# Introduction

*Drew Davidson*

This book is a combination of two Special Issues of On The Horizon that focused on strategies for applying games, simulations and interactive media experiences in learning contexts. The first special issue came out in early 2004, and the second in early 2005.

Since then we have seen an explosion of academic interest in a variety of new and different interactive media that could be used for education. Some examples of this would be the online world of Second Life and Web 2.0. Also, organizations, like the New Media Consortium and the Serious Games Initiative, have developed to provide forums and communities for academics interested in these topics.

Both of these issues were developed collaboratively. Throughout the process, the authors and editors all worked together, using MovableType (http://www.movabletype.org), to create thematically connected issues. We worked together, creating articles with concepts that resonate with one and other. This book is the work of all of us as a whole and I would like to thank all the authors for their participation.

It is my pleasure to introduce our international group of contributors, each writing in a topic area that addresses various methods for implementing media in learning experiences. Along with myself, our group includes: Clark Aldrich, Ian Bogost, Mia Consalvo, William Crosbie, Simon Egenfeldt-Nielsen, Mindy Jackson, Donna Leishman, Michael Mateas, Marc Prensky, Scott Rettberg, Kurt Squire, David Thomas, Siobhan Thomas, Jill Walker, and Jenny Weight.

- Clark Aldrich outlines four stages of deploying simulations in his article that received the Highly Commended Award from the Emerald Literati Club.
- Mindy Jackson looks at how games are being used across disciplines.
- Drew Davidson gives an overview of the phenomenon of university programs and degrees in games, simulations, and interactive media.
- Simon Egenfeldt-Nielsen defines some barriers to using educational games in a course.
- Kurt Squire delves into the kinds of learning that occur during gameplay.
- David Thomas discusses the issue of games teaching us violent or educational content, or both.
- Donna Leishman illustrates how interactive experiences can help slower learners.

• Mia Consalvo explores how cheating at games can be turned into learning opportunities.
• Michael Mateas delineates the importance of procedural literacy.
• Siobhan Thomas writes an in-depth review of Clark Aldrich's book, Simulations and the Future of Learning.
• Scott Rettberg explains how interactive media can be used to study literature.
• Jill Walker illustrates how blogging can be used in teaching and learning.
• Jenny Weight explores the possibilities of incorporating computer-based media into courses.
• William Crosbie provides an in-depth review of Virtual Humans by Peter Plantec.
• Drew Davidson looks at the process of establishing an official university center that focuses on the study and creation of games and simulations.
• Marc Prensky sounds a call for open source development of learning software.
• Ian Bogost challenges us to become more actively involved in our educations and shows how games enable us to do so.

In closing, I would like to note that this book, like the two special issues, is meant to serve as the basis of many more discussions across conference panels, online forums and interactive media that in turn will engender more special collaborative issues and texts. Much has happened since the articles for the special issues were originally written, but there is still much to discuss. As such, this book is being release under a Creative Commons license (http://creativecommons.org/licenses/by-nc-nd/2.5/) and can be shared as long is it is properly attributed, non-commercial and not derivative. So, let the conversation continue…

# The Four Slates of Educational Experiences

*Clark Aldrich*

Simulations teach timing and balance, something not possible through traditional classrooms, film, or books. They enable new types of educational experience that can be rigorously, effectively, and consistently deployed, increasing the power of any organization that uses them well.

Successful simulation deployments today, be it in corporations or academics, live, remote, or mixed, use up to four stages, or slates. Each slate has different, unique characteristics that have to be deliberately built into a program from both the creator and the implementer to ensure success.

And each slate builds on the other. They must come sequentially. Therefore while each can be compressed, and some programs will go further than others, none can be skipped over.

## Slate One: Background - The Locker Room

The first slate involves traditional linear instruction. Students hear about the goals of the program, the models used, the time frame involved, and some background.There is a range of options for this first slate, from traditional classroom, to virtual classrooms, to pre-canned, pre-recorded sessions. Much of the traditional instructional design applies here (and just here).

Learning in slate one is at a superficial, intellectual level. But if this slate is skipped, students will be disinterested in and confused about the simulation.

## Slate Two: Introduction - The Shallow End of the Pool

The students are given explicit instructions, so-called “walk-throughs,” on how to successfully navigate the experience. Then they engage in a limited functionality version of the simulation.

The goal of the second slate is two fold.

First, it is to expose the student to the interface in a low-tension environment. This is more critical than it might first appear. While an interface for an application such as a web-based tool should be seamless, inviting the plea from the user, "don't make me think," a simulation (and especially one that teaches soft-skills), is presenting a new way of looking at a potentially familiar situation. This "new way of looking" requires new thought, is a critical part of the learning, and therefore, necessarily makes an end-user think.

Second, it is to allow the student to understand some of the key relationships of the simulation in isolation. They can experience a direct, one-to-one connection between certain causes and effects that will be less salient in the third slate.

Ideally, the second slate experiences are highly annotated. It is easy to see why things work, and why things don't work. They should also be highly modular, allowing students to practice at their convenience, often in small chunks. Finally, they should show some simplified feedback after the session. If designed and built well, the simulation should not require an instructor at all during slate two.

Slate two teaches a little more comprehensively than slate one, including introducing a more visual and kinesthetic lens for looking at an issue. If this slate is skipped, students will be confused when they get to the full version of the simulation. Many early simulations, such as branching video and virtual products, go no further than this second slate.

## Slate Three: Engagement - The Deep End of the Pool

The third slate represents the steepest part of the learning curve. Students encounter increasingly complex situations and receive increasingly detailed and subtle feedback, while they are engaging a simulation, and more complex data in the review period just afterwards. While the introductions into each scenario may be linear, the gameplay most assuredly is not.

While the slate two experiences isolated the various relationships, slate three combines them in increasingly subtle and complex ways.

Slate three experiences are often engaged in real-time. There is no longer one way of doing anything. There is no longer "the answer," just out of reach. Help files are less direct. Frustrated users will (and should) often go back to linear material from slate one. Everyone will end up engaging the simulation differently.

Slate three is often more successful if people learn in groups. Putting two or three people per simulation forces one to observe, building teamwork, exposing each to alternative approaches, and decreasing learning time. Chat rooms can be used if the students are not co-located.

Unlike, say, computer games, instructors can also add significant value at this point. This difference comes from at least two reasons. The first is that simulations are not necessarily fun and entertaining, like the game counterparts (although fun is often a good thing, depending on the topic area). Second, what is learned has to be applied in a real world situation. While pretend pilots might learn how to use Microsoft Flight Simulator on their own, we would not want our real pilot to use that alone. Those learning supply chain management need to really know it.

Most of instructors' value in this slate comes from one-on-one contact with the students. They truly go from being presenters to coaches. This is more effective live, but with distance learning technologies, the coaching can also be done remotely, even asynchronously.

They will spend some time handholding, helping on the technical or interface issues. Hopefully, most of these have been resolved in the second slate.

They will spend a lot of time providing customized help, relying on their own instincts how much support to give a participant. The instructor might want to communicate to the student not to hurry through as fast as they can, but to try new approaches and to take risks, for example. In many cases they will make the real time feedback and the post-experience reviews more meaningful to the student.

This second role of enabling the instructor to give support requires both new skills and design consideration. In slate three simulations, the program must contain visualization that captures the flow of a simulation experience, and can present it at a glance. That way, if a student is engaged for twenty minutes, the teacher can, in a few moments, get a feel for how the experience progressed, in order to provide meaningful feedback. Or if asynchronously, then instructor could review some charts at their convenience and email back some observations and advice.

Finally, slate three is more effective if it include established debriefings, outside of the immediate review session of the simulation. Participants stop playing and formally reflect on their experiences. Students may discuss specific situations, voice their approval or vent their objections with the characters or conditions in the simulation (i.e. "If that person were in my organization, I would fire them immediately"). It can let people connect their learning to the real world. This might be done individually, in small groups, or with the entire group, depending on the class topology.

In slate three, the learning is emotional, and becomes, with practice, intuitive. If this slate is skipped, students will get some of the value from the simulation, but it will take longer, require more discipline, and the learning might be incomplete. Any rigorous formal assessments using the simulation will most likely happen here.

## Slate Four: Practice - Free Swim

The fourth, final slate is un-chaperoned engagement. The students spend their time practicing their skills, pushing the envelope of the experience. Spending at least three or four hours on the simulator is necessary for a student to work the skills to an intuitive level.

Slate four requires ongoing access to the simulation, either via the Internet for lower-fidelity simulations, or through a centralized lab or distributed through a medium including CD-ROMs for robust simulations.

Some organizations may have ongoing contests for high-scores here. And some students endwill modify the parameters, potentially building entirely new scenarios, adding another intellectual layer of knowledge on top of the developed intuition.

## Conclusion

These four steps can take just one or two days if a group is in a hurry. More likely, this will happen over a week, or even over months. Understanding the different slates is key for both simulation designers and implementers, academic and enterprise.

Whether part of lab-based, blended, or remote learning experience, simulations take more work, and they result in exponentially better results. They add more steps to the process, but each step is critical to the successful education, not just the implementation of the simulation. These approaches have evolved from the early physical interface simulations, such as with flight simulators or complex machinery controls, to complex "soft-skills" such as leadership. The question will soon not be, why use simulations, but why would you expect courses to work without simulations?

# Making visible: Using simulation and game environments across disciplines

*Melinda Jackson*

## Introduction

Computer games demonstrate effective pedagogical techniques that can be used in learning across academic disciplines. Simulation and game environments are capable of illustrating interconnected processes within complex multi-component systems, of enabling nano-visualization and manipulation of the microscopic, of embodying experiences and new identities that cultivate cultural empathy, and of making the unseen tangible.

Computer simulations historically have been used in specific scientific disciplines (engineering, bio-sciences) and for high-risk occupational training (military, aviation, medicine).

Military use of simulations and "war game" environments dates as far back as the 1950s. Today, the JANUS simulator controls enemy movements and other combat conditions within virtual training exercises for U.S. Army battle staff (1) (http://www.educause.edu/ir/library/pdf/ffpiu018.pdf). Flight simulators are still used to train commercial pilots and NASA astronauts (http://www.simlabs.arc.nasa.gov/) (2). Visualizations and modeling are standard curricula content within science and engineering (http://www.sciencemag.org/feature/data/vis2003/ssintro.html) (3).

These organizations and disciplines know simulation accelerates learning, enables knowledge transfer, allows extraction of meaning from myriad complexities, and provides manipulative experiences unavailable in the normal physical space of a classroom environment.

Imagine if such learning environments were available for students of business, architecture, history, geography, sociology, psychology, literature, law, etc. Simulation and game environments focus learning not simply on the knowing of facts and ideas, but on the USING of facts and ideas.

## What Video Games Have to Teach Us About Learning and Literacy

The U.S. digital entertainment games industry generates $6.9 billion annually (http://www.theesa.com/) (4) in sales of microworlds and embodied character experiences that allow players to build businesses and cities, visit historical scenarios, voyage foreign terrains, interact with differing cultures, design narratives and social spaces, and solve complex problems. Game developers also know how to design engaging and intuitive interfaces and to create logic systems that provide realism and rapid response to user inputs.

There are many popular entertainment games that teach players about complex systems through cause-and-effect realizations. For example, a game such as Rollercoaster Tycoon™ (http://www.rollercoastertycoon.com/) (5) reveals intricacies of business management and marketing. SimCity™ (http://simcity.ea.com/) (6) provides real insights into the complexities of urban planning and development. Large, complex systems can be modeled and interacted with in ways previously unavailable. In computer simulation and game environments, "if-then-else" becomes a much more powerful and visible logic string.

Furthermore, games exemplify good pedagogical practices and salient aspects of how people learn: Human learning occurs in context, is active, is social, and is reflective (http://www.ericdigests.org/2003-3/learn.htm) (7).

James Paul Gee in his book What Video Games Have to Teach Us About Learning and Literacy (2003) notes the ability of game environments to "situate meaning in multimodal space through embodied experiences to solve problems and reflect…" (Gee, pg 48). Players adopt character identities of 'scientist,' 'historian,' 'architect,' etc. (for online discussion of book, see http://www.iaete.org/soapbox/summary.cfm?&tid=What3080) (8).

The digital game industry also knows its consumers and markets specifically to a user group who prefer interactive, non-linear, and dynamic entertainment experiences. This market segment represents a large slice of students enrolled today in U.S. schools and higher education.

According to a July 2003 Pew Internet and American Life Project survey of American college students, 65% reported being regular or occasional game players with 32% reporting playing games during classes – games that were not part of the instructional activities (http://www.pewinternet.org/pdfs/PIP_College_Gaming_Reporta.pdf) (9).

In a keynote address at the New Media Conference, John Seely Brown characterized today's "digital generation:" as multiprocessing, multimedia literate, knowledge navigators, preferring discovery-based learning, and biased toward action. (http://journalism.berkeley.edu/conf/conference2003/present/brown.pdf) (10).

Not only do effective interactive simulations and games naturally use good pedagogical principles, but they also cater to the natural preferences of the digital generation of learners.

Simulation and game environments enable new forms of knowledge interaction previously unavailable within the normal curricula. A radical swing from passive to active learning occurs and the learner perspective shifts from third to first person, or even from singular to plural.

Problem structures and solution processes can be investigated, experimented, interpreted and applied. The student is literally "immersed" within concepts, principles, systems and variables.

Time and place can be manipulated. Slow processes can be sped up to view longitudinal outcomes; fast processes can be slowed to view incremental progression. Hazards can be manipulated safely. Inaccessible regions can be traversed. The macro or micro can be zoomed in or out for differing viewpoints and details.

Nuances and subtleties, critical ideas and misconceptions can be uncovered. Engaged within relationships and interdependencies, causal factors, quantitative and qualitative variables, students develop deeper meaning and lasting understanding.

For example, the game Civilization™ provides contextual game play in the art of cross-cultural communications (http://www.civ3.com/faq5.cfm) (11). Albeit the goal of the Civ series games is to command and conquer, along the way the player learns about History, geography, political and military strategies, and negotiation through multiple cultural encounters.

Simulation and game environments enable transformative learning experiences. Powerful "aha" moments are realized when students subsume the learning experience into the thread of the story of the subject, the mechanics of the subject domain's system (whether physics or psychology, law or linguistics).

Edward Tufte's seminal work on the design of visual information describes how to make "good thinking visible" (http://www.edwardtufte.com/tufte/)(12) by answering questions such as "compared to what?" "why the change?" "in relationship to what?" and "to what end?" Visualization enables multivariate comparisons, shows causality and allows movement from particular to general and back to particular.

An elegant example is the Visual Thesaurus from PlumbDesign (http://www.visualthesaurus.com/)(13); click the online version to bring this interactive thesaurus to the desktop. Words are clustered, bolded and sized in relation to one another. The connections can be explored and realigned by mouse click. "Aha."

Beyond traditional visualization displays of words, numbers, symbols and graphs, within simulation and game environments visualization becomes a dynamic and active process of experimentation and experience. The ability to provide such provocative learning experiences deserves serious consideration across academic disciplines.

