construct challenges that confront and build on users' pre-existing beliefs (4) construct challenges that lead to productive future

understandings, (5) anticipate the users' experiences from moment to moment, providing a range of activities to address learners' needs; (6) invite the learner to participate in constructing the solutions and interpretations (7) embrace the ideologically-driven nature of education and training.

Instructional development models (e.g. ADDIE, rapid prototyping) for game-based learning require draw but also differ from traditional development processes. They frequently include: (1) Managing expectations, (2) providing an early holistic model of the product for clients, (3) iterative design cycles, (4) early user feedback, (5) an increased role for visual designers, (6) business models with blurred lines between marketing, strategy, and (7) distributing instructional design tasks across roles. These findings imply that if instructional and performance technologists adopt "designing experiences" as a metaphor for their practice, then they may need to embrace some "fuzzy" areas like aesthetics, which is discussed in the final section.

From Content to Context

Participants across all three cases reported that a primary driver of their move to game-based learning was clients' desires for more engaging and immersive experiences. These terms are commonly used in games, but rarely discussed in learning. More engaging, immersive eLearning is more than "fancier window dressing for content," but is a transformation of assumptions about what it means to think, learn, and teach. Tom Crawford describes Root's interest in gaming:

> We're always looking for innovative, fun, engaging pieces, so games are kind of a 'no duh to move to." We ask, "How can we people engaged and get them to learn?" People look at our maps and everyone says, "It's a game board." So we're giving in to what they're telling us. But the most important pieces of our strategy and philosophy of life is really that eLearning has missed the boat. The Industry has focused on content, getting out the *content*, but they leave out the *context.*

For Root Learning and their clients, *why* something matters is much more important than the content itself, which fits with situated and functional views of cognition (c.f. Barab, Hay, Barnett & Squire, 2001, Cognition and Technology Group at Vanderbilt, 1993). Whereas there is a saying in eLearning that "content is king," in a situated view of knowledge would say that it is the context in which learners develop knowledge is king.

(1) Creating Context. The first thing that games do is create an emotionally compelling context for the player. Many games use cut scenes, short movies designed to situate the player in the game world and context. But, there are other, simpler ways. Root's materials build on nostalgia, curiosity, visual appeal, and presumably, employee's interest in the "bottom line" of their company. Good games connect with the player emotionally and provide an entrée or invitation into the world that is to be learned. The context creation (much like the problem in problem based learning) is the bridge from where the player is to where she wants to go.

A common misconception about games and simulations is that they are perfect representations of reality. Inherently, they are simplifications of reality (much like any representation, i.e. book, picture, or film is also an incomplete representation of reality). Games are spaces in that they are worlds that we participate in the construction of, but they are also built according to particular values, as we saw with Root's learning maps. They call our attention to some aspects of reality while obscuring others. Part of what makes games so powerful as a medium for learning is that they allow us to build worlds that are instantiated according to a particular set of rules.

The Root materials work on several levels to *frame* the experience according to these rules. First, the "maps" draw on board game tropes to immerse the learners in an experience where they are gathered together around a common task in a setting where informal talk,

collaboration, and discussion is encouraged. But further, they make very powerful use the core metaphor (going down a road, jumping a chasm) to situate the learner while putting forth an argument for how the particular problem should be viewed. In short, they use graphic artists to provide a visual metaphor for engaging with the topic. These metaphors are far from innocuous; they communicate subtly (and not so subtly) what the problem is about. They also set the agenda for the activities to follow.*

It's worth noting that Root Learning uses artists – not instructional designers – for task analysis. For Root, it is less important that they create an exhaustive (or even reasonably thorough) statement of the problem. What's more important is that they build a common metaphor for talking about the experience that is understandable to all parties. The assumption is that the core challenge is communicating the proper way of framing the problem, and then particular knowledge, skills, procedures, and beliefs can follow. Thus, games structure experiences around problem solving – problems of the designer's choosing, the player's choosing, or when games work best, as a hybrid of both. A core theoretical and design problem of games is that they are not only designed by the developer, but rather spaces to be inhabited by players whereby their actions fill out the game world.

(2) Intellectual and Emotional Engagement: Inviting participation from the user. In creating a context for experience, games invite players to inhabit the game space. How different games and game genres work is beyond the scope of this paper and is still being understood by game researchers (See for example, Frome, 2004; Games-to-Teach Team, 2003; Gee, in press; Squire, 2005; Steinkuehler 2004a; 2004b. But core to most games is that they both establish

* Commercial video games do the same thing with cover stories, scenarios, and cut scenes. They situate the player into a particular role. This serves several ends; it explains why the game isn't simulating everything in the world (i.e. few see the opening of Doom and want to kiss the martians, making it unnecessary to program in all of those potential interactions.

challenges and goals for learners to meet (save one's job, rescue the company), but also establish seductive identities and capacities for players (high performing manager, ace delivery driver).

In the case of Root learning, the physical layout visually, metaphorically, and literally invites the learner inside of the map to participate in constructing the learning environment (mostly through various related activities, such as matching games). The images are designed to evoke pop culture nostalgia, drawing the user's past identity into the experience. It immediately ties the brand and (and learning) not just to an abstract pedagogy but to personally meaningful *emotional* experiences. Participants are invited to scan different eras and pick out what year the "Pepsi challenge" hit, when Michael Jackson's hair caught on fire, and so on. As the eye moves down the street (and through time), it encounters shops showing different trends, with shrinking rates of profitability presented in order to elicit concern over participants losing their jobs.