## Sampling Some "Serious" Games

The rapid diffusion of digital media technologies – including commercial game engines –means production toolsets are available and cost levels are affordable for wider adoption by academia. A number of universities, research centers and businesses are creating examples of the usefulness of simulations and game environments across disciplines.

The Serious Games initiative at the Woodrow Wilson International Center for Scholars seeks to extend traditional simulations and modeling to affect public education and debate of public policies. Serious Games co-founder Ben Sawyer identifies three categorical advantages of game-based models and simulations: 1. Design advantages encourage wider and repeated use, and amplify strategic thinking and learning opportunities among users; 2. Technology advantages include off-the-shelf consumer hardware and software, high-end visuals, audio and 3D graphics, artificial intelligence and intuitive human-computer interfaces; 3. Development advantages include background in creating both non-fiction and fiction-based models with incomplete or empirically-derived data sets (http://www.seriousgames.org/images/seriousarticle.pdf) (14).

Sawyer suggests that academics utilize game development industry design principles, processes and techniques of "world-building" to create powerful learning environments for analysis and predication modeling, evaluations, and education.

Interestingly, one of the first demonstration projects of Serious Games is an interactive game called Virtual U (http://www.virtual-u.org/) (15) designed to foster better understanding of the finances and management practices of U.S. colleges and universities (perhaps as the old business adage goes, it's best to "start with what you know").

At MIT, the Education Arcade initiative (http://www.educationarcade.org/) (16) is developing and studying conceptual prototypes to illustrate the social, cultural and educational value of digital interactive game technologies.

The Digital Media Collaboratory (http://dmc.ic2.org) (17) at the University of Texas at Austin is engaged in several projects that aim to elucidate the invisible and unknown through sim/game learning environments. A nanovisualization project allows students to arrange and build molecules in 3D space; a career exploration project for low socio-economic status (SES) kids provides experience and exchange of social and cultural artifacts to children who otherwise might not be exposed to high-SES occupations and career pathways.

An excellent source for exploring entertaining games that are meant to educate is Marc Prensky's catalog at Social Impact Games (http://www.socialimpactgames.com/) (18). While many of the games listed are intended for public education, there are also several special interest groups games meant for political and religious persuasion (which some may consider propaganda).

So, religious and political factions know that interactive games provide potent platforms for indoctrination, as does the U.S. Army recruiting branch. The online game America's Army "provides players with the most authentic military experience available, from exploring the development of Soldiers in individual and collective training to their deployment in simulated missions in the War on Terror" (http://www.americasarmy.com/) (19).

Business also understands the value of simulations for training

Enspire Learning has created a team-based multiplayer business simulation called Executive Challenge to develop leadership skills and business acumen (http://www.enspire.com/simulations/executivechallenge) (20). SimuLearn

has created a Virtual Leader training environment that teaches communication, project management, and team building skills (http://www.simulearn.net/) (21). Access Technologies Group provides a product called Simentor™ (http://www.simentor.com/) (22) that allows businesses to customize sales staff training for their specific product lines and markets.

The MSNBC online news channel regularly incorporates interactive games to further story coverage, such as their infamous "Baggage Screener" simulation that allows the player to empathize with the difficulties of weapon detection by acting the role of an airport security worker (http://www.msnbc.com/modules/airport_security/screener/FLASH.htm) (23).

Simulation and game environments are potent instructional tools. From illustrating physics principles to practicing medicine on a virtual patient, it is easy to understand the importance of providing such learning environments to science and engineering students. But the examples provided herein are meant to pique interest in – to make visible – the potential of game applications for other knowledge domains, such as literature, psychology and sociology, history, law and ethics, anthropology and cultural studies, communications, social work and social policies.

# Games by Degrees: Playing with Programs

*Drew Davidson*

How would you like to major in videogames? As the Director of the Entertainment Technology Center at Carnegie Mellon University in Pittsburgh, I meet a lot of students who are eager to do just that. In fact, it's seems that degrees with any focus on games are some of the most popular degrees around the world. This trend extends across higher education in several ways that I wish to explore here. Currently, I see three major ways that game degrees are being offered: one, in institutions that were started with a strong focus on degrees in game design and development; two, as degrees offered by career-focused, for-profit institutions; and three, as degrees being offered at more traditional universities. Let's take a look at how this is playing out.

Before I begin though, I should clarify that the focus of this article is on programs of study, majors and specific degrees. I am aware there are various schools, departments, centers and individual professors who offer courses or concentrations of study that focus on games, but I want to explore specifically how institutions are capitalizing on student and industry demand by offering officially accredited degrees in the study of games. For more information along those lines, you should read Kurt Squire's two-part article on "Gaming in Higher Education" (link in References). Also, this is not meant to be an exhaustive listing of all degrees and programs currently being offered (for that, see the Gamasutra, IGDA and Education Online Search links below in References). Instead, I am focusing on several inter-related areas and providing a variety of examples across the board. And lastly, this article is not going to fully explore the different foci of all of the various programs. In general, all of the programs offer a mix of courses on a continuum ranging from a vocational teaching of skills to help students get a job in the game industry to an interdisciplinary teaching of concepts and exploring games as an object of study. That said, it should be noted that there is pedagogical debate when considering the merits of vocational and interdisciplinary teaching philosophies.

Career-focused, vocational higher education has been around for some time at various trade schools and for-profit institutions. Historically, these institutions mostly offered Associate degrees focused on a career in a specific industry. For instance, you could get a degree in graphic design or animation. The philosophy behind this type of educational institution is to provide students with a practical foundation of skills that will enable them to get a job in the field of

their choice. Recently, these institutions have been successfully attaining accreditation in order to offer the more advanced degrees of Bachelors and even Masters. With these degrees, students get a solid general liberal arts education along with a career-focused emphasis to help them get a job. Even so, a major drawback of this type of education is that it can potentially limit the student with such a specific focus. By being encouraged to study in one particular industry or field, students fresh out of high school are somewhat unrealistically expected to have a sense of what they want to do with the rest of their lives. While some 18-year-olds may know with certainty, most are still growing into themselves as young adults. That said, I think that moving towards offering more advanced degrees enables these institutions to offer students a more well-rounded education and expand their post-graduation job opportunities.

A concurrent trend in higher education is the creation of more career-specific majors being offered at traditional accredited universities with interdisciplinary focus. Granted, these universities have always had colleges that offered various degrees with a career focus. Schools of Business and the Sciences offer programs that are often focused toward specific fields and industries, but to exist at a university, these programs are required to have a strong liberal arts foundation. So, the theory is that students will inherently be better prepared for the "real" world by getting a good, solid education at a university, regardless of their major. But currently, universities are feeling the pressure to maintain, or even grow, their enrollments. Now we are seeing universities developing and offering more contemporary degrees to attract students with their educational reputations and more focused programs of study.

The relatively nascent phenomenon of videogame degrees makes for a great case study of both of the trends mentioned above. Universities and colleges offer, or are beginning to offer, degrees (Associates, Bachelors, Masters and Doctorates) focusing on videogames. The manner in which these institutions are offering these videogame degrees varies enough to merit some explication.

Let's start with schools that focus almost solely on videogame degrees. DigiPen focuses on computer science as it is applied in real-time interactive simulation (RTIS) programming and 3D computer animation. They have 5 departments (Art, Computer Science, Game Software Design and Production, General Education, and Mathematics and Physics) offering 6 degrees (an Associates and Bachelors of Science in RTIS, a BS and MS in Computer Engineering and Science, and an Associates and Bachelors of Art in 3D Computer and Production Animation). Similarly, Full Sail offers several degrees around videogames. Most directly, there is a BS in Game Design and Development. Two related

degrees offered are Associates in Science in Computer Animation and Digital Media, and also a BS in Entertainment Business.

An interesting corollary can be found in the videogame courses offered by both the Game Institute and the Academy of Interactive Entertainment. The Game Institute does not offer any degrees directly but specific courses are taught to help students develop the skills they need, and in conjunction with Edmonds Community College, they offer a Certificate in Game Development. The Academy of Game Entertainment Technology offers certificates in Game Programming and Level Design. Similarly, the Academy of Interactive Entertainment does not offer advanced degrees, but students can earn a Diploma of Computer Game Development. Also, 3D Buzz is a website that offers tutorial-based training for anyone interested in trying to further develop their technical skills in relation to the games industry.

Next, let's see how some of the institutions that come from a career-focused education perspective and are now offering videogame degrees. The Art Institutes offer two degrees that focus on the game industry; a BS in Game Art & Design and a BS in Visual & Game Programming. At the University of Advancing Technologies you can get a BS in Game Design or in Game Programming. UAT also offers a MS in Simulation and Game Studies. The Academy of Art University offers Associates, Bachelors and Masters of Fine Arts in Game Design and Animation. All of these vocational institutions are adding games degrees to their portfolio of degree offerings.

Now, let's explore how some of our traditional universities are beginning to offer videogame degrees and programs of study. The School of Literature, Communication and Culture at Georgia Institute of Technology offers a variety of degrees. There is a BS in Computational Media, an MS in Information Design and Technology and a Ph.D. in Digital Media. The Department of Telecommunications at Indiana University offers a Masters in Immersive Mediated Environments. The International Centre for Digital Content at Liverpool John Moores University is offering an MA in Digital Games. The Savannah College of Art and Design offers a BA, MA and MFA in Interactive Design and Game Development. Arts, Computation and Engineering at the University of California, Irvine are offering an MFA with an ACE concentration. The Computer and Information Science Department at the University of Pennsylvania offers a MS in Engineering in Computer Graphics and Game Technology. Worcester Polytechnic Institute is offering a BS in Interactive Media and Game Development. The Fine, Digital and Performing Arts Department at Shawnee State University offers a BFA in Game and Simulation Development Arts. The Elec-

tronic Game and Interactive Development Program at Champaign College offers a Bachelors degree in Electronic Game and Interactive Development. The Utrecht School of Arts offers a Bachelors of Art and Technology in Design for Virtual Theatre and Games. The University of Arts, Media and Design in Zurich offers Bachelors in Game Design. The Guildhall at Southern Methodist University offers three certificates in Art Creation, Level Design and Software Development.

There are also universities that are offering programs with support from the industry. Electronic Arts is working with Carnegie Mellon University, the University of Southern California and the University of Central Florida. The Entertainment Technology Center at Carnegie Mellon University offers a Masters in Entertainment Technology. The Interactive Media Division of the University of Southern California offers a Minor and Major in Video Game Design and Management as well as a Masters in Interactive Entertainment. The Digital Media Division of the University of Central Florida is starting the Florida Interactive Entertainment Academy and will offer graduate certificates in videogame development. Ubisoft is working with the Quebec Ministry of Education and the Université de Sherbrooke and Cégep de Matane to create Ubisoft Campus to offer programs in video game development.

And this is just the tip of the iceberg. The above institutions are only an overview of some of the more noted programs. As I mentioned briefly above, along with these degreed programs there are various schools, departments, centers and professors who are offering courses or concentrations of study that focus on games. In many of these instances, there are already plans to start the process of turning these fledgling efforts into accredited degrees as well. For example, the Interactive Entertainment Group in the Computer Science Department at Northwestern University is working toward a degreed program. Rochester Institute of Technology, Ohio University and the University of California – Santa Cruz have all recently developed degrees in games. And both the HyperMedia Lab at the University of Tampere and the Center for Computer Games Research at the IT University of Copenhagen are also working toward degreed programs.

This trend in education is attracting industry and governmental attention and support as well. The International Game Developers Association has and Academic Advocacy group that has developed a Curriculum Framework to serve as industry-suggested guidelines for game-related educational programs and now has Education SIG. And the Microsoft Research group has put out an RFP to collect and develop Computer Game Production Curriculum. The Washing-

ton State Skills Standards has set up skills standards and recommended curriculum standards. The IC2 Institute has published a Digital Gaming Technology Forecast for the State of Texas. And Lauren Gonzalez has written a thorough editorial on the relationship between the game industry and academia for Gamespot.com, an industry-tracking website. These efforts illustrate industry interest in educational goals, that has the potential to help students develop the skills they need, but is also problematic in having curricula potentially become to industry-specific at the cost of a overall well-rounded education.

With the growth of the videogame industry, I believe we will see many more institutions offering degrees to entice students with the job opportunities in this field. This focus comes with the risk of students obtaining a unique degree that may seem too industry-specific to enable them to transfer their skills to jobs in other industries. Although this risk is being offset through requiring solid liberal arts and general education coursework in these degrees. Also, many of these programs explore how games fit into our culture as a whole, enabling students to bring their expertise and experience to a variety of fields. And so, while games will one day be superceded by some other popular field, these degrees can remain viable by adjusting their focus to continue offering programs of study that teach students the concepts and skills of working with the interactive and inter-related media found in games.

As we move forward, I see the trends of these degree offerings from for-profit institutions and from traditional universities dovetailing into a more general trend of both entities absorbing the best of each world. As I mentioned briefly above, there is debate over the merits of vocational versus interdisciplinary educational. Interestingly enough, while researching the programs for this article, I found that all of them are offering a various combinations of the two. For-profit institutions will continue to attain regional accreditation, becoming universities with a career-focused, vocational foundation and a strong educational offering as well. Traditional universities will enhance their interdisciplinary academic heritage with career-focused degrees that offer students more choices.

In the end, the students benefit most from this developing educational trend. This paper has focused primarily on game programs and degrees. But as the world becomes ever more hyper-mediated, I see our educational institutions continually updating their offerings in order to stay current. This makes economic sense for the institutions, but it also allows for our pedagogy to keep improving as we expand on the concepts of what higher education entails. Students will reap the benefits as they learn what they need to know to survive and thrive in our society. In his article in this text, Ian Bogost posits that our

educational systems need to change, and in one way, we can already see it happening, as more and more institutions are opening their doors to the study of games. Students are now able to go college and play with games, learning how they work and how games can fit into their careers.

# Practical barriers in using educational computer games

*Simon Egenfeldt-Nielsen*

## Introduction

The discussion of the educational potential of computer games have raged for more than 30 years, and even longer if we include non-electronic games. This discussion has been present in the public debate but also with varying degrees of intensity in the research community (Duke & Greenblat, 1981; Dempsey et.al., 1993).

Research has to a large extent ignored the more practical and self-evident problems inherit in the use of computer games in educational settings. Instead computer games have been approached with general questions and assumptions poorly validated in empirical settings. This paper will instead approach the educational use of computer games on a more specific level, describing some of the concrete problems that became apparent in an empirical study.

The empirical study was conducted in a history course that lasted 7 weeks. The study consisted of introducing a historical strategy games in history teaching in conjunction with traditional teaching and student group work. The game used was the quite complex commercial historical strategy game Europa Universalis II (Paradox Entertainment, 2001), which all students received a copy of. The study involved two teachers and 86 students aged 15-17 years with a mixed gender. The researcher functioned as technical assistant during most of the 7 weeks due to the teachers' lack of knowledge about computer games. The empirical study is described in details elsewhere (Egenfeldt-Nielsen, 2003a).

## The Educational Frame

When researchers and teachers approach computer games several practical questions arise that initially cause concern (Saegesser, 1984; Dorn, 1989). This was also apparent in my case.

In an educational setting the day is split in small segments with each subject having its own allocated time slot. To learn a game, get it started, and get into

it you need more than one hour. It is very hard to introduce a game, and then continue the introduction two days later. Most of the students had little recollection of the initial introduction and started more or less from scratch with the game tutorials in the next hour. This were not limited to the first steps with the game but continued to be a problem in the following weeks. The students played the game on Tuesdays and then were supposed to discuss it Thursdays. This time gap was not feasible as the game experience was too far away for reflection.

The physical frame also caused problems as the school was not adapted to group work, the computers didn't work, and there were too few of them. This was despite a month long preparation, where the computer games had been installed and tested. For the first weeks the first 15 minutes were tight up with login problems, bad cd-rom drives, incorrect wired computers, video driver problems, and other technical issues. These problems could be viewed as temporary and of little relevance if we contribute them to the current limited knowledge and usage of information technology in the educational system. It could also be pinched on this specific school. However, the situation found on this school is consistent with earlier research on information technology in schools, and this leads me to conclude that the school's problems are representative. The lack of computer equipment is commonly reported as a problem in research and it doesn't seem to be about to go away. To see the lack of equipment as a temporary problem is dangerous thinking as this may continue to be the situation for many years onwards (Watson & Tinsley, 1995).

The lack of computers was just one problem. The most severe problem was that the computer support was to weak, and that students vandalised the computers by for example rewiring monitor, mouse, and keyboard to other computers than they were suppose to. It should therefore not be underestimated that the technical problems will always be an important challenge, when using computer games.

## Preparation Phase

The preparation for this history course was a little different than preparation for a normal class, as I took an active part in developing the content. This later proofed to be a problem, as the teachers didn't really get into the computer games, and failed to acquire the necessary knowledge to integrate computer game, group work, and teacher talks.

The success of this teaching course was from the start hampered by the lack of deep knowledge of the game. It was not that the teachers didn't play the game because they played for several hours. But they didn't get deep enough into the game to help the students later on. The male teacher did have some experience with strategy games and were more capable of adapting but still he wasn't really able to fit the game, group work, and teacher talk into a coherent whole. There approach to the game was reactive rather than proactive. They played and learned the game parallel with the students, and it was therefore hard to plan the teaching in connection with the game. This was in the post-interviews recognized by both teachers as a significant problem.

## Learning to Play the Game

Initially I feared that the computer game would be too hard to learn, and this later proved to be warranted. The game was as complex as strategy games come but this was also the strength of the game. This made it possible to have a richer representation of the historical universe and give the students more options for exploring history dynamics.

With the tutorial the first problems with the nature of computer games arose: First, there were a large difference in how fast the students learned the game. Clearly the students with game experience learned the game much faster, and especially those with prior experience with the strategy genre. Not surprisingly most of these were boys. Some students finished the tutorials within the first hour, whereas other 3-4 weeks later were still struggling with basic concepts from the tutorial. According to the interviewed students up to 1/3 in the class fell into this group. This group never really got involved with the computer game. They found it too hard, and didn't get the game to work at home. The students were expected to play at home to increase their skills, and reduce the span between playing sessions. When the weakest students didn't play at home the discrepancy between strong and weak students accelerating very fast.

Second, a lot of students, especially the less knowledgeable about strategy games, didn't find the tutorials necessary. Contrary to the teachers' advice they quickly jumped into the scenarios in the game, and were quite overwhelmed. This was not like other games they knew, where they could quickly overview the possibilities. They wasted a lot of time, and experienced a lot of frustration and thought they would never master the game. Hardly the best start for a course. You should be careful with, how you tweak the usage of computer

games in an educational setting so the game dynamics and the learning dynamics don't work against each other. In this case it was apparent that a defeat in the computer game will not spark curiosity in the students if it comes to early and to overwhelming but rather make the students give up.

Third, the first scenario was constructed in a way that went contrary to normal game experience. The first scenario was intended to show the students that mindless war wouldn't work and of course they throw themselves into fierce battles instead of careful diplomacy, trade, and development of their nation. Therefore most lost with a big bang. This made them very frustrated and unsure of the game. Normally a game is constructed so the difficulty slowly increases to match the players increasing skills. In this case, however the player (students) did not experience a slow increase in difficulty but a very steep learning curve.

We wished to make the students go through a historical learning process where they learned to appreciate other important historical factors than war. This was done through some initial scenarios where they would experience the limits of war. This was somewhat naive and counter intuitive to the game. In the game you start to learn how to wage war, and as the challenges grow you learn to take into account other factors. This is sometimes called a layered approach, and is a characteristic way for computer games to present information to the player. In a layered approach the game presents the necessary information and give the player more options as his skills increase (Egenfeldt-Nielsen, 2003b). In this course you started with a too tough challenge and never really learn to wage war.

From a teaching perspective this was the natural way to go as you could control what experiences the students had with the game. After the first hours we knew they had tried to play a small nation and experienced defeat in war. This fitted best with the weekly teacher talks that should match the game scenario. If they students were in completely different places in the game, and had experienced completely different things, then how should the teacher be able to make a meaningful and relevant talk.

## The Teachers Role

The teacher has often been identified as a significant resource when information technology is integrated in schools. But they have also been considered one of the main barriers (Watson & Tinsley, 1995). Dorn (1989) states that

the attitude of the teacher towards games influences the outcome, and the teacher's knowledge and skill in using the game is also an important factor.

The two teachers that participated in this study were different on several parameters, and this proved to have significant bearing on the approach to the course. Teacher A were on a technical level much better equipped to approach the game and integrate it in the teaching. He relatively quickly learned the game and found it interesting to play the game for long stretches of time. Teacher B took 5 weeks before saying that: "Ah – I am finally beginning to see, how this game can be used for teaching history". This was when she was familiar enough with the game.

Teacher B was significantly more worried about whether the students received the historical material on a detailed enough level. Her ambitions were higher and her approach more sceptical. This was not in a negative way but rather a healthy approach to a new teaching form. She was very much caught up in a prioritisation problem, where she constantly felt that she had too little time to teach the necessary history to the students. She also had several problems with over viewing the class as she had 28 students compared to 19 in the other class. This was clearly hard to manage when the students played the game. Some students became somewhat stuck in the game, and here the degree of familiarity with computer games became apparent. One of the things that students clearly found very worthwhile was the interaction with the teacher around the computer game. The students would encounter a problem and discuss it with the teacher that would explain background and challenge their assumptions for example the reasons behind religious unrest in southern France during the start of the 17th century. Here the students interest and motivation where driven by a concrete experience in the computer game.

The teaching style for the two teachers differed in how well they fitted with the computer game. The more general and overall approach were closer to the game, and therefore to some degree better supported what was happening in the game. On the other hand the more detailed approach was a good supplement to the game that presented the bigger picture. According to the students the integration of background information (textbook and teacher talk) where not integrated well enough. According to some it might as well have been a separate subject. This was probably due to teacher's lack of knowledge about the game but also a built-in problem of the study. The study was trying to see computer games in school, on the schools premises. This meant that the course used normal textbook and teacher talks, which were not adapted for the game experience. This was clearly not a success.

## Some Recommendations and Directions

One way to minimize technical and practical problems is to arrange the course to stretch over one week. This would have several advantages but would be quite hard to accomplish in many schools. This way each student could work at the same computer, continue a game for a longer stretch, easier built up experience with the game over several hours, and the time cost for starting up each hour would be reduced.

From the outset teachers should be very aware of expectations and control these so the students don't expect the game to be pure entertainment. It should also be considered carefully what genre to use and if you can give the students a choice between different genres or games. This should especially be in relation to gender preferences and differentiation in terms of prior experience with computer games.

The teachers must make sure that they know the game quite well prior to use, and have game examples that can be used in the teaching. The teacher talks should use events and experiences from the game as a focal point. This requires that the teacher plays through some scenarios and picks up interesting examples for the teaching. One example could be to play the troubled years of England in the start of the 17th century, where internal unrest made England invisible on the European mainland. The historical thinking in the game and the underlying variables should be made explicit as the majority of students had a hard time recognizing these. This problem seemed to be more severe for the youngest students.

The teacher's talk should be adjusted to the game and reading requirements should be carefully selected so they fit with the game. This also entails that the course will not have the same content as a traditional history course but is allowed too differ.

During the course it should be possible for the students to explore the game universe freely, and learn the game at their own speed. The students should get some victories and confidence in their game skills before you challenge them too reflect on the game experiences. This also entails differentiation so some students will be faster off too more controlled scenarios that fit with history teaching. The students with prior knowledge of computer games will be restless if they have already learned the game and have to wait for weaker students. When the weaker students are pushed forward they will often be pushed in the periphery, and not really participate in the discussion of the game. Some of the

group discussions could with some advantage be changed to teacher directed discussion as some students have a hard time getting started with the discussions.

## What You Were Afraid to Tell the Teachers but They Still Knew in Their Heart

This article has concentrated on some of the obstacles in connection with using a commercial strategy game in history teaching. A lot of problems were encountered that one should be aware of when considering computer games for teaching.

Using computer games in an educational setting is hard work, and you as a teacher need to know the game quite well. Furthermore you need to learn at least a large percentage of the students how to play computer games or at least a new genre, and this is if not a new language then close to.

You need to rethink your teaching style, and how to put together the material you have taught for years in class with group work, and a computer game that in places simplify, in some places lead to wrong conclusion but potentially also presents information more dynamically. It can all get very confusing for students and teachers.

So one may ask is it worth it? Probably not in the short run but I believe that the computer games have something else to offer than other teaching forms in the long run: Namely, a dynamic and rich presentation of a given subject area that you as a student have a chance to engage and challenge through interaction. This is ultimately the way that you need to teach material if it is to have a real impact on students, and not just become superficial knowledge limited to a school context. In this perspective the participating teachers were also optimistic.

# Educating the Fighter: Buttonmashing, Seeing, Being

*Kurt Squire*

## Introduction

Imagine for a second that you are a teacher or instructional designer, charged with developing an advanced science course, covering a few hundred new terms, facts and concepts. How would you go about designing instruction that "covers" these concepts? What kinds of experiences would you want learners to have? How would you pace them and how would you know if they truly mastered what you needed them to learn? These questions, which may seem traditionally the domain of instructional technologists, are ones also faced by video game designers. As games get longer and more complex, designers have devised ways to "teach the player" to see and act in particular ways. Whereas educational technologists ask if education can happen at a distance, gamers shows you that it already does, as game designers and distributed game communities help them become better players. If you want to see the cutting edge of distance education, look no further than computer and video games.

And so, video and computer games are getting more and more attention from educators. Some groups, such as The Serious Games movement or The Education Arcade are starting to investigate to how to make games (or immersive digital environments, if you prefer) for learning. Inside and outside of academia, projects including Quest Atlantis, Riverworlds, Whyville, and MOOSE Crossing are trying to harness different elements from computer and video games and use them in educational software. Certainly, these endeavors are worthwhile, and a lot will be learned by further design-based research approaches (Barab & Squire, 2004). But a strategy I want to take here is to show that if there is something worth learning from in fighting games, presumably the most "mindless" of all genres, then educational technologists might benefit from looking at games more generally.

Along with Gee (2003) and I want to argue that there is also a lot to be learned about instructional design by studying contemporary computer games (c.f Gee, 2004; Malone & Lepper, 1987). Commercial computer and video games have mostly overlooked by educational technologists because:

(1) they involve signs, patterns, and literacies that are foreign to non-gamers which often appear as just "flashy graphics" and "button mashing",

(2) they privilege functional knowledge over declarative knowledge.

As such, a fighting game can be used to unpack several issues of interest to educators: what kinds of learning occur through game play, how interactive systems are designed to be learned, how complexity is managed, and upon critical reflection principles that might be derived from studying games in their own right.

Far from "button mashers," expert fighting game players exhibit an expertise that is akin to a professional practice. Building on the work of Gee (2003) and the New London Group (1996) I argue that this expertise is a "design type knowledge" critically comprised of learning to "see" a problem space and coming to understand a game as a designed system. Given the importance of problem identification in game play, perhaps it is little wonder that this expertise largely goes undetected by non-gamers. A second, perhaps equally important problem is that fighting games are ultimately a performative game, whereby pattern recognition, detection, and quick action are valued over reflection (which typically occurs in between rounds or after losses). Contrary to earlier claims that games are flow inducing and therefore lack any critical reflection (e.g. Appelman and Goldsworthy, 1999) if we examine game playing activity, we see that many games are constructed specifically to create such reflection in action. When we look at game playing as an activity system which includes all of the fan writing, reading, analysis, and discussion it produces, it is clear that game playing usually becomes the subject of gamers' own critical and reflective analysis (Steinkuehler, in press). Although fighting games may not be the first genre of choice for instructional designers, they do have a unique capacity to help us understand how games work as a medium, what kinds of expertise they recruit from players, and how game playing communities organize around constructing and mastering game playing practice.

## Methods

To make this case, I examine Viewtiful Joe, a side-scrolling fighting game that comes from a long line of 2D-side scrolling fighting games, and as such is part of an oft-maligned genre that most would consider "mindless button mashing." Other analyses of other game genres (c.f. Gee, 2004a; Squire, 2004) are worthwhile and would likely provide useful insights, although these two particular properties seem to be inherent to the medium. This paper offers a critical analysis of Viewtiful Joe, a traditional two-dimensional single player sidescroller game. I logged roughly 40 hours of game play, and at the time of this writing, was working through the sixth level. Implicit to this paper is the assumption that until we develop more robust theories of gaming, it is absolutely essential that games researchers (and perhaps educational technologists) invest significant time in playing games. Just as one cannot imagine a literature scholar who "preferred not to read books" we can also imagine the limitations of games scholars writing about a medium without finishing a game.

Much of the paper is built on the second boss monster, Hulk Davidson. Building on a phenomenological process (c.f. Steinkuehler, Black, & Clinton, in press), I based much of this work on a close read of my own learning process while playing against Hulk Davidson. I took several pages of notes, capturing my thoughts, feelings, and continuing awareness of the game challenges. I paid special attention to the kinds of knowledge I was developing, particularly what kinds of "declarative knowledge" statements I could make while playing. These notes are captured in tables 1-3.

I also examined both professional and amateur game FAQs and walk-throughs, documents which are important because they are the tools that gamers use to teach one another to play games. Game FAQs (collected at Gamefaqs.com) allow us access to gamers' Discourse (Gee & Green, 1998), to see the values and language that gamers employ to inculcate others into their practice. Further, I observed and interviewed three players playing the game, in order to get a better sense for how others encountered the text. We might consider this approach phenomenological case study, one which is designed to generate theoretical insight into the nature of fighting games which then can be expanded and developed through further research. Given the paucity of in depth research on what constitutes gamer expertise and how gamers become expert, I believe it is essential that the field begin to use more of such studies as the bases for developing research agendas.