YaYa Media's games operate more like traditional videogames, creating alluring roles for players to inhabit. Bizzfun, their accounting game, is designed to show high school students how accounting and communication skills can lead to "exciting" careers in business, such as in the fashion industry. Although Bizzfun may not have been designed to target women specifically, a majority of its users are women. The roles it creates (powerful fashion industry leaders) explicitly "shows high school students how the skills they already have will make them successful in any business and speaks (in their own language). Similarly, YaYa's Jeep racing game teaches sales representatives about Jeep options not through PowerPoint, but by letting them design and race their own virtual vehicles that include realistic Chrysler parts.

(3) Problem-Driven Activity. In these cases, key factual information – the things that you might find in a PowerPoint – is organized and presented to give players a compelling experience, all of which emphasize a particular worldview (Pepsi must adjust sales strategies, accounting is

fun, Jeep upgrades are good). As opposed to traditional instructional approaches, which typically contain the need for instruction, generalities, examples, definitions, practice, and feedback, game based approaches are organized around situations, roles, activities, and practices. Although game-based approaches are interactive, co-constructed by users and experiential, there *are* still overarching narratives at work. Root Learning executives explain how their approach treats data as subservient to an overarching narrative.

> Most executives feel that everything is important. We ask 'What are the key piece of data people need to do to do their jobs differently'. One thing that artists do is filter through and say, "this is the key piece. This is the lynch pin to the story."

Of course, this is not "any old story" but the story that Pepsi executives want their employees to believe. Root designers claim that few object to this approach because they always make companies' goals explicit, and use the discussion and debriefing times to address the validity of this interpretation explicitly.

Breakaway Games' *A Force More Powerful* is a clear example of this principle. Players complete a series of missions around nonviolent political action, missions which are designed to teach players the principles of nonviolent political action. As players hold demonstrations, free hostages, or take over communications stations (like radio stations), they learn the principles and strategies of nonviolent action. Missions are designed around historical scenarios modeled to include important variables including "strategic and political factors, ethnicity, religion, literacy, material well-being, media and communications, resource availability, economic factors, and the role of external assistance". Through these missions players develop not just factual and descriptive knowledge of tactics such as "training, fund-raising, community organizing, leafletting, protests, strikes, mass action, civil disobedience and noncooperation" but an

appreciation for their *functions* in situ, for their strategic role within historical situations and understanding of how and when they're used for action.

As anyone who has read a game FAQ knows, commercial entertainment games are actually overloaded with information – names, terms, procedures, and strategies (or moves) that players must master to be competent. As such the information of game-based spaces differs from most traditional (and even learner centered, e.g. Jonassen, 1999) learning environments in that players are given loads of data to manage through tools, databases, and online forums. A Breakaway game designer explains how this skill – understanding how people navigate multiple information streams is essential for the next generation designer:

> I think the value of games in the future will be understanding human psychology and how you interact with information as opposed to traditional instructional design skills necessarily. How do human beings react to multiple sources of info to come to an analysis? That's what we're good at without knowing. We handle masses amts of data – letting people manage copious amounts of data very well. That's the future. It's about how this data comes across and how you analyze it and come to a conclusion.

Indeed, even the most simplest of game interfaces includes dozens of pieces of information, most of which have been streamlined for efficient use through several generations of testing with thousands of users. Consider this screenshot from Firaxis' *Civilization III* (See figure 6 and 7). Through evolution over thousands of games in a highly competitive environment, successful design interfaces have been taken up and used, whereas bad or confusing interfaces are abandoned. Players enjoy complexity – especially the pleasure of experiencing amplified output that comes from playing with powerful tools. What they do not like is "uninteresting decisions", (i.e. boring games), games where they are left with too many easy or inconsequential decisions (micromanagement) – decisions where there is no learning to be had.

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From a training perspective, driving this move toward games is a shift from caring what the person "knows" or can "store in the head" toward a concern for what the person can *do,* given access to a full set of tools, resources, and social networks which is consistent with the situated view of knowledge (c.f. Salomon, 1993; Hutchins, 1995). One of the primary benefits of games is that they can immerse players in "smart contexts" where they have access to and are given reason to use tools, resources, and social networks. Games such as Lineage 2 are designed to be played by hundreds of thousands, if not millions of people, and mastering the game's quests, economy, and political structure requires collaborative problem solving. Training programs, from this paradigm, seek not to just give people user manuals or explanations of tools, but also and more crucially experiences that demand complex information, where they use tools to make sense of multiple information streams. And game design, perhaps more than any other area of design is on the cutting edge of creating and supporting these digitally mediated distributed communities of expertise.

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(4) Challenges that confront and build on users' pre-existing knowledge and belief. With games, knowledge is not "presented" to the learner, but arises through activity – activity that occurs in relation to pre-existing knowledge and beliefs and the projected identities that are established for players (Gee, 2003). In the case of Root learning, mini games, which include

matching games where players identify the fastest growing product sector or most profitable retail outlet -- elicit learners pre-existing knowledge and beliefs. Further, the mini-games are designed to draw on learners' desire to be informed participants in popular culture or knowledgeable workers, which when combined are powerful contributors to conceptual change (c.f. Gardner, 1991). Critically, participants confront these beliefs in a social setting where participants must a) actually commit to a view publicly and d b) explain their choices, which makes their cognition visible to participants, creates opportunities for reflection, and creates a mechanism for addressing conceptual changes. This design allows learners to share stories, theories, and experiences with their products, further tying the learning experience to their work outside of the learning context.