## Understanding the Fighter

While fighting games have been important players in the gaming market for almost two decades, there has been relatively little academic analysis of their structure or properties as a semiotic system. In the late 1990s, a number

of academics began deconstructing game characters, as a part of a broader move toward understanding games and popular culture, and fighting games particularly Mortal Kombat, were often a target of this analysis (c.f. Cassell & Jenkins, 1998). None of these studies investigated the properties of fighting games or their players, none deconstructed fighting games as systems, and none sought to understand how they are learned or played by players. In the absence of any pre-existing work on the fighting game, this section lays a foundation for understanding fighting games from a cognitive perspective.

One of the reasons that games are overlooked and misunderstood as an instructional media is that the majority of instructional designers and analysts are not literate with the medium and to the outsider, sophisticated game practices may look simply like "button mashing." Expertise in fighting games arises through a rough progression of (yet also interaction among) four phases:

(1) learning to "read" the game as a semiotic system

(2) learning, mastering, and understanding the effects of the range of } possible moves,

(3) understanding the higher order interactions among these rules and the emergent properties of the game system

(4) and a continuous monitoring and reflecting on goals and sub-goals.

To those used to studying knowledge in formal school settings, which privilege declarative knowledge, such embodied, situated gaming "knowledge" may seem foreign. Whereas schools privilege declarative knowledge, (particularly definitions or verbal representations of a "correct" answer), games privilege what it is that the player can actually do. No commercial game (save, perhaps, Full Spectrum Warrior) cares whether or not the player can articulate

knowledge of the game world; instead knowledge becomes embodied in performance, although this knowledge can be later broken out into declarative statements.

Consider for example, Viewtiful Joe, a commercial game released in 2004 for the Gamecube. Viewtiful Joe is a side-scrolling 2 dimensional fighting game in the vein of "old school" fighters such as Street Fighter. The player progresses through levels populated with monsters, puzzles, and obstacles, using special moves to defeat enemies and solve puzzles. Viewtiful Joe draws heavily on this style of fighter that was popular in the early 1990s, but is known for its almost cruel level of difficulty and uncompromising dedication to the genre. Although Viewtiful Joe could be beat in under twenty hours, it takes most players at least three times as much to finish, if they can at all. Although perhaps not as difficult as Ninja Gaiden (Gee, 2004; Thompson, 2004), Viewtiful Joe is difficult enough that many players never finish it at all.

Viewtiful Joe follows an established structure of relatively easy monsters / puzzle / mini- boss monster / easy monsters / boss monster (See Figure 1). The game is designed so that the player first confronts relatively easy monsters where she rehearses basic moves (and gains points that can be exchanged for new skills), next meets mini-bosses who require using special skills, with boss monsters who require tying together chains of special skills moves. Each of these segments is punctuated by puzzles where the player must interact with the environment to unlock passage to the next segment. Viewtiful Joe is unique in that many of the puzzles involve speeding up or slowing down time. For example, on one level the player must slow down time so that a droplet of water coming from a faucet grows extra large and triggers a button. In a move that is becoming increasingly common in game design, Viewtiful Joe also reintroduces all six major bosses in a final level, which functions as a final exam of sorts for gamers.

This rhythmic, repeating structure, which is also used in Ninja Gaiden (c.f. Gee, 2004) introduces difficulty, manages complexity, and enforces competency in gamers. First the player masters basic controls through fighting ordinary monsters while also quickly accumulating points for power-ups. This sequencing encourages and requires the player to develop the controls to become automatic for the player. Second, the relatively easy monsters give the player a feeling of accomplishment and the game pace a "faster" feeling as the player moves through screens relatively quickly. Third, the alternation of fast and slow sections of challenge and rehearsal establish a rhythm, much like a film maker might alternate shots or a musician would alternate verses and choruses. The

easier sections are ones where the player consolidates skills and receives rewards for actions; the harder boss sections are where the player experiences failure, and is forced to confront novel situations, and develops new skills.

## Beating the Fighter

To illustrate the cognitive complexity behind a challenging fighting game and illustrate how gaming expertise gets developed, I will focus on Hulk Davidson, a boss monster that first appears at the end of the second level and reappears in level 6. Hulk Davidson is a "slow, arrogant rhino that hits hard, very hard, and is one of eight bosses in the game" (gamefaq.com) (See Figure 1). Defeating the Hulk Davidson takes only four or five minutes under optimal circumstances, but it is not uncommon for a player to spend a few hours learning Hulk's patterns and developing effective strategies for beating him. An average gamer might spend from 30 minutes to two hours to beat Hulk Davidson, putting this task on par with the average class session.

It is beyond the scope of this paper to explain to non-gamers how to beat Hulk Davidson; most game FAQs (strategy guides created by fan communities posted on sites such as gamefaqs.com) use between 300-1000 words to describe this process to the already proficient player. Presenting that text here in full would be a semiotic nightmare of dangling signifiers such as "Ukemi," words with situated meanings to players who have already spent 5-10 hours playing as Joe, but little to anyone else. These texts do however give us insight into gaming expertise, as they show how expert gamers represent their practice for other gamers and display their identities for which may give them better accolades. Here is an excerpt from an 80 page gamefaq.com:

"If you stay close to him, then after 3 axe swings he will get ready to charge, lowering his head. He does not "rev up" for very long before he charges, so get out the way by mach running to the other side of the screen and jumping onto one of the platforms above. It can be a little hard to tell when he has hit the wall even if you are on one of the lower platforms, but you will get a feel for the timing of this move after you have seen it a few times, as well as the sounds he makes. If it hits you, you will get a very big feel for it - Ukemi can save you a little of that heartache. However, it is a pretty easy attack to avoid."

The process of "beating" Hulk Davidson is largely one of learning to read what is important in the game space. To do this, the player must understand Hulk's moves, understand Viewtiful Joe's potential actions, how they interact with the problem, and then realign his goals accordingly on the fly. Essentially, this is

a dual space search problem, similar to hypothesis testing in science (Klahr & Dunbar, 2000).

The expert game player sees the game animations and sounds not just as "pretty graphics" but as signals to the game's state which are used for action, such as Hulk's "lowering of the head" (See Table 1). The more that these states are understood, the deeper the emotional pleasure, and part of what makes games unique as a medium is the way they marry signs functioning as indexes to action – signs that carry strategic significance for the character – with emotional response. So, for example, when Hulk Davidson shouts lowers his head and shouts "Hee yum!" the skilled player might sense anticipation or excitement, knowing that Hulk is about to launch fire rockets – meaning that the player better get on his toes because the sky is about to rain fire -- while feeling visceral fear because of Hulk's thundering chants which signal impending death.

For the player unfamiliar with the genre, these many signs and signifiers may be completely foreign. A novice might immediate hear Hulk's roar without understanding its meaning, or even that it indexes underlying actions. In other words, novices have problems not just deciphering what Hulk's roar means they should do, but even the fact that this code ought to be deciphered. In this interview, one gamer who grew up on Pong, Atari and Nintendo and still plays massively multiplayer games shares her frustration with Viewtiful Joe:

"I didn't understand it. It was like walking into a set of internally referential codes. Unless you had played games before, I could not understand what they wanted or meant. It was like walking into a conversation on a topic that started years ago. It was spoken in a language where I didn't understand what the different symbols mean. I felt like I was being left out of an old boys' conversation. That game really irritated me. It was like everyone laughing at a joke and you don't get it. It relied way too much on prior knowledge and experience of games in the last 10 years."

What about the storyline, graphics, visual appeal?

"Yes, I liked them all. That wasn't at all what bothered me. The storyline was classic comic-book hero superboy. The aesthetics were pseudo-retro, very cool. That's what made me want to play the game. What made me not want to play the game was actually playing the game. It was primarily the game play, but also its symbol system itself."

These passages reveal a problem with non-gamers analyzing games' semiotic systems and partially explains gamers' concerns with non-gamers' claims to

understand games as a cognitive space. Whereas someone familiar with comic book conventions might understand Viewtiful Joe as a "comic book" game, understanding it as a 2D side-scrolling fighter demands knowledge of an entirely different semiotic system.

To understand how gamers communicate this expertise to one another, let us examine the text from the gamefaq to see how the author wants to coach the player through the game. First he directs the player to a basic heuristic strategy and subgoal: stay close to Hulk. This seemingly straightforward goal is actually somewhat counterintuitive when first playing the game. Hulk has a very large axe, and he likes to hit you with it or throw it at you. One would think that staying far away from Hulk and waiting for him to throw the axe, and then charging would be the generally logical thing to do. So, an important first step in beating this boss is to adopt this counter-intuitive strategy of staying close to Hulk. A second step is to not swing at Hulk until he charges (attacking too early will destroy his shield, causing him to rain fire on the player). A substantial amount of game play is spent trying different strategies and picking out the appropriate sub-goal for the task. What the author has done here is analyzed the problem space and determined an optimal set of solutions, which result in a general strategy of remaining close to Hulk. An interesting secondary value is for strategies that allow the player to remain "in control" of the situation where Hulk is performs moves with relatively little randomization.

Second, the passage tells the player what to attend to: Hulk's 3 axe swings and the "lowering his head" animation. The 3 axe swings are important because when Hulk is in an axe swinging state the player is very vulnerable and attacking Hulk will only cause him to rain fire. Second, it points to the player that there are 3 and only 3 axe swings every time, which the player can learn to predict and avoid. Last, there are several other noises and animations happening simultaneously which the author does not point the reader to (See Table 1). All in all the problem space is quite complex (See Tables 1-4), but the author is economical with the text, which is action-oriented and lacking much declarative knowledge typical of school texts. The author does not say "Hulk Davidson has 3 swings that he uses each and every time. Using a jump move, avoid these attacks until Hulk charges. The charge will be marked by a lowering of the head…" Rather, the author assumes that the player will develop declarative knowledge through interaction with the problem and instead focus on specific, important details (3 axe swings), and leaves irrelevant ones out. Earlier moves or concepts (mach running, jumping onto platform, see Table 3) are "black boxed". Consistent with the general argument of this paper, the FAQ focuses the player on what to attend to in the environment and how to couple this

with effective action, skipping unnecessary declarative knowledge.

Third, the author identifies ambiguity in the task and the importance of repeated trials until the player himself can detect the pattern: "You will get a feel for the timing of this move after you have seen it a few times, as well as the sounds he makes." Not unlike an expert surgeon or craftsmen, the author points out the importance of experimenting in the problem space and getting a feeling for both the timing of events and the patterns of interaction among variables. Experiencing some failure is to be expected and the hallmark of good learning. The author does give guidance to the novice, suggesting what features of the environment (the sound he makes) are worth attending to. However, from these ambiguities emerge a number of critical interactions, and this preceding discussion was just a part of one method to beating Hulk. The remainder of the text goes on in similar fashion to describe a method for beating Hulk. Other gamefaqs include some parts while leaving others, but most rely on similar patterns.

The problem of defeating Hulk Davidson can be solved multiple ways, so most game guides focus on heuristics rather than explicit procedural directions. Indeed, even sketching out the boundaries of this problem space and testing them is impractical, if not unintelligent. Table 5 is a mapping of all of the theoretically possible combinations of moves the player could make in any given problem space (keeping in mind that it is a simplification, as timing is critical variable not represented). Indeed, after a few minutes (or hours) of experimentation, players come to quickly map out the optimal states (drawing on knowledge from previous levels; it's important to note that this is the second boss, and the player has already spent a few hours with Joe). Good players develop intuitions of which combinations fit their playstyles, are optimal approaches, and are most likely to lead to reliably positive outcomes. Table 4 outlines some very typical heuristics culled from game faqs as well as my own experimentation on the level. Once the player gets the "feel" of the level – intuitively understanding the emergent patterns without having to think through it, she is approaching mastery. As a result, game playing expertise is more akin to "heuristic" knowledge than traditional "conceptual" or procedural knowledge.

## Becoming a Fighter

Fighting game expertise consists of reading the game interface (including character animations) as a semiotic system, knowing the strategic significance of

possible moves, anticipating the emergent game system patterns and properties, and readjusting sub-goals on the fly. Often times, players will describe this experience as one of "flow," where they are confronted with constant challenges, monitoring incoming data and performing at the top of their abilities (Csikszentmihalyi, 1990). At their essence, action games, but particularly fighters are performative media, where the primary pleasures are derived from active problem solving in situ, analogous to performance in sport, music, dance, or public speaking. This pleasure of flow feels almost rhythmic as the player becomes entrained with the game system, experiencing the avatar as an extension of the self. In single player games, this means coming to understand and appreciate the pleasures of the game system, whereby the avatar becomes an extension of the self.

In educational game studies, some have described a "flow paradox," whereby a challenge is how to give players enriching experiences in game worlds, but also draw them out of the world for critical reflection (Goldsworthy and Appelman, 1999) In other words, if games are experiences of flow, where players are "in the moment" and confront series of challenges, how do we also encourage them to reflect-on-action, a practice that is central to developing expertise (Schon, 1991)? Games' interactivity – the way that their constraints (such as the power of Hulk's axe) force themselves on the user demand that the player adjusts her actions "under the threat of extinction." For game players to get past Hulk Davidson, they must learn to read Hulk and his signs, and use Joe's skills effectively. By staggering monsters and mini-bosses with different skills and attributes, the game requires the player to master a broad range of moves to finish the game. In other words, Viewtiful Joe is designed to be learned by cyclically building on players' expertise and providing new challenges, something Gee (2004) refers to as cycles of expertise. Indeed, as flow theory might predict, when games cease to be challenging or interesting to players, gamers decry them as repetitive or boring.

Examining game playing as activity systems, we see that an immense amount of reflection does indeed occur naturally during game play. In this case, we see players reading and writing FAQs, participating in message forums or talking with peers. As a player, it is impossible to conceive beating Hulk Davidson without some sort of reflection on game play in order to understand failure and monitor my progress. As interactive systems, games organize and manage failure for players allowing them to learn through interaction with the system (c.f. Squire, in press). If we look at the series of monsters, mini-bosses and bosses as a curriculum, we see that Viewtiful Joe is structured to ensure that the player knows how to fight closely, at a distance, and using an array of moves.

Viewtiful Joe doesn't allow the player to rely just on one or two effective actions; she must learn to manipulate all of Joe's capacities and match them to conditions for action. Giving players a wide array of actions and requiring a deep knowledge of these various actions is partially what gamers mean when they describe a game as "deep".

With the cognitive complexity that goes into beating the bosses in Viewtiful Joe, it would be easy to overlook the cognitive importance of the easier sections where the player fights weaker monsters. These sections serve cognitive functions, most importantly, allowing players to become increasingly attuned to the moment-to-moment actions of the game system and sharpen their perception of the game "language". As players enter the latter levels, consisting largely of monsters that were "mini-boss" monsters earlier in the game, they perfect their skills through rehearsing skills learned earlier. Indeed one of the most underappreciated parts of games – and most instructive parts for progressive educators is the way that essentially "repetitive practice" is built into the game to build mastery (Bransford, Brown, & Cocking, 2001).

But the "easier" levels also play an important function in terms of balancing the game. Players earn "Viewtiful" points for killing monsters, so if a player loses against a boss, she can go back and repeat battles to earn power-ups. These power-ups give more lives or add maximum speed, so that the game eventually (partially) becomes balanced for the player's skill level. This ingenious little design means that if players do not yet have the skills to beat the boss, they are sent back for further "training." Unlike most remedial instruction, which might feel pointless, the "remedial" levels of Viewtiful Joe are entirely functional. The player has a broader context for learning the "fundamental" skills, and is sent to practice just as she learns why she needs to practice them. If she completes the practice, she will also be rewarded with extra powers, which motivates the player go to back and retry something already completed. (In reality expert players may already have a similar amount of points, since they performed better on earlier levels and subsequently gained more bonus points).

## Educating the Fighter

Even if the lessons educators can learn from fighting games are not immediately or intuitively apparent to all, hopefully I have presented a convincing argument that fighting games are much more than empty displays of gratuitous violence and fighting game players are more than mindless button mashers.

Hopefully, this piece also suggests how if games are to be taken seriously as an educational medium, how we can benefit by examining games much more closely than we have thusfar.

Gaming as performance; learning as seeing and doing. Resulting from this analysis are several arguments for what instructional designers and educational theorists can learn from games. Fighting games, at least are a performative act, which as a cognitive performance might be likened to reading sight music. As such, seeing is crucial. Novice players (including game critics) might look at games and see flash graphics, whereas gamers see a series of signs tied to action. This isn't to suggest that gamers ignore the aesthetic pleasures of graphics. Indeed, the interplay of the two is in part where emotional meaning resides for gamers within action in the genre. But what it does suggest is that much of the fighting game is learning what to look for in the game. Not surprisingly, most academics have develop little expertise in fighting games and therefore misunderstood playing fighting games as a cognitive activity.

"Knowing what to look for" when learning academic subjects happens in the same way. Students need to learn to "see" problems as experts, understanding what is important in a problem and what is noise (Chi, Feltovich, & Glaser, 1996). In our schools, where we largely sever students from the problems encountered in disciplines, (successful) students become adept at "reading" the signs of textbooks and story problems (c.f. Shoenfeld, 1983; Sternberg, 2003), but have little opportunity to interact with complex problems "from the world" in their naturalistic contexts. This "severing" students off from the contexts in which they happen is a core problem in our formal academic system, and something that mathematics, science, and literacy educators have lamented for years (c.f. Barab et al., 1999; Bransford, Brown and Cocking, 2001). In the traditional classroom, textbooks (and lectures) are the primary conduit of information (with discussion sections to discuss meaning). In the "game curriculum" games produce novel and new experiences, and texts are used to help show players what to attend to, and to help synthesize action. Which model is better aligned with contemporary learning theory is for the reader to decide.

Examining the Viewtiful Joe gamefaqs, we get a good picture with how game-based literacies function. Declarative knowledge (i.e. how many axe swings does Hulk make while swinging a normal strike) are taken-as-given. Although the amount of "declarative knowledge" a player confronts in just one level could take several pieces of paper (see Tables 1-3), gamefaqs function as expert systems by directing the player to the proper framework for understanding the

problem and the one or two facts that really matter. The gamefaq reframes the challenge as one of "staying close", and making sure that Hulk's shield remains intact. Even more so, they emphasize the importance of "seeing" the problem in a productive manner, pointing the player to the specific facts animations that matter. Facts are useful in the service of action and are used for interpreting strategic significance. Consistent with situated accounts of knowing and pragmatic epistemology.

Educators interested in designing games for learning need to understand that helping us "see" patterns is one of the most compelling qualities of the medium. Players quickly learn to decipher meanings in-action because it allows them to do work. Those who want to build environments based on principles derived from games might do no more than think of what cycles of perception / action are available to their students, and working to align them with desired outcomes, because if games remind us of nothing else, is that action is fundamentally situated in contexts (Young, 2004).

Those who ask "where is the learning" in games need look no further than to see the seeing and doing that players do. A popular query asked to games researchers is "where is the content?" Hopefully, the tables full of moves, actions and consequences suggest that there is in fact content in popular games, and in fact most of it "comes for free" while playing a game. Hopefully, these sections also impressed upon the reader that gaming knowledge is a highly specialized language foreign to outsiders. Educators interested in game-based learning need to transcend their "content fetish" to see that what games do is immerse players in simulated worlds. Of course, educators from a situated perspective have long argued that most of what we do while learning is actually just these cycles of seeing and doing, perception and action, whereby we become attuned to the affordances of a situation and learn to act within it. Whether we are talking about learning to detect patterns in multiple choice tests or in 5 paragraph English papers, fundamental to learning are these reciprocal relations between seeing and doing.

## Cycles of Expertise

Surely, much valuable learning comes directly out of pattern recognition, and learning-while-playing, but this is also to suggest that when taken as an activity system, game playing itself involves reflective practice. How gamers come to learn such complex activities can teach us a lot about learning and the design of

learning environments. When taken as activity systems, learning through game play has implications both for psychologists studying play and for educators hoping to derive principles of instruction from games. By alternating "flow-like" sections and sections with challenges (See Figure 2), games like Viewtiful Joe create cycles of expertise (Gee, 2004), whereby learners both confront new challenges and consolidate new learning. Previous theoretical frameworks for games (c.f. Bowman, 1982) (wisely) drew heavily on Csikszentmihalyi Flow theory to describe how games can keep players in a state balanced between boredom and frustration. If we look at game playing over the breadth of a game, however, we see that to get good at a game requires both experiences of flow and experiences of explicit reflection. Learning occurs in both, but if we attend to games' ability to put us in states of flow (which may be unparalleled among media) then we miss the way they are constructed to also encourage new learning. In most games, bosses serve this function of "jarring" the player from their existing mindsets to rethink whole new ways of acting.

When taken as an activity system, we see that game play involves a good deal of activity that any educator would identify as reflective. Clearly, players studying game manuals, FAQs, and cheats are enaging in literacy practices, as are those players who write them. But so ar students who are obsessed with their games during school, sharing or downloading cheats, drawing on their patterns notebooks, or rehearsing moves in their minds. They are reflecting on their action. Of course as educators, we might prefer them pondering ideas consistent with our agendas. If we only look at game play itself, we miss half the story. Sleeping, web searching, reflecting is also part of the game play, and this is why game players can put a game down one night, and pick it up the next morning and "get it" (also similar to athletes and musicians working on difficult performances).

Educators can learn several important ideas from this. First, psychologists need to be careful to take a holistic view when conceptualizing game play. Merely attaching electrodes to a player's head will no more get the full story of the cognitive activity happening during fifteen minutes game play than will randomly hooking an academic to an electrode during an average faculty meeting or class session. Game play consists of rhythms, including periods of frustration, boredom, or rehearsal punctuated by periods of reflection. Second, we need to understand that the game itself is only one part of the activity system when designing educational software. This is not to suggest that we might not have learning environments that are entirely online, but it is to suggest that we ought to think carefully about how to leverage the naturally-occurring writing, reading, thinking, and socializing that goes on surrounding games to encour-

age deep learning. Part of what Viewtiful Joe does so well is balance these two needs carefully, rewarding the player when she must do "remedial" work on easier levels.

## Aesthetics of being Viewtiful Joe.

So far, this paper has concentrated on the cognitive dimensions of Viewtiful Joe, ignoring the aesthetic elements of the experiences. There are several visceral and cerebral pleasures to playing Viewtiful Joe, ranging from the pleasure of completing a hard boss, to the pastiche humor involved in fighting a large talking shark as a slacker-turned-superhero. But the aesthetics of Viewtiful Joe are absolutely critical if we want to understand how games function. Many, many times while suffering through repetitive levels or "way too difficult" bosses I found myself asking, "Why do I want to do this?" This is a question that educators frequently ask their students, and as educators there may be no more critical question we can ask of our game players who willing engage in thousands of hours of hard work every year on their games. Of course, this answer will be different for different people, but if we can begin to crack this nut, perhaps we can leverage the power of games.

In fighting games, perhaps more than any other genre, the controls system is to the player like a cane is to a blind man, a cognitive tool that functions as an extension of the self for achieving action (O). In short, even through the smallest of actions, we see big outcomes, we see our impact on the world. Compare this to most students' experience of classrooms, where their impact on the day-to-day functioning is generally minimized. As previously mentioned, the levels are created in such a way that hard challenges are peppered with interesting puzzles and hard bosses. No gamer would suffer boring, repetitive levels every time, nor a relentless string of bosses. The game is balanced (and includes interesting self-balancing mechanisms, such as the power-ups) so that the game is tuned to players' ability and tastes.

A game like Viewtiful Joe also creates a contract with the player, so that the game never presents a challenge where she doesn't have the skills to solve the problem. In the case of Hulk Davidson, the boss may ask the player to stretch his skills to new levels, but in all cases, she has been shown the basic moves that need to be learned. Gamers refer to this property as being "difficult" but fair. Of course, some games (especially bad ones) violate this contract. Game discussion boards are replete with criticisms of such games, and generally one

can find these games stuck in bargain bins. In the good game the action is difficult, but the player always feels like she knows what she did wrong (sufficient feedback on action) and has enough data and tools to do better next time. And the player also always has a sense of progress toward that goal. Viewtiful Joe always gives me a sense that I'm progressing – whether it is gaining points to be traded for skills or logging time toward better understanding the boss. If even this is too much, I can always consult the answer guide (gamefaq).

While Viewtiful Joe is brutal in difficulty, it's also compassionate in its treatment of the player. When the player dies, the game pokes fun, using what Will Wright calls amusing failure states to lighten the tension of losing and remind the player that it is "just a game." After each death, an encouraging voice reminds you "Joe must go on". In part, this writing encourages the player to become Viewtiful Joe, the reassuring voices welcome the player to inhabit this character who will not quit despite whatever odds. One of the reasons that players will go on fighting as Viewtiful Joe but not finish those algebra sets is that the game plays on everyone's desire to be superhero, and every battle, every dialogue is constructed to reinforce this identity.

As educators, there is a tendency to question the need for story, characters, graphics or sound. Afterall – as educational technologists, these "fuzzy" elements are outside of our domain. Yet, it is precisely these compelling graphics, writing, sounds and character that implore Joe to go on and are at least a part of the pleasurable experience for many players. This is not to suggest that every game must have bump map shading (indeed Viewtiful Joe does not). It does suggest that a Puritanical approach to learning that eschews anything pleasurable and fears that "entertaining" kids will spoil them may only further alienate our students and render schools even less relevant than they already are. An alternative might be to carefully consider the aesthetics of the school experience, something important to certain strands of thought in education (i.e. Maria Montessori) but notably left out of the Tyler model of education. As online learning continues to proliferate, perhaps there are opportunities for rethinking some of these basic assumptions about the student experience.

# Messages and Mediums: Learning to Teach With Videogames

*David Thomas*

"These violent video games are learning tools for our children and clearly result in more aggressive behavior,"-- Randall Hagar, Director of Government Affairs, California Psychiatric Association .

"First person shooters have made up physics. Take being a sniper, for example. Sniping is a lot of fun in a FPS. The programs don't worry about wind and they don't worry about gravity. The distance from your target is irrelevant. In contrast, sniping in real life is very scientific. Some people say these games train people to be snipers. If people are learning from FPS, they will be pretty bad snipers."-- Kym Buchanan

At the heart of the videogame violence debate beats an important assumption—that videogames have the power to change us, that games can teach us to hurt and kill.

At the heart of the serious games effort is an important assumption—that videogames have the power to change us, that games can teach us to think and solve problems.

When we look at the idea of using videogames in an academic setting, as a part of programs to teach people new knowledge, skills and abilities, we make similar assumptions. We believe that games have something special to offer. We question the classic tools of education and look for new techniques for reaching a digitally savvy audience. We want games to teach.

If the computer can revolutionize book selling and letter writing, we ask, why can't it stimulate a new era in education?

But even as we hope to bring the allure of "SimCity" simulation, the dramatic involvement of "Final Fantasy" and the gripping tension of "Doom" into our classrooms, we need to recognize that we are still at an early point in our understanding of videogames as a medium. We are still in the process of figuring out how games work and why they are fun. We don't really know what it is about a game that makes it compelling or what kinds of messages and meanings people take or make from them. As James Newman points out, "…glib

assertions of what videogames are, based on beliefs about the way that they are played, are problematic."

Now we want to push the world of videogames into the service of teaching. We want to use games to produce learning. Yet, at the same time, those who study education continue to question some basic assumptions these desires rests upon.

"How do we know what we are teaching is what students are learning?" is a perennial question of learning outcomes.

As an example of the kind of ongoing concern that surround this question, consider the remarks made in 2001, by the National Research Council:

"The time is right to rethink the fundamental scientific principles and philosophical assumptions that underlie current approaches to educational assessment."

Even as the world of education is rethinking how to assess when learning is taking place, we are busily trying to change how people learn.

Perhaps nothing points out these tensions more than casting the question of games that teach against the videogame violence debate. Why? Because media effects are the core of the argument around the censorship of violent videogames and should be a strong point of caution with educators looking for a new ludological learning balm. If games are a magic medium for teaching, then the videogame violence crowd is right. Games can easily teach you to kill. If games are something else, then we need to recognize that we might not quite know what we are doing.

## Videogames as a medium

"When people learn to play video games, they are learning a new literacy," James Paul Gee explains. The basis of Gee's book "What Video Games Have to Teach Us About Learning and Literacy" is that videogames are different from other kinds of media. While they may resemble television, film or even literature, they are fundamentally different. To play a game is to learn a new language, one native to the medium of videogames, rich in the culture of gaming and spoken fluently by its players

Of course, the notion that different media are different in deep, meaningful ways is not new. Marshall McLuhan championed a view of media summed famously as "the medium is the message". When McLuhan argued, "…any technology gradually creates a totally new human environment," he pressed for a deep reading of new media. The emergence of a new medium does more than require mastery of a new vocabulary. The media itself starts to reshape our vision of the world.

While McLuhan (unfortunately) did not live to see the rise of the modern videogame industry , his perspective remains a valuable touchstone when examining the new medium of videogames. Looking from McLuhan's point-of-view we can see that videogames are not just a unique medium, but also one that we have just begun to study in earnest. As Espen Aarseth notes: "2001 can be seen as the Year One of Computer Game Studies as an emerging, viable, international, academic field.

Even more, our object of study continues to grow and evolve. Mark J.P. Wolf's points out the medium has "evolved with astonishing speed, and it is still changing—rapidly." Perhaps this liquid nature of the videogames is what encourages Wolf to insist that games should borrow from the theoretical works of film and television to increase our grip on the new medium. But scholars as Aarseth have consistently rebutted that assertion taking a very McLuhaneque read of this new medium:

"To see computer games as merely the newest self-reinvention of Hollywood, as some do, is to disregard those socio-aesthetic aspects and also to force outdated paradigms onto a new cultural object."

What we know is that videogames are a unique medium. We know that they operate differently on us that other media and that we are still learning about them.

What we don't know, with any certainty, is how they work and what we take from them.

## Difference In Action

To show how troublesome this issue is, I want to return to the example set up in the quotes that introduce this paper—the issue of videogame game violence.