This "gamelike" approach gives the experience an entertaining feel where it is safe to disagree (much like a family game of trivial pursuit), but also challenges players' core assumptions about their practice. A Root designer explains:

> Our model is really about challenging assumptions. And we can do it in a way that no PowerPoint presentation can – by letting them challenge their own assumptions. Our basic theory is that most people are intelligent, rationale people and when presented with information will come to their own conclusions. They come the same conclusions that the organizations do, although most organizations are actually afraid of giving them information. Rather than being afraid, we try to put it in their hands and let them talk about it. Liberating information doesn't cause problems. It creates solutions.

This notion that "information should be liberated" is one commonly associated with the gaming generation, a generation familiar with open source software, websites, and communities such as wikipedia (Squire & Steinkuehler, 2005). The idea is that information in and of itself is cheap; what is valuable is the right *conceptual knowledge* – or organizing set of assumptions and ideas.

Effective game-based learning involves structuring these challenges so that learners develop the kind of understandings that designers would like.

Games are unlike other interactive learning systems in that they contain failure states, conditions where players' choices can lead to negative consequences; game constraints push up against players' behavior limiting what they can and cannot do. In entertainment games such as Ninja Gaiden, "boss" monsters ensure that players have learned all of their character's moves (such as blocking and defending). In educational games, level design or time constraints can induce participants' failure, using "seductive failure states" to entice learners into make mistakes that are tied to their misconceptions about a domain (Games-to-Teach Team, 2003). This is a design mechanism that has been commonly exploited in research prototypes developed at academic institutions, but less so within industry, perhaps because it necessitates approaching game design from a more traditional instructional design perspective and requires substantial background research into learners' previous conceptions (c.f. Klopfer & Squire, in press; Barnett, Higgenbotham, & Grant, 2004).

In a few cases, game designers have used games' capacity to generate learning through failure as explicit selling points for games, suggesting that it could be a core affordance of the medium. As a Root designer explains, "For us, learning to recover is more important than 7 bullet points. How do you come about learning to recover? Making success of a failure is a key to learning through games." Good Games should give you contexts to practice failure (and recovery safely). They are environments where learners can and do take risks, trying on different learning strategies, learning through an abductive process of inquiry rather than a linear one of question and answer (Squire, 2005). In fact, in their studies of gamers, Beck and Wade* found

that this willingness to take risks and learn through failure is a characteristic trait of the gamer generation that contrasts them from their older peers.

(5) Knowing Through Practice. Games are fundamentally about *doing*. Perhaps the biggest difference between game-based and more traditional approaches to learning is that game designers most often start with the user experience, more specifically, with what the user *does*. Legendary game designer Sherigu Miyamoto (creator of Mario, Zelda, and Pikmin) likes to say that he starts with verbs, what it is a player can do in a world. Imagine listing the verbs available to a learner in a classic eLearning scenario. Most likely, they are read and look. If the person is lucky, maybe chat. Many game developers begin with these verbs, and then create structured problems which build player mastery and add nuance to player skills through extensive practice involving repetition and variation. Although some marvel at the fact that games take 20, 30, 40, even 100 hours to complete, in fact what is happening here is that game designers are allowing players to learn new skills and apply them in a variety of situations (c.f. Chronicle). Most games structure levels so that these skills are combined and put together in new ways through time. The game *Viewtiful Joe,* for example, structures levels so that players must combine and use knowledge in a variety of settings, the kind of practice schedule that is useful in generating transferable knowledge and skills (Squire, 2005). Game designers build levels with new challenges, player capacities, and constraints in order to maximize novelty – which leads to player learning (and staves off boredom). As designer Raph Koster (2004) argues, game designers are locked in an eternal battle with their players, creating newer and newer challenges in order to stay one step ahead of players' skills.

Academically developed games in research contexts have shown that this structure can work, and these designs are beginning to enter the commercial space as well (Barnett et al.

2004). In the case of *A Force More Powerful,* Breakaway's designers have created a variety of different levels and scenarios so that players can try strategies in different situations and, in so doing, develop a kind of deep expertise that comes through multiple cases. As players encounter different scenarios, they practice routine skills, develop a mastery level understanding of game basics, and develop more flexible understandings of game content. This variety of levels both enforces mastery and prevents overgeneralization from a minimum of cases. *A Force More Powerful*, which also ships with a robust level editor, enables students and designers alike to create levels communicating and extending this knowledge.

The most promising model for games and training could be these kinds of levels, delivered episodically, which serve as refresher courses tailored to a particular employees needs, much like a personalized tutorial or "just in time" experience. With their Blockbuster game, Root is creating a module that will be the equivalent to 20 hours of training, yet doled out over several months, made available on time and in demand. The idea is that players can begin by mastering basic skills in the game and then try these basics out in limited conditions in an apprentice situation (in the real world). Next, they can return to the simulation for further training (as opposed to doing a lengthy training up front). Each of the 137 modules they have designed includes context, content, practice, and then elements that take them out on to the floor to complete. In this way, the game starts to span across the real and virtual space, a particularly promising form of training called "augmented reality". One can imagine sales representatives, or even employees themselves identifying training needs and selecting the appropriate training. Whereas most game-based training solutions have been thusfar conceptualized as off-site, traditional instruction, their biggest potential may be in such distributed training scenarios.