The reason videogame violence is such an interesting case study in an article

about videogames as a tool for teaching and learning is that both critics and pro-videogame educators agree on a central point—videogames can be used to teach.

Perhaps no one embodies the videogame and violence link more than retired Army Lt. Colonel Dave Grossman, who asserts:

"Where does a 14-year-old boy who never fired a gun before get the skill and the will to kill? Video games and media violence."

But when we look at the games Grossman and others use to make their argument, we find a disconnect. We've played these games and spent time with people who have played these games. Yet we are not violent, murderous criminals.

Focusing on a game such as "Grand Theft Auto: Vice City", we can see the paradox in action.

An editorial published in the San Francisco Chronicle reported:

"Yee, a child psychologist, correctly notes that 'games' such as 'Grand Theft Auto: Vice City' and 'Postal 2' are not just benign fun. In 'Grand Theft Auto,' the players have a chance to kill police officers (with blood splattering in high-tech animation), have sex with a prostitute (car rocking, with sound effects) -- and then punch and kick her afterward."

Side-stepping the dubious claim that GTA's blood qualifies as "high-tech animation", the editorial summarizes a typical response to the game. The argument continues from here to urge a connection between the violence in GTA and real world violence.

Does this argument add up? First, let's make an objective inventory of possible offenses in this game:

- First-degree murder
- Second degree murder
- Third-degree murder
- Illegal drug use
- Drug smuggling
- Extortion
- Racketeering
- Armed robbery

• Solicitation of prostitution, and, of course
• Grant theft auto

Looking at this list of behaviors, it's easy to question the game's social utility. Then again, common sense asks, "With so much negative behavior on display and rewarded in the game, and considering the millions of copies sold, why hasn't the game triggered an avalanche of real world violence?"

The response to this question most relevant to the current discussion runs--Players experience one thing but take away from it something else. That is, players pretend to be a criminal but appear to only take away un-associated pleasures from the game, not felonious instincts and a desire to act.

I have long argued in terms of the videogame violence debate that it is wrong to tell players what they will take from a game. In GTA, you cannot assume that the game will pour criminality into the player's heart. It's just as likely the player takes away something completely different.

## Consider these examples of "lessons" you could take from the game:

• At the beginning of the game, the lead character and player avatar Tommy Vercetti notes of the title's namesake Vice City, "There are more criminals in this town than in prison." The story portrays the city as a corrupt locale where no one is innocent. From this a player might internalize a lesson about how evil begets evil. "Live by the sword, die by the sword." It's also worth noting that there are no children in the GTA games. In this world, no one is innocent.

• In the game, take a bat and beat an innocent bystander to death. Blood pools on the sidewalk. Now wait. Within a few minutes one of two things will happen. In one case the body will evaporate, leaving a white chalk outline. Weird. In the other, an ambulance will arrive, paramedics will hop out, revive the corpse and leave. The previously assumed corpse will stroll off down the street. In either if these cases, the lesson might be—death is impermanent. Everyone gets a second chance. Redemption is possible.

• Drive a car as fast as you can through the street. Sooner or later you'll crash. The lesson? Reckless driving leads to accidents.

• Play the game hour-after-hour. Complete the missions, master the game and

reach the closing cinematic. The lesson? Hard work is its own reward. You really should stick with things.

Is this a sarcastic list of lessons? Hardly. These morals are as evident in this game as, "Killing is fun and prostitutes give extra health."

Of course, this puts pressure on the videogame violence pundits to explain why one set of messages is more likely to form the basis of learning than the other. If the medium is an impartial distributor of messages, then players are as likely to gain positive as negative messages from a game like "Vice City". On the other hand, as any videogame player can tell you, most people can tell the difference between the game and reality.

The real question then is, "What do players of 'Grand Theft Auto' learn?" Or, "Do players learn anything in the game that is transferable to the real world?"

When Newman warns:

"Presenting a summary of the extant research into the effects of violent videogames is problematic in itself as the findings of various studies, as Kline (199) and Griffiths (1999, 1997a, 1997b, 1993) have noted, are inconclusive and often contradictory"

Can we simply sit to the side and excuse our optimism about games for learning? Why should we assume positive outcomes anymore than the others should assume negative outcomes?

When we turn to the desire to use games to teach, we run into the same problems that violent games encounter. What meaning does a player take or make from a game? What do they learn? Certainly, we can create games that ask chemistry questions inside a "Doom"-like world. We can simulate a third-world economy as easily as "SimCity" recreates San Francisco and Detroit. We can stack boxes in 3-D space to teach physics and we can traverse virtual landscapes to explore geography. But what we can't do is assume learning.

## This is the lesson of McLuhan.

Warning: Curvy Road Ahead

Even though we may not have a complete theoretical picture of videogames, that does not infer we should not use games for learning.

Researchers such as Gee directly attack the issue of understanding games with learning in mind. The fast growing world of videogames research continues to clarify and contextualize what games are and what they mean. And, of course, the videogame industry itself moves forward on its continual march to improve games and make them more attractive to consumers.

As the medium of videogame develops, so will our understanding and sophistication of the medium.

How we respond to what we don't know at this point is as important as how we work with what we do. As long as we carefully approach games and learning, we can capitalize on successes and learn from mistakes. As practitioners in the field, we need to balance advocacy with critical introspection. If we assume videogame-based learning benefits we will find that we are not teaching as often as we are. And in the meantime we will be open to accusations of squandering time and money and distracting students from real learning.

And we need to look no further than the last great wave of technologically-motivated education to give some urgency to the warnings.

With the arrival of CD-ROMs and, eventually, the Web, educators were quick to proclaim "eLearning" the next big thing. During the eLearning heyday, overreaching proclamations were made far and wide. A particularly wild predication, maintained "eLearning is 50% faster, 50% cheaper and 50% more effective" than traditional methods.

Of course, the best eLearning could show after millions of dollars of investment was an occasional equivalent transfer of learning at slightly lower cost.

If we return to McLuhan for some advice on this matter, we come to a stern warning. Writing 40 years ago, his vision into the future of education frames both the risk and the opportunity:

"The young student today grows up in an electronically configured world. It is

a world not of wheels but of circuits, not of fragments but of integral patterns. The student today lives mythically and in depth. At school, however, he encounters a situation organized by means of classified information. The subjects are unrelated. They are visually conceived in terms of a blueprint. The student can find no possible means of involvement for himself, nor can he discover how the educational scene relates to the "mythic" world of electronically processed data and experience that he takes for granted."

Where McLuhan leads us, and where I'd argue he's left us, is that we do learn from videogames. Even more so, we need to learn from videogames. But what we learn is not wholly in some educator's control. We need videogames in our schools so children can learn about digital media, so they can experience the thrill of control and the science of interaction, so they can build intuitive models of cause and effect and develop a sense for complexity that a pre-digital education could not impart. But when it comes to teaching "reading, 'riting and 'rithmetic" we might find that our new digital techniques are as likely to confuse and to educate. Both outcomes lie ahead.

# Visual Literacy and Learning: Finding some online territories for the slow learner

*Donna Leishman*

## Section: 1 Introduction

It is well established that literacy levels in young people are at a low point. Decoding words, understanding phonics, fluency, vocabulary and comprehension are in decline or at least stalling, whereas societies visual literacy is growing partially due to the exponential growth of ambient advertising.

It is not for me to make a judgement on this shift, however the two different codices offer different types of intelligences, one visual, and one linguistic, there is room for and cross over in both.

This paper is an attempt at uncovering some online practices that I propose utilise the age old lineages of the visual comic and cartoon, which can help us better understand how to create and learn through interaction enabling technologies such as those available today. As a secondary theme I will be looking at the potential for new media practices (I use the label to cover a range of disciplines from design to fine arts in the digital realm) to encourage a different type of educational dialogue between student and tutor, a dialogue which could be useful in developing student confidence and thus re-engage them in academic enquiry.

The idea for this paper was instigated 3years ago by some feedback that I received from secondary school teachers specialising in troubled children and "slow learners" about my Masters of Design project, these teachers were of the opinion that works such as my RedRidingHood (1) animation could energise their student's curiosity and reflective thinking.

At this point it should be made clear that I am primarily a practioner, I teach visual communication students at undergraduate level (2), who are in the main between the ages of 18-30. They are taught different types of media and methods - generally I help the students produce work that uses, interprets and subverts the symbols and signs of contemporary culture. I am not an expert educationalist and have not worked at length with students who have formal learning disabilities. What I do have is a passion and insight as a practioner to promote interactive practices, the value in the act of creating them, as well

as an associated interest in what interactive forms mean in the wider cultural context.

The examples in the links for this paper have been devised with these "slow learners" in mind, but I would like to add not exclusively, as I see the applications of the media expanding towards tertiary and graduate education.

## Section: 2 Creating Motivations

Slow learners can hold a variety of issues that need to be addressed: problems with language development, with cultural issues or with motivation. The generally held observation when working with students, who are disaffected or intimidated by the media, is that high interest, low vocabulary reading materials (that are meaningful to the interests, life experience, and self-identified 'needs' of the reader) are solid methods to promote engagement. Too easily are such students considered or mislabelled as underachievers in school and are grouped and generalized into the classification of being "slow learners". An alternative view is that such individuals should be regarded as unique sets of problems (and strengths) and thus no one-education model or indeed one set of materials can cover 'all'.

I see an interesting link with such problems and one of the virtues found within interactive media. The idea that: (such individuals) should be regarded as unique sets of problems (and strengths) and as such no one-education model or indeed one set of materials can cover "all". Echoes the arguments voiced around the problems incurred when a traditional literary critique is attempted on dynamic and interactive texts. The problem with interactive forms is that reading and analysis no longer come from the one master text or artefact and is nearer to what Umberto Eco calls "works in movement" (3). Multiple readings are required to get an adequate sense of the complete experience and all the permutations of said experience may never be uncovered. There may be no human author to interview; the audience may be entirely virtual or unobservable. It is a move towards participant observation (observing the system), personal interpretation and close readings (4). Thus like the above statement, each system/artwork is a unique set of problems and strengths, requiring a different interpretative strategy.

I propose that using non-linear and interactive materials as a base to begin discussions can subtly level the playing field. As with interactive forms it is often

the case that no “right” or “wrong” readings exist. As Scott Rettberg describes, when tutoring students at Richard Stockton College, he introduces them to “ reading with a strategy in mind … I encourage students to develop particular goals (e.g. to become knowledgeable about one particular character or one particular cluster of plot events)’”(5). This is a departure from traditional close reading techniques.

In this type of exchange, the role of experiencing the rules of the system, and risk taking are all given primacy, so in effect removing the gulf between the empowered expert tutor and student. The attempted reading can almost been seen as a method by which to generate diverse co-authored (via the group discussions) interpretations. Indeed practically speaking and as Simon Egenfeldt-Nielsen (6) observed, tutors may even be reverted to a lower position, if unlike the students they have no first hand experience with simulations, games or online media, and would need to embark on a prior “test run” to familiarise themselves with the technical restraints and conceptual issues likely to occur, whilst all the while retaining the group-reading integrity.

The works I discuss as potential tools to kick-start educational conversations between students are tutors are chosen specifically for their ease of engagement qualities. The initially intimidating aspect of new technologies and new structural forms can be a significant and off putting problem, the ability to engage is found within the visual styles employed and the tasks asked of the reader rather than the structural complexity of the form. The simpler and more common the style (representative signs) the more familiar and welcoming it can be to a new reader.

## Section: 3 Fluidity of Language

The balance between close connection of the sign vehicle and signified concept can be seen as a two contrasting axes: at the far end we can interpret with certainty (specific, denotative, deduction) to the other pole where we cannot interpret with ease due to ambiguity (vague, connotative).

In general non-pictorial icons (letters) have fixed and absolute meanings. The letterform "a" will always be understood as meaning "a", though when combined with a "c" and "t" its forms the word "cat" referring to a furry friend. If the string is broken down the letter "a" is still recognisable, however if it is distorted by illegibility or by the method of presentation e.g. hand drawn or part of a kinetic animation, the perceived meaning moves more towards the ambiguous nature of abstracted visual marks.

Such marks are the constituent elements of an image. Broken down they are often meaningless squiggles, dots and lines. Though once fully re-constructed the image has the ability to be understood with certainty and to speak to the reader in a much more direct manner (note the adage a picture can tell a thousand words). We need very little formal education to understand pictures when they are specific (such as a photograph). Modern societies proliferation of image-based and time based communication allows for an ever more sophisticated understanding of complex images turning pictures into visual icons. The traditional opposition of text as perceived (learned) and image as received has blurred, today we often see pictorial icons with illegible text, a crossover instigated in and by contemporary culture. An example of this occurrence is the "technotext" Lexia to Perplexia by Talan Memmott, as mentioned in Jenny Weights' paper (7)

Understanding signs in an interactive environment demands more perception/ more commitment, as the structure and rules of behaviour tend not to be standardized or taught to us at a young age. Physical (onscreen movement or point and click) as well as mental action enables this accommodation, this learning. The visual signs allow a more immediate immersion, freeing up our cognitive energy to perceive the rules. The viewers enter into a kind of discourse with the expression, becoming active participants in the exchange, facilitating their own cognitive growth through trial and error. The danger with offering both dynamic content as well as an experimental or unrecognised visual style is that the user may be overwhelmed and vertigo/confusion can take over. It could be argued that the experimental interactive environments of this nature do not allow any common point s of entry and thus are elite, excluding many partici-

pants apart from the niche, masochistic or the most determined.

The choice of aesthetic representation is relevant when we discuss methods of successful immersion within interactive systems. LeDiberder brothers (8) state that a characteristic of a simulation (a type of interactive system) is that they pay great attention to detail, we can see that within the aesthetics of recent computer games (the Playstation2, X Box, Game Cube) opposed to Net based practises, there is a move towards photo-reality and virtual reality, which for many is seen as a way to improve human sensations of presence and immersiveness(9). McCloud (10) holds a different opinion, he reflects on how the simple image enables us have "universal identification", rather than a specific reality.

"The cartoon is a vacuum into which our identity and awareness are pulled…an empty shell that we inhabit which enables us to travel in another realm" (p36). McCloud questions why we respond to the cartoon as much or more than a realistic image, and answers "amplification through simplification" (p30). Being human we can assign identities and emotion were none exist.

It seems short-sighted to see the aesthetics of interactive media as being best when photo - realistic or textual, we should open our minds (like we do allowing non-real and real "rules of behaviour") to mixed realities, when metaphor, icon and symbol are all employed, worlds somewhere between stylised, abstract and photographic.

McCloud gives an example,"In some comics the split is far more pronounced, the Belgian 'clear – line' style of Herges TinTin combines very iconic characters with unusually realistic background, this combination allows readers to mask themselves in a character and safely enter a sensually stimulating world."(p43) (11)

I believe that the popular form of comics and their moving image sibling – cartoons, have much to give to the development of educational interactive media. Firstly they are ubiquitous, they permeate both our childhood and adult lives - shows such as The Simpson's, Sugar Puff Girls and Ren-n-Stimpy (12), have attracted child and adult intellectual enquiry alike.

Secondly the graphic / drawn nature of the comic and cartoon inevitably add an emotional association. Like many other new media practioners I have nostalgic and fond memories of the crude hand-drawn cartoons of the 1980's(12). This reductive, simple and basic quality was also seen within the early and now

vintage computer games era (12). This human crafted element again helps to generate a sense of attachment and imagination, for often within state of the art games or 3-D rendered landscapes the lack of human mark/trace may seem daunting to a new user. I also suspect that there is something within the on-screen mark making that can promote an emotional attachment that computer generated polygons do not.

An important stylistic trait of the comic is the boldly inked line style. This strong graphicness can simultaneously make both simple recognisable shapes, normally in the portrayal of characters, and complex total images as shapes overlap or evolve.

"Mastery of any medium using minimal elements has long been considered a noble aspiration. The Art of comics is a subtractive art as it is additive and finding the balance between too much and too little is crucial to comics creators the world over." (p83) (10)

I am not advocating that the popular media usurp literary or classical media in the classroom, though I do believe in the crossover. Graphic artists such as Chris Ware (12), Daniel Clownes (12), Kelly Keda (12) and Marjane Satrapi (12) are in my opinion doing precisely this, deceiving us with simple imagery and then presenting us with sophisticated notions of what it is to exist within modern social structures. Rather the angle I would take is to highlight the popular practices, which simultaneously look alluring, familiar and easy to understand by the virtue of their associated cultural mode of communicating (mass and through television and print) but have a potential depth within their narrative or visual content. I believe such practices when used within new media technologies can produce an exciting experience both for the user, and the creator (see section 4 for examples).

## Section: 4 Some Examples of Practice

(13) http://waxebb.com/donna/parta.htm

## Section: 5 Proactive

What is it to make - to make an artefact or to make a choice?

The act of creation is widely acknowledged as an intrinsic part of our society.

Online media, or in general any rule based system offers the audience an opportunity to be proactive, to uncover and explore what it is to exist, as an individual or as part of a larger group within a set of rules. Such abilities are intrinsically rewarding. The onscreen interactive exchange has yet to become standardized, expectations from the user can still be either rewarded, thwarted or played with.

In freelance / not for profit interactive practice each entity is often a unique setting, system and ideology. This situation encourages a collaborative co-explorer relationship between student and tutor. Powerful, positive feelings are often felt when the student successfully unlocks or starts to make confident unguided decisions within the system. An onscreen action (then) re action can still be a surprise, a shock and a joy. In more advanced classes the post experiential discussions can be worked to help develop self-found opinions on social politics, hegemonies and stereotypes.

To create and design such content, we must first observe, take note, reflect on, rework, subvert, extend, reduce or add to a set of rules as your imagination sees fit. The issue of visualising and developing a high interest onscreen environment is a substantial task. Understanding the rules at play, the invisible nature of our intuitions and possibly how they come to be formed, enables a confidence building perspective. By knowing what it is to make the system (even theoretically), how to render/represent a voice, we can gain not only a different perspective towards other practioners work but also an ability to see under the skin of the work. Developing ones creativity enables us to appreciate a failed design, and also builds a sense of confidence to explore and challenge. A non-passive role can hopefully be used within the student's educational and professional life alike.

## Section: 6 Conclusions

Building visual and text based literacy skills can be a meaningful experience at any stage of our development. Learning can give you a sense of independence and confidence. The shift from texts that can be read and interpreted to visual texts that can be explored or constructed has happened. As Espen Aarseth discussed, master tropes of aporia and epiphany (14) control the progress and rhythm of the user's investigation. Through the student's own investigation a

unique sense of how expectancies are formed can be felt. The prescribed ideas at the beginning, the revised ones as you test your expectations and have them disproved, continually loop through the entire experience. Emotions such as the joy of an unexpected surprise, fulfilment when unlocking and exploring hidden paths, as well as onscreen play sensations, and a general wonder about characterisations can all be experienced within interactive structures.

Within interactive media a distinctive (not experienced in other media) feeling of continual aporia can be felt, a feeling of confusion, this links to Stuart Moulthrop's Interstitial ideology (15). But through the mutual confusion, after all in this teaching framework, both student and tutor sense this traditionally negative emotion, through their discussion hopefully an appreciation can be found for the interpretative space left by unresolved meaning, in this space they can hear their own interpretative voice, as this is often the authors hard coded intent.

In conclusion I would like to see this paper as a call to participate, to educators to test the experiences (simultaneously from yours and the students perspective) of one to one and group dialogue discussing the experiences and possible meanings in these interactive case studies. To practioners I say consider the aesthetic of the clear graphic line as a vehicle to present high interest / low vocabulary visual worlds.

# Cheating Can be Good For You: Educational Games and Multiple Play Styles

*Mia Consalvo*

A couple years ago I bought the SquareSoft game Threads of Fate (2000) because I had always enjoyed the Final Fantasy line of games. Threads offered players the opportunity to play as either a boy or girl main character (a rarity for Square) and follow the storyline through each perspective. The game was an action-RPG, and I had mainly confined myself to turn-based RPGs until that time. I jumped into the role of "Mint," quickly got engrossed in the storyline, and had fun learning various attack combos. After about 10 hours of play, however, I hit a wall. During a mini-boss battle I figured out (after laborious trial and error), what I needed to do to defeat the boss, but I could not physically get my avatar to do so, not being very adept at platform-style moves. After several hours of frustration, I threw the game down, and never returned to it. I did a half-hearted Internet search to see if there were cheat codes available to make the battle easier or get past it, but couldn't find any. The game sits unfinished in my game library.

After interviewing dozens of game players about their play styles and interests, I know I'm not alone in such 'failures.' The reasons for failing to finish a game can vary: some games are too difficult, or too easy (losing their challenge), while others come to a point where players cannot figure out the next logical action. Others have a storyline or action that failed to hold player interest. Whatever the reason, the games at one time commanded attention, but then stopped being enjoyable and thus play ended.

Of course gamers complete many other games, and perhaps replay some of those games because of consistent levels of enjoyment. But even in those games, there may have been times when players got stuck, got bored, or were mystified about the next steps. Yet here, players managed to find a walkthrough or strategy guide with hints towards the next objective or a guide with step-by-step actions for solving a certain puzzle. Maybe there was a valuable code to get past a particularly sticky point, or that unlocked more enjoyment from the game, after an initial play-through.

What those experiences point to, both positive and negative, is the need for help and guidance when individuals play games. Without help at a critical

point, a game may come to an abrupt halt. When the consequence is less enjoyment of an entertainment-based game, the result is unfortunate, but for an educational game, it means the end of learning.

## Cheating and game playing

Cheating is one of those terms that seem to be very easy to define, but the term quickly turns slippery. In a specific context, poised with a yes or no question (is copying off another student's test cheating? Is buying 'gil' off the Internet for use in a game cheating?), most people will take a position on which actions constitute cheating and which do not, even if they do not agree with others. Yet, how does this extrapolate into general terms? Who gets to decide what cheating is—the cheater or the cheated, or a third party? If you don't 'hurt' anyone but yourself, are you cheating?

Barton Bowyer argues that cheating "is the advantageous distortion of perceived reality. The advantage falls to the cheater because the cheated person misperceives what is assumed to be the real world" (47). So the cheater is taking advantage, of a person, a situation, or both. Cheating in this definition also involves "distortion of perceived reality" or what others call "deception." Deception can involve hiding the "true" reality, or "showing" reality in a way intended to deceive others.

Players of digital games have the options of following the rules, overtly refusing to abide by the rules, or secretly not abiding by the rules (although appearing to do so), and thus cheating. Different outcomes occur in each situation, and Johann Huizinga argues that we attach different meanings, and different penalties, to each of the latter. He states:

"The player who trespasses against the rules or ignores them is a 'spoil-sport.' The spoil-sport is not the same as the false player, the cheat; for the latter pretends to be playing the game and, on the face of it, still acknowledges the magic circle. It is curious to note how much more lenient society is to the cheat than to the spoil-sport. This is because the spoil-sport shatters the play itself… he robs the play of its illusion" (11).

The idea that the spoil-sport is somehow worse than the cheater is echoed in Bowyer's accounting of cheating in history, as he argues that cheating is a "normal" part of society or culture, present in most aspects of life. It begins early:

"all the way from Peek-a-boo to their card game of Cheat, children learn the principles of cheating" (300), and pervades our world "to be is to be cheated" (428). Bowyer also agrees that cheating is transgressive, and alters the game being played to give power to the cheater: "to cheat, not to play the game that reflected the norm, indicated that there was another world, the world of deception, in which people did not play the game, your game, but their own" (300-301).

According to past thought on the practice of cheating, then, the pursuit has a negative connotation—both in real life activities as well as in game playing. Yet when players are questioned about what the term means, different meanings emerge. Most abstract definitions given by players center on the idea of an 'unfair advantage in gameplay.' Cheating is seen as something outside the bounds of fair play, even if it is technically legal or allowable within the game. However, when pressed to identify specific practices that constitute cheating, interesting divergences in answers occur.

One central difference is between single-play and multi-play experiences. A large number of players believe that cheating can only occur between people—'you can't cheat a computer' was a common response in my research into cheating behaviors. For a person to cheat, another player, or a group of other people, had to be either disadvantaged, or lacking access to (or awareness of) specific objects, abilities, or actions that could help a person 'get ahead' in the game.

For another group, cheating could include cheating against other players, but also against technology—the console, computer, or related hardware—even in a single-player game. For this group, cheating in single-player games centered on 'cheating oneself' out of a particular type of experience. It meant ruining the surprise of what came next, or the sense of accomplishment earned from solving a puzzle all alone, or beating a boss after a tough battle.

But no matter how individuals defined cheating, many engaged in those actions—either occasionally or with regularity. Because of the negative connotation associated with cheating, justifications for the practice were frequently offered. So why do they cheat, if it has such an off-putting undertone to it?

They cheat for many reasons. And these reasons can help us understand the gameplay process for different people, in different locations, at different times and in different contexts. That's because cheating isn't just about subverting the (game) system—it's also about augmenting the system. It's a way for individuals to keep playing:

• through boredom;
• through difficulty;
• through limited scenarios;
• and through rough patches or just bad games.

Cheating, or however these activities might be differently defined, constitutes players asserting agency, taking control of their game experience. It is players going beyond the 'expected' activity' in the game. Knowledge of how, when, and why people cheat (or refuse to) can help us improve the gameplay experience. So what is this cheating, why does it occur, and how can we use this knowledge in a beneficial way?

## Giving aid

Players want to play the game. They want to 'have fun,' but more importantly, they want to succeed. Success comes through advancement, achievement of goals, increasingly interesting and challenging environments, and firm control of elements within the game. Yet games do not always offer players equal chances at success—the players may have different skill levels, be in a bad mood that day, or the game may simply be poorly designed. Yet even with these challenges, game players try to play the game, and elements of cheating practices can help players get through certain spots, and still attain larger goals.

In interviews with game players, one of the most common reasons for using walkthroughs or tips from online sites is 'getting stuck' in a game and being unable to progress any further. Players often view this situation as an unfortunate event—they would like to be able to progress in the game on their own, but admit that at times their skill is not at the level of the gameplay, or more frequently, the game does not provide clear instructions about the next logical steps to take.

These situations, common in entertainment-themed games, should be expected and planned for in educational games as well. Although there has been a significant amount of analysis of educational games and their helpfulness in learning (a short list of early research could include sources such as Coleman, 1989; Hsu, 1989; Hughes, 1981; Liedtke, 1980; Salend, 1979; Shubik, 1989; and Winner & McClung, 1981), practically no attention has been paid to peripheral products or aids that might help players complete or succeed in these games. Items such as walkthroughs or basic strategy guides could help players,

especially those not familiar with game playing or with a particular genre of game, succeed in learning the structural aspects of the game, and then focus more deeply on its content.

But wouldn't this be 'cheating?' Perhaps, if the player ends up using the walkthrough as a hand-holding device and does not attempt any original input into the game. However, the historical use of strategy guides, and their construction, works against that type of use. From their beginnings, guides have urged readers to use them 'as a last resort' and to look for 'only the part you need' and then put the guide down and get back to the game. From guides for Myst in the early 1990s to more recent walkthroughs for the Final Fantasy series, guide authors understand that over-reliance on a guide actually decreases the fun involved in gameplay. Likewise, with educational games, overuse of a guide or walkthrough would destroy the 'game' part of the learning experience, leaving a simplified direction set to follow.

At their best, guides and walkthroughs designed for educational games might be along the lines of the Universal Hint System (found online at www.uhs-hints.com), which gives players hints that start from the very general and progress to the very specific, one at a time, to help them solve puzzles and solutions on their own and not spoil progress in the rest of the game. Such systems would allow players that are unsure of an answer, or a next move, to get a little bit of help without breaking the illusion of the game. Such a system also allows players at different skill sets, in both educational content and game skill, to play the same game. Repeated play can allow those that had initially rocky starts to go past the formerly troublesome spots unaided.

## Cheat codes: the next step?

Another activity related to game play that players engage in is the use of cheat codes, either entered in via a controller, the keyboard on a PC, or through a device such as a Game Shark. Such codes allow players various things—god-like abilities such as full health or unlimited money or ammunition; the ability to go to any section of the game desired; and fun additions to the game such as bobble-heads for avatars or bicycles in a driving game.

Players use these codes for some of the reasons mentioned above (getting stuck, being unable to perform a specific move or action), as well as for others. A code can help a player get past a difficult enemy or puzzle that has caused them

substantial frustration. It can also provide new content to explore in a game, either for a player that has already finished the game, or who is bored or tired with the game 'as it is' and might wish for different experiences without having to progress in a linear fashion (or through advancement of any sort) through the game.

These uses can also be integrated into the playing of educational games. Codes would allow players that are interested in content, but not as skilled in a particular genre, to get past difficult skill-based portions of the game to access additional levels/parts/areas. They would also give players that had completed the game once access to new areas to explore, or the ability to jump to any area instantly, in order to review or replay those portions. That would allow more experienced players greater control over their experience, and the ability to replay aspects of the game of interest (or need). It would also reward players for playing the game well—codes could be awarded based on certain achievements or benchmarks in the game, or they could be released to all players after a certain period of time.

Another interesting use of the codes might be discussion of their use as an ethics-based case study. Players could discuss the advantages and pitfalls of 'cheating' and their beliefs in such activities. I have found that players have varying views on the uses of such codes, with some believing codes to be cheating (and refusing to use them) while others see them as an acceptable part of gameplay. Having such discussions would lead players to clarify their own ethical stances, and determine how their actions accord (or don't) with their stated beliefs.

## If the game cheats for you, is it still cheating?

If we wanted to disallow players the option of adding in codes to make gameplay better or more rewarding, but still give help to less skilled players, another option is adding "auto-dynamic difficulty" (ADD) to the coding of the game (Miller, 2004). Scott Miller, a game designer, argues that when players encounter huge difficulties in games, it is the fault of the designer, rather than the player. He proposes adding code to games that would let the game 'auto-adjust' to a player's level of achievement. If such a system had been in place in Threads of Fate, for example, the game would have recognized that I had died "x" number of times in a specific battle, and would then have made that battle slightly easier for me to complete (and then perhaps more and more easy if I kept dying), or would have slowed my damage rate to keep me going longer.