(6) Modeling the End User. Games' open-endedness poses unique challenges for instructional designers; although games differ in the amount of control users have, compared to traditional instruction, games give learners a tremendous amount of choice and freedom in choosing what to do. Doug Whatley of Breakaway games describes some of the issues designing within a game-based pedagogy:

> Most training is highly linear. You have your objectives up front. Then you add information so that the learners can spit it back. Creating a world in which the user is completely free, where the experience is open-ended is a little different circumstance. We have to know lots more about them and bring it back into the environment.

It may be surprising that in designing an open-ended simulation, designers worry that they need to "know more about the end user." Good game design involves designing experience around what players might be thinking and doing, including carefully graduating complexity for the end user.

The "holy grail" for game-based learning designers is to model the end user based on data gathered in situ, much like an intelligent tutor. YaYa's game engine which was developed for data gathering for marketing (i.e. how can we infer what types of products 25 year old men in Madison, Wisconsin prefer through their in game choices?) suggests where the field is headed. YaYa's engine already can gather data on users' choices, compare these choices to existing models and, potentially, serve up custom content accordingly. Designers of intelligent tutors, for example, have become very good at creating models of users' behaviors (albeit within limited domains) and then programming the tutoring system to respond with customized content fitting learners' actions (cite). To date, no educational game offers this kind of assessment of learners' actions in situ, or this kind of adaptive content. Games developed in research contexts have done extensive user testing to identify learners' existing knowledge and conceptions, and then

structure levels accordingly. As such, the model of the user does not exist in the artificial intelligence, but in the design (Jenkins, Squire, & Tan, 2004).*

A number of commercial entertainment games are exploring how to use real-time data to customize content and adjust difficulty, suggesting paths that educational game designers might explore (Hunike, 2005; Wright, 2005). To date, however, most researchers are finding it difficult to take data generated in game-based activity and infer back cognitive understandings.

(7). Embracing Ideology. Running through these findings is a notion that designing games for learning is not just about conveying content, but representing the world according to a particular set of rules which are aligned to particular viewpoints and ideologies about how the world works. A perhaps overlooked capacity of games is to frame problem situations in particular ways, including those variables, situations, and issues that instructional designers deem important while leaving out others. Organizations turning to game-based learning share a concern in training workers to make "better" decisions, (i.e. decisions that are more in line with their goals for the company).

In one example, Root was trying to help Pepsi truck drivers understand Pepsi's move to rebrand their business as large retail stores (such as Sam's) were generating most of Pepsi's profits (c.f. Harris, 2005). The map of the business terrain shows a "logical" progression from the 1950's to the 1980's, following a trend along different business models, including depictions of the changing beverage marketplace and trends in retail distribution. The physical layout frames the problem landscape in a particular way (including some features and leaving out others). In this case, the map framed Pepsi's problem as continuous growth maintaining continual growth and adapting a market where most profits come from sales by large retail

* Basically, a gamer will "fly through" levels until they reach one of difficulty, at which point they struggle. Games like Viewtiful Joe now contain feedback loops so that players can "power up" by buying bonuses each time they fail, effectively balancing the game for the user.

stores. Part of what make's Root's products powerful is that they are systematically organized to frame problems in particular ways (i.e. continued growth in profit and reduction in cost is necessary).

When a company like Pepsi produces a game for delivery drivers aimed at training them to spend more time with large "box" retailers and less time with "mom and pop stores," Pepsi is more than just teaching knowledge or skills (both of which they are doing), but Pepsi is also trying to get drivers to adopt its corporate *values,* where profits, expanding markets, and efficiency are more important than maintaining traditional customer relations or worker job satisfaction. What makes games like this -- or the Jeep / Chrysler game or the A Force More Powerful game – distinctive are the way that they model problem spaces according to a particular ideology and then invite users to interact with them. As such, games seem well poised in organizations that want employees to think strategically with knowledge on the fly, seeing problems the way that organizations want them to be seen, and acting in ways that are in accordance with their organizations' values.

However, as participatory systems, games invite learners to enter the problem space, thinking with information and making decisions in real time, which, to be effective demands an openness toward information that is uncommon in most organizations. A designer from Root Learning explains:

> Most organizations (like most of education) are built on a military-style set up of command / control hierarchy. Information is made available on a need-to-know basis. The idea is that if people (lower level employees) have the information, they will be dangerous. But there's no way that I (as a leader) can manage information and decision making on a task-to-task basis. It's just impossible. There is too much information and not enough time in the day. So, if you want people to do the right thing, they have to have the information to make their own conclusions, and then it will happen.

Underlying this instructional approach is an ideological shift away from hierarchical organizational models, where every decision must be vetted by upper management, and toward distributed models, where particular cultural values and ethos permeates, driving employees to make the "right" kind of decisions from "within" rather than "without' (c.f. Gee, Hull, and &, 1996; Levy, 1999). Game-based approaches create learning contexts where information is free, open, and discussed and made "talkaboutable". They hope to create a context in which employees might openly confront and discuss beliefs and willingly take on the corporate ideology, or way of seeing problems.

Changing Design Models.

The previous section described how game-based approaches to training share unique qualities, some of which differ from traditional instructional design. Designers of game-based learning systems are also reporting unique approaches to instructional design (some of which may be familiar to others in eLearning). To suggest that there is one approach to game design within the commercial games industry would be mistaken; there is no one common method for game design, and there are almost as many different approaches as there are game design studios. As eLearning companies begin developing games and hiring game developers, these methods permeate instructional design as well. Participants in serious game are reporting at least seven distinct, crucial themes that characterize how they design games.

1. Managing expectations
2. Providing a holistic model of the product for clients
3. Iterative design
4. Early user feedback
5. Increased importance of visual designers
6. New business models
7. Distributing instructional design tasks across roles

The following section explores these phases in more depth.

(1) Managing Expectations: Because there are still relatively few examples of game-based learning systems in existence, expectations between clients and developers can differ greatly. Different stakeholders often create different models in their head of what the game will be and these will differ greatly. Deb Tillet, CEO of Breakaway explains,

> The biggest, biggest concern I have with non-gaming customers is that they require more education and laying out of expectations. If we are dealing with Microsoft games, they know what the milestones and deliverable are and where we should be each step of the way. We have education sessions with non-game clients about what to expect (and when). The standard military business way of making a big committee, stating the parameters of a project and then implementing it to spec is not how you do games. So the first thing the client comes in and wants to see is "What is the final product going to be". We set a goal and work together. You can't lay out the specifications two years in advance with entertainment technologies.

People's experiences with games differ greatly, with some fully aware (and expecting) real-time physics and 3D graphics, with others expecting something more like Pac-Man. But clients also need to understand how game development processes differ from traditional instructional design processes, and how this affects milestones, deliverables, and so on.

(2) *Providing Holistic Models of the Learning Experience*: Holistic models of the entire user experience can save time and money by quickly and easily illustrate key concepts to the client without wasting valuable time in preproduction. Most game designers find it difficult at the outset to provide fully detailed models of game play. Game developers are notorious prototypers, preferring to develop rudimentary models of game play in order to figure out what makes good game play and what does not, which creates uncertainties for designers and clients alike. Root learning has found it useful to create animatics – storyboards that are shot on film to give a sense of a typical user experience and communicate timing, rhythm, and pacing. Root Learning reports that clients will often express satisfaction with initial design documents, yet change their minds once they see a full animatic, which provides a sense for the entirety of a

project. Developing early models of the experience also helps designers plan for what game developers call “feature creep”, which is the continuous addition of features in a project which adds time, cost, complexity and usually will “break” a game design. is one method for managing these expectations. These animatics function to increase early communication (a common goal of collaborative visual rapid prototyping, c.f. Boling & Bichelmeyer *) and create a framework for both clients and game developers to think about the instructional experience.

(3) Iterative Design. One crucial difference between software developers trained in the games industry and the tenets of traditional instructional design processes is that game designers tend to prefer to jump in and begin coding game prototypes rather than conduct needs analysis, create design documents, or write out specifications. For most game designers, the first and most important step is finding a working core game dynamic, an interesting set of interactions which can be polished and expanded upon into the full game. Having even simple objects on screen to interact with can give the clients and design team a sense of what is engaging (and not engaging), what is working, and what the experience will be like. Thus, for companies like Breakaway games, which consist mostly of game designers, rapid iterative prototyping is the norm and fundamental to their instructional design processes. It is not unusual for a company to have a working initial prototype within a few weeks, but then spend the next months polishing and finishing the project.

(4) Early User Feedback: With the many risks associated with game-based learning approaches (high production costs, uncertain outcomes, novel instructional approaches), design teams frequently incorporate user feedback early and often in development. Teams need to know as early as possible if they are coordinating game play mechanics, art direction, instructional goals, and learner because changing even small features late in production can cause ripple

effects in changing other areas, resulting in lost time and money. In entertainment games, developers such as Maxis use rapid user testing, which they call "kleenex testing", because tests are quick and dirty and you never use the same user twice -- with literally thousands of testers to test and refine design concepts in each phase of development (c.f. Jenkins, Squire, & Tan, 2004; Wright & Laurel, 2004).

Root even advocates getting users in on design meetings with subject matter experts as a way of clarifying when something is confusing or contradicts their own experience. A designer explains:

> Have them (users) in the design meetings. Knowing what they don't know or already know is a key way of getting there. With controversial topics, we bring them in immediately. We try to find focus groups that are the most contentious and ornery and then test with them. We try to get the most honest, direct feedback to win them over, and everyone else becomes easy. Rather than shine away, we try to bring them in early whenever allowed to make part of sessions for open honest feedback make module really work for that group.

The trick here, like with Maxis' "Kleenex testing," is that users cannot be used too often or they can become part of the design team. If they become too familiar with the product, they will lose perspectives as users. Working with teachers, we found that once a member "truly" becomes a part of the design team, they lose end-user perspectivity (c.f. Squire et al., 2003).

(5) New Business Models: With every advance in computing power and storage capacity, the costs of game development rise, with top-end training / simulation games such as Full Spectrum Warrior costing several million U.S. dollars. Putting together the capital to fund a commercial scale game is difficult, but with an estimated $75 million in "serious games" products in development, it is happening.

For many companies, the vehicle for this innovation is a creating partnerships and projects that span marketing and training. YaYa Media's Jeep game is being used to advertise

new vehicle models as well as train sales representatives about new features and raise their enthusiasm about the product. A number of other serious games blur these lines, including America's Army (US Army recruitment and training), Homes of Our Own (industrial education and public relations for home builders), A Force More Powerful (non-violent training and political activism) (Macedonia, 2002; Prensky, 2001; Rejeski, 2001). Many new titles are currently in development, and it seems possible that future collaborations between marketing and training will flourish as each sector attempts to respond to changes in the modern media marketplace.

The emergence of a serious games industry is also the result of consolidation and change within the games industry, driving more commercial game developers into looking at games for training, marketing, or other non-traditional purposes as new markets (Sawyer, 2005). Training games allow them to invest in new core technologies, own intellectual property, or gain retail rights to training games (such as owning the entertainment retail rights to a training game). Breakaway Games occasionally offers in kind services up front on training games in order to obtain commercial market rights or future contracts. Traditional game / publisher relationships usually leave developers with little power, forcing them to "starve" between projects, providing incentive for entertainment game developers to be entrepreneurial about locating new markets.

(6) Interdisciplinary design teams. As games grow in complexity, so do the teams required to make them. A contemporary entertainment game might employ 120 people, including dozens of programmers and twice as many graphic artists and animators. Because games are a highly visual medium, traditional developers working in game-based learning report visual designers playing a more central role in game projects than in traditional instructional design.

Root, for example, employs three staff members on every project, which fairly closely mirrors the breakdown in games companies.

1. graphic artists
2. program managers
3. programmers

For Root, the most critical step is connecting artists and clients early in the process so that artists can understand users' needs and develop a core metaphor for the project. The project manager meets the client and obtains the basic information (objectives, goals, and institutional constraints), creating an outline for the project. Working closely with clients and a select group of users, the *artists* create the initial specifications, storyboard, layout and animatics.

For Root, the most critical goal of this process is to understand the culture of the organization in order to understand what products will work, what the cultural values of the organization are, and what unspoken messages they might be trying to convey. Crawford says,

> The trick to their success is bringing together diverse people in order to talk about the client, making it something of an anthropological study. Diverse ideas from people who normally wouldn't get together. MBA and artists just don't get together; it's not logical. When you do you get a unique different product working with 2 different thought patterns and learning styles, you get something that will appeal to all learners.

Designers of games for learning are finding, like entertainment game designers that a productive tension between programmers, artists, and storytellers is critical to a successful learning product. Traditional instructional designers are noticeably absent from this equation.

(7) Distributing Instructional Design Functions: Notably, most processes for developing game-based instruction distribute traditional instructional design competencies across multiple roles and do not employ many, if any traditional instructional designers. All of the groups I interviewed found instructional designers somewhat redundant to the skills offered by graphic artists, programmers, script writers, or user-interface designers. Some companies did employ

producers with instructional design experience but, more frequently, hired them based on other expertise, such as interactive media design. Game design is a craft demanding knowledge and skills in psychology, interface design, art production, user testing, and software design. Executives in these companies felt that game design itself was an excellent preparation for instructional design of any sort. As one executive commented,

> Traditional instructional designers are stuck in old paradigms, which are all about objectives, content, and pen and paper assessments. We need people who can think holistically, imagine user scenarios, and understand the culture of organizations. There is no one way to do things.

The strong sense I had after many interviews with these game-oriented companies was that an ideal instructional design curriculum, from their perspective, would include courses in narrative, usability studies, cognitive science, software production, and basic art. What was especially surprising was the way that traditional graphic designers were preferred for their ability to interact with clients, iterate ideas, and understand different cultures. Traditional instructional designers were criticized for being "too married to text" and unable to work with visual media effectively.

Perhaps most importantly, the *culture* of traditional instructional design programs was seen to be at odds with the culture of contemporary media, particularly game cultures. Not only are text-based representations privileged over graphic or interactive representations, but the values underlying traditional instructional design practices – controlled information, predictability, linearity, hierarchies, and centralized control are at odds with the values underlying the new media landscape – open access to information, flexibility, non-linearity, user autonomy, customization and permeable boundaries. Pushed by game cultures but also broadly indigenous to the Internet, these values are seen to be at the center of the contemporary new fast capitalist economy (Friedman, 2005; Gee, Lankshear, & Hull, 1996; Squire & Steinkuehler,

2005). As researchers have noted, the Nintendo generation has brought the cultural values of their media with them (just as the television generation did), and those companies that learn to speak their language and harness their creativity will be at a competitive advantage over those that do not (Beck & Wade, 2004).

Implications: Going Digital

Games' flashy graphics and powerful simulation capacities are both enticing and intimidating to instructional designers. Some see this technology as enticing learners; others may see it as pandering. But underlying many companies' shift toward gaming technologies is a recognition that today's media landscape has dramatically shifted from that of a decade ago, with more demands for learners' attention, more information at their disposal, and the business environment changing more rapidly than ever before (Rushkoff, 1999; Jenkins, in press). A number of managers are noting that today's workers 35 and under operate with a different motivating logic than their older counterparts, and videogames have been shown to be a powerful predictor of workers' changing attitudes toward work, leisure, and life goals (Beck & Wade, 2004). This section will focus on one of the many implications for instructional designers, the need to embrace aesthetics and compelling learning experiences as more than just superfluous, but integral to effective training.

Getting Beyond Textualism. One of the deep disconnects between contemporary learning theory and instructional design, as it is generally conceived, is what historian Paul Saettler (*) refers to as textualism. Textualism is the belief that knowledge is "true" when represented through textual definitions. Textbooks, workbooks, and lectures work relatively well for generating this kind of knowledge – written explanations, definitions, and so on. Unfortunately, such descriptions, when not buffered by embodied experiences, often lay inert. This problem of

"shifting signifiers" can be represented by the student who can recite any formula from a Physics textbook, but cannot use them to explain basic phenomena in his environment (Gardner, 1991; Perkins, 1993; Whitehead, 1929).

Traditional instructional design practices, with the careful formulation of objectives, functional specifications, and measurable indicators of performance are deeply wedded to text. These companies working in digital-game based learning had less need for these traditional ISD competencies and more need for skills such as communicating corporate culture through visual media, devising creative solutions to novel problems, and the ability to rapidly change directions mid-project. Traditional instructional design competencies were generally distributed across teams, comprised of business strategists, marketers, artists, interface designers, and programmers. One cannot help but wonder if part of the problem is the cultures of instructional design programs themselves. In many graduate programs, it is difficult to imagine students turning in a needs analysis in the form of a picture, let alone a digital model. While this type of practice may be foreign to instructional designers, it is common practice in other disciplines and fields.

Creating Compelling Experiences: More Than Just Eye Candy: Games have the capacity to provide learners situated, embodied understandings of complex phenomena. What the boundaries and features of these understandings developed in digital environments are we are only now being investigated. But, as we live in increasingly digitally mediated environments, most companies and work environments prefer employees who understand the properties of digital media just as earlier generations preferred those adept at written text.

Implicit to this view is a focus not just on games per se, but also and equally on visual media, culture, and literacy. Educators' concerns about "eye candy" shows a deep

misunderstanding, – if not distrust – of popular culture and the arts. Eye candy functions in games in important semiotic ways, cueing emotions, conveying meanings, and tipping off users to new semiotic possibilities. Understandings of these mechanisms is critical to game-based pedagogy; for example, one can see how Root Learning designers use such cues to create a sense of emotional connection and immediacy for Pepsi or Blockbuster workers who could otherwise quit their jobs for other similar service sector jobs. Good artwork can work to ramp up emotional intensity, perhaps making the player feel pressured, nervous, angry, sad, or compassionate. Game designers use these kinds of tools to make games such as Harvest Moon (a farming simulation for kids), Katamari Damacy (a game about rolling a ball), or World of Warcraft (a massively multiplayer game featuring many mundane activities) compelling.

There is a well known saying among of serious games: "If you want to take all of the fun out of it, get a bunch of educators involved." (c.f. Aldrich, 2004, 2005; Gordon & Zemke, 2000; Prensky, 2001). Questions such as "Can I strip away the graphics and save money, or could we succeed by making something more serious" are common at game related conferences.[*] Not every piece of instruction needs to be a fully functioning 3D environment, but instructional designers might embrace some of these conventions, embracing the opportunity to create compelling experiences for learners.

Will eLearning go digital?. Even if eLearning designers do not immediately jump to build game-based learning modules, they might look to digital games for design inspiration. Gaming communities are the cutting edge of consumer grade simulation, artificial intelligence, and community design. One route for eLearning designers is not necessarily to design games per se, but to at least understand how and why they work and then use this understanding as a means

[*] For an example of these questions, see transcripts of recent Serious Games conferences available at http://www.seriousgames.org/

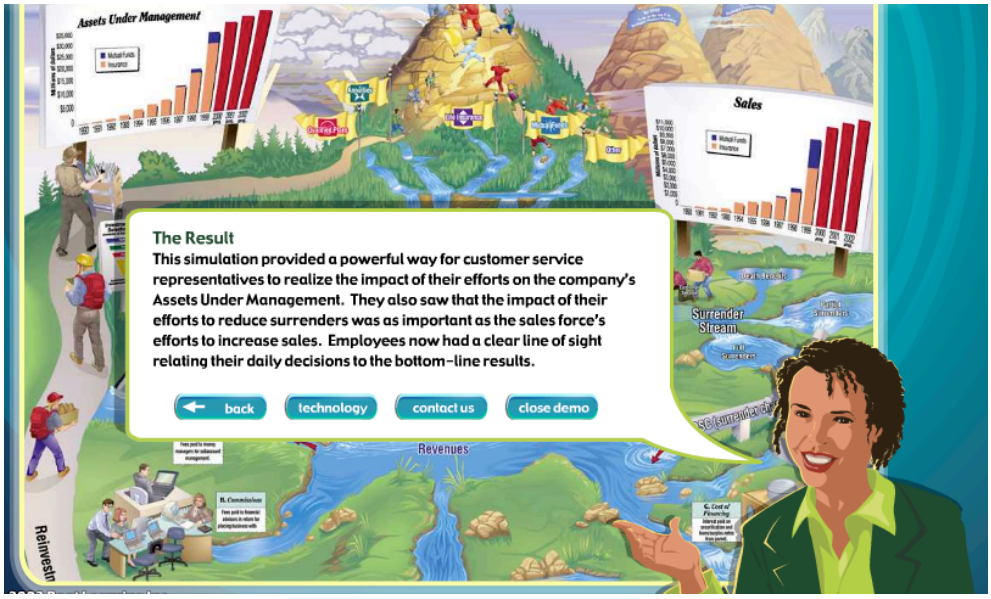
for designing other forms of educative media. One example of this, also described by Jon Goodwin of E.I. Lilly, was to allow users choices in customizing characters, enabling them to think about different variables at work in a situation (such as business or accounting) (c.f. Games-to-Teach, 2003).

Perhaps most importantly, examining games might help eLearning designers understand the mechanisms by which digital cultures work. To date, most eLearning is designed along the lines of the old paradigm of instruction – resulting in something akin to a trivia contest – as opposed to the instantiating the kind of experimentation, problem solving, and collaboration that characterizes new the gaming age. If digital cultures do embody a different set of values and ideas about learning – a set which next generation workers are already bringing to the workplace and to training, then games could be the perfect research and development laboratory for instructional designers. Games are but one way that ELearning has an opportunity to truly go digital; to embrace the values and ideas that are indigenous to the digital age and embodied by gaming. This shift seems to be occurring in the military and certain sectors of training. It remains to be seen how the eLearning will react.

Figure 1. Breakaway's Force More Powerful

Figure 2: Root Learning Map

Figure 3. Root Learning's Digital Simulation – Game Media



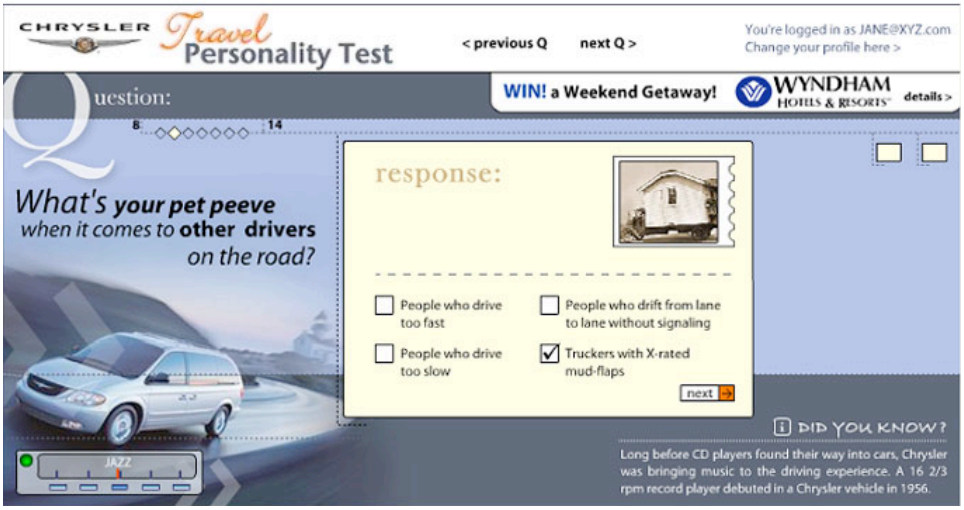


Figure 4: Screenshot from YaYa Media's Chrysler Travel Game

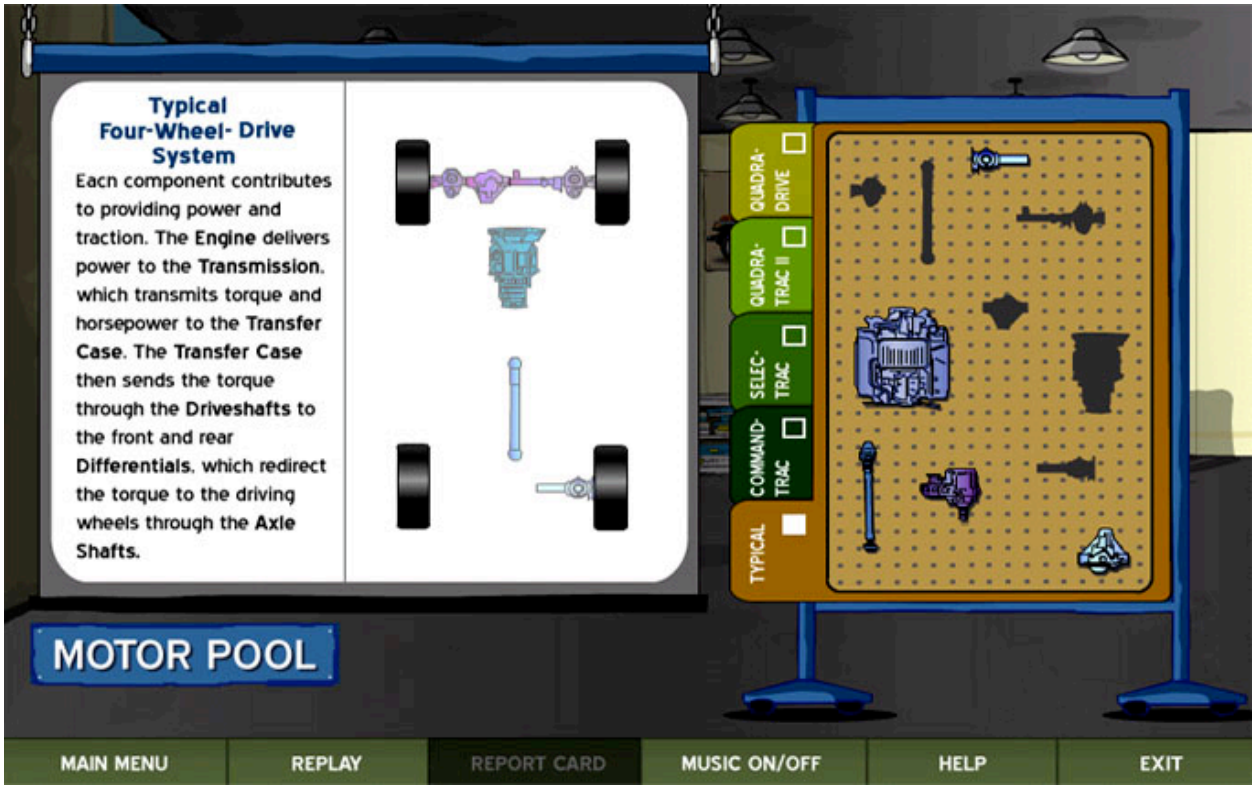


Figure 5: Screenshot from YaYa Media's Jeep Driving Training Game.

Figure 6: A relatively simple screenshot from Firaxis' Civilization III

Figure 7: A more complex screenshot of advisors from Firaxis' Civ.III

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