Such systems would give the player subtle nudges towards success. Alternately, if a whiz at platform games picked up the game, it would become more difficult for that person.

Such a system has the advantage of allowing designers the authority to determine how much or how little help players should receive. It also creates a better system for the stronger game player, who might find such games consistently designed for more novice gamers. However, it also has drawbacks. Players don't get to decide how much help they 'need' and the system might still not be adequately designed to anticipate every kind of player. Further, designer/educators would need to decide in advance what the primary objectives are of gameplay—if it involves learning a particular skill, or set of content, then allowing a game to adjust would not give everyone the same experience, and would not guarantee that all learning objectives had been reached. ADD is another potential tool, but one that requires more technical planning, and very careful consideration of its implementation.

## Multi-play and cheating: Punishment of other players

Most players, if willing to cheat in a single player game, adamantly oppose the idea of cheating when there is more than one player involved. Perhaps the only exception is if everyone is cheating, and everyone knows about it. However, overall, it seems that cheating should be disallowed in games with more than one player, unless the play is cooperative, rather than competitive. An interesting idea, though, might be to allow all players access to walkthroughs and guides, even in competitive games, as these might help games from ending prematurely if all players are unable to progress. However, if players do manage to find ways to 'cheat' that are unauthorized by the game/educator, determining ways to sanction offenders is likely to be an important part of establishing gameplay and its rules and keeping the game going successfully.

In past experiments it has been proven that if players do not have the ability to punish those caught cheating (or suspected of cheating) then group cohesiveness disappears, and the gameplay experience will suffer (Fehr & Gächter, 2002). Various options include the ability to 'call out' and blacklist cheating players, as well as giving players options within games to punish offenders, including fining them, limiting their progress temporarily, or perhaps forcing them to start over in the game as a new character. As Fehr & Gächter have shown, allowing individuals in a group the ability to 'punish' those that

have transgressed the rules can be a way to incorporate cheating practices into a game and co-opt them, rather than letting them halt or destroy the game. Again here, such practices can also lead to further educational moments, as players negotiate how to deal with transgressors appropriately. It also allows players another level of agency or activity in the game, rather than forcing them into the role of 'passive victim of the cheat.'

## Evaluation

Finally, players can complete the circle and enter the production of game-related materials by producing guides, walkthroughs, FAQs or other devices on their own. Such activities can allow educators (as well as players themselves) to see how well individuals have played the game, in that players must be able to recount or explain levels, actions, and other abilities in great detail. This can serve as an evaluation of what is learned through gameplay, on both micro and macro levels. Additionally, the creation of such guides can help serve future players of the game—giving the activity relevance beyond a basic (and isolated) 'test of knowledge.' Players can also help in refining aspects of the game that are difficult or troublesome, buggy or just poorly designed.

## Conclusion

These are preliminary ideas for how players' difficulties as well as play styles can be better served in educational games. Until now, there has been no attention placed on how educational games might need out-of-game materials, or elements that could later be incorporated into the games, to help players in keeping the game going, in learning more, and in adding new, fun, as well as education material into a game. Players want to do well at games, sometimes in spite of the game's very design. We must pay attention to FAQs, walkthroughs, codes, and player-created behavioral rules as critical parts of the gameplay of all games, and especially those where we wish players to take away more than just 'satisfaction'—where education is a primary goal.

# Procedural Literacy: Educating the New Media Practitioner

*Michael Mateas*

For humanities scholars, artists and designers, computer programming can seem a narrow technical skill, a mere familiarity with the latest fads and facility with the latest jargon of the computer industry. In this view, programming has almost no connection with theoretical and philosophical considerations, with concept and aesthetics, with a design focus on human action and interpretation. This attitude is often adopted by new media scholars and practitioners, including game designers and game studies scholars, who may assume that the "mere" technical details of code can be safely bracketed out of the consideration of the artifact. In this paper I argue that, contrary to this view, procedural literacy, of which programming is a part, is critically important for new media scholars and practitioners, that its opposite, procedurally illiteracy, leaves one fundamentally unable to grapple with the essence of computational media. In fact, one can argue that procedural literacy is a fundamental competence for everyone, required full participation in contemporary society, that believing only programmers (people who make a living at it) should be procedurally literate is like believing only published authors need to learn how to read and write; here I will restrict myself to the case of new media scholars and practitioners.

By procedural literacy I mean the ability to read and write processes, to engage procedural representation and aesthetics, to understand the interplay between the culturally-embedded practices of human meaning-making and technically-mediated processes. With appropriate programming, a computer can embody any conceivable process; code is the most versatile, general process language ever created. Hence, the craft skill of programming is a fundamental component of procedural literacy, though it is not the details of any particular programming language that matters, but rather the more general tropes and structures that cut across all languages.

Without an understanding of how code operates as an expressive medium, new media scholars are forced to treat the operation of the media artifacts they study as a black box, losing the crucial relationship between authorship, code, and audience reception. Code is a kind of writing; just as literary scholars wouldn't dream of reading translated glosses of work instead of reading the full work in its original language, so new media scholars must read code, not just

at the simple level of primitive operations and control flow, but at the level of the procedural rhetoric, aesthetics and poetics encoded in a work.

Procedurally illiterate new media practitioners are confined to producing those interactive systems that happen to be easy to produce within existing authoring tools. Even those practitioners who don't themselves write much code will find themselves on interdisciplinary collaborative teams of artists, designers and programmers. Such collaborations are often doomed to failure because of the inability to communicate across the cultural divide between the artists and programmers. Only practitioners who combine procedural literacy with a conceptual and historical grounding in art and design can bridge this gap and enable true collaboration.

A number of current intellectual movements highlight the need for humanistic procedural literacy. In game studies there is a growing understanding that much of the meaning of a digital game, including the gameplay, and the rhetoric and ideology of the game, are encoded in the procedural rules. The nascent field of software studies has begun to explicitly explore code, and how code functions within culture. And of course for interactive art and design, procedurality lies at the heart of the meaning of interactive artifacts. New media artists, game designers and theorists, media and software studies theorists, and generally anyone involved in cultural production on, in or around a computer, should know how to read, write and think about programs.

Games, and more generally interactive art and entertainment, can play a crucial role in the education of the procedurally literate theorist and practitioner. Bridging the worlds of game education and educational games, students can construct procedural, interactive experiences, informed by theoretical readings and the study of successful procedural artifacts, as a means of gaining procedural literacy. Whether the student will go on to become a theorist in new media or software studies, a game designer, or a new media artist, the procedural literacy gained through the study and construction of games and other procedurally expressive artifacts will enable her to successfully grapple with the expressive power of computation. The rest of this paper looks at one of the earliest historical calls for universal procedural literacy, explores how games can serve as an ideal object around which to organize a procedural literacy curriculum, and describes a graduate course I've developed, Computation as an Expressive Medium, designed to be a first course in procedural literacy for new media practitioners.

## Procedural Literacy: A (Very) Brief History

There are a number of contemporary educational projects organized around the notion of procedural literacy. Flanagan and Perlin have begun the Rapunzel project, an agent-based programming environment intended to appeal to middle school girls, precisely at an age when many girls, for a variety of social and cultural reasons, start loosing interest in math and science (Flanagan & Perlin). Guzdial has developed a university freshmen media computation course that introduces computer science from the perspective of manipulating media objects such as still images, sound and video. His course is designed to address the high withdraw-or-failure rates in introductory computer science courses, particularly among women (Guzdial 2003). Maeda's Computational Aesthetics group at The Media Lab has developed a number of programming environments intended to facilitate visually oriented designers and artists in learning to program, including Design By Numbers (Maeda 1999) and Processing (Fry & Reas). In my own educational work, I'm developing courses on "programming for artists" for the Georgia Institute of Technology's undergraduate and graduate courses in computational media (I describe the graduate course, Computation as an Expressive Medium, in more detail below).

This recent work builds on a long tradition of work on universal procedural literacy: Papert's work teaching children to program in Logo, described in the 1980 book Mindstorms (Papert 1980), Kay and Goldberg's work on procedural environments in which everyone, including children, can build their own simulations, described in the 1977 paper Personal Dynamic Media (Kay & Goldberg 1977), and Ted Nelson crying in the wilderness that "you can and must understand computers NOW" in his 1974 Computer Lib/Dream Machines (Nelson 1987). However, the earliest argument I've seen for universal procedural literacy, pointed out to me by Guzdial (Guzdial & Soloway 2003), is one given by A.J. Perlis in a talk at a symposium held in 1961 to celebrate the 100th anniversary of M.I.T., and published in the collection Management and the Computer of the Future (Greenberger 1962). The symposium consisted of 8 talks, with two discussants responding to each talk, and was attended by such luminaries as C. P. Snow, J. W. Forrester, Herb Simon, J. McCarthy, and A. J. Perlis. Perlis' talk, The Computer in the University, focused on the role the computer should play in a university education. Perlis' argument is worth reviewing in some depth, as he accurately identified a number of issues and concerns that are still with us today.

Perlis begins by describing current common uses of the computer in university settings, primarily for numerical analysis. He notes that most university

computer use is characterized by "…extensions of previously used methods to computers; and they are accomplished by people already well trained in their field who have received most of their training without computer contact" (p. 186). He notes that most students learn to use computers in relatively haphazard ways, either driven by the need of some particular application, or in the context of a numerical analysis course that is primarily focused on teaching numerical methods, or on their own, or in a course that teaches some particular programming language. None of these approaches focus on the teaching of computation per se. In describing the programming language approach, for example, he writes:

"A credit course involving the use of some automatic programming language is provided. Fluency in 'conversation' with this language and clear understanding of the language's grammar are the intent of such a course. Here, too, the approach suffers from limited and even misguided pedagogic objectives; and the result is a student well conversant in, say, Algol 60, but still very likely uneducated as to the scope of computation." (p. 187)

Note that this approach is similar to the way computing is currently taught in media arts programs, primarily as a black box tool (substitute Photoshop, Director and Flash for Algol 60) rather than as a process-based medium with its own unique conceptual possibilities. The procedural literacy revolution has really been more of a slow evolution. Certainly more people are able to control their computers in more ways now than they could 43 years ago. Scripting environments such as Flash or Director, VB, and back in the 1980's, Hypercard, enable more people to engage in some degree of procedural authorship. But all of these special purpose environments come at the price of obscuring the full expressive potential of computation. The next stage of procedural literacy is learning to navigate the huge tower of abstraction that exists in any computer system, with each layer defining its own little process universe, and with all layers, including the programming languages themselves, contingent human-authored artifacts, each carrying the meanings, assumptions, and biases of their authors, each offering a particular set of affordances.

Perlis goes on to describe that the purpose of a university education, regardless of the particular field of study, is to help students develop an intuition for which problems and ideas are important or relevant (a cultural grounding for knowledge, "sensitivity… a feeling for the meaning and relevance of facts" (p. 188)), to teach students how to think about and communicate models, structures and ideas ("…fluency in the definition, manipulation, and communication of convenient structures, experience and ability in choosing representa-

tions for the study of models, and self-assurance in the ability to work with large systems…" (p. 188)) and to teach students how to educate themselves by tapping the huge cultural reserves of knowledge ("…gaining access to a catalog of facts and problems that give meaning and physical reference to each man's [sic] concept of, and role in, society." (p. 188)). During the talk he argues that the computer plays a critical role in at least the last two areas, and, during the discussion period, agrees that computers play a critical role in the development of intuition and sensitivity as well. Thus, for Perlis, procedural literacy lies at the heart of the fundamental aims of a university education. Consequently, he argues that all students should make contact with computers at the earliest time possible: the student's freshman year. For 1961 this is a radical proposal: all students, engineering and liberal arts students alike, should have a two semester computer science sequence in their freshman year, this at a time when computers were still rare, esoteric monsters. Even today, with the relative ubiquity of computers, most universities do not have such a requirement in place.

Admitting that the optimum content for such a course is not yet known (and, 43 years later, is still not known), he goes on to describe a two term course then being developed at Carnegie Tech (now Carnegie Mellon).

"During the first term the students wrote programs in a symbolic machine code, the Carnegie TASS system; and during the current term they are writing their codes in GATE, the Carnegie Algebraic Language system. Coding in machine language, they are taught mechanical algorithms of code analysis that enable them to do manually what the GATE translator does automatically. In particular, they are becoming adept in decoding complex logical relations to produce branching codes and in manual decoding of complex formula evaluations by mechanical processes. The intent is to reveal, through these examples, how analysis of some intuitively performed human tasks leads to mechanical algorithms accomplishable by a machine." (p. 189)

Notice that in this early course there's a focus not on particular languages or tools, but on how the computer can be transformed into any language or tool; computation is treated as a universal representational medium for describing structure and process. Achieving this level of procedural literacy for new media practitioners is a huge challenge; we don't want to simply teach specific tools or programming environments, but a general competence in computation as the medium for representing structure and process. Ideally, as in this early Carnegie Tech course, students would understand that even programming languages are just tools, that the space of computation is bigger than the particular view of it embodied (enforced) by any particular programming model (e.g. the se-

quential model of languages like C++ or Java, the eval-apply loop of languages like Lisp and ML, the search and unification process of languages like Prolog, etc.). While teaching machine code and having students write their own assembler in machine code is probably not the way to teach these concepts to new media practitioners, we need to find a way to get them across somehow.

Several respondents commented on Perlis' talk, including Peter Elias and J. C. R. Licklider. Elias disagrees with the fundamental importance of programming:

"Perhaps our most serious difference is in predicting the ultimate state of affairs when time-shared computers are available on every campus and good symbolic processing languages are in use. By that stage it sounds to me as though Perlis would have programming assume a large role in the curriculum, while I should hope that it would have disappeared from the curricula of all but a moderate group of specialists." "I have a feeling that if over the next ten years we train a third of our undergraduates at M.I.T. in programming, this will generate enough worthwhile languages for us to be able to stop, and that succeeding undergraduates will face the console with such a natural keyboard and such a natural language that there will be very little left, if anything, to the teaching of programming… "I think that if we stop short of that, if it continues to demand as much effort to learn how to speak to machines as it costs us to teach students a course for a couple of semesters, then we have failed. I do not see anything built into the situation which requires as much as that." (p. 203)

Elias desires the development of frictionless tools that, like the computers on Star Trek, allow us to make the computer do our bidding wit h little work (e.g. "Computer, gather data on the anomaly, correlate it with all known space phenomena, and suggest a course of action." Computer: "Done"). The problem with this vision is that programming is really about describing processes, describing complex flows of cause and effect, and given that it takes work to describe processes, programming will always involve work, never achieving this frictionless ideal. Any tools that reduce the friction for a certain class of programs, will dramatically increase the friction for other classes of programs. Thus, programming tools for artists, such as Flash, make a certain style of interactive animation easy to produce, while making other classes of programs difficult to impossible to produce. Every tool carries with it a specific worldview, opening one space of possibilities while closing off others. A procedurally literate practitioner will still make use of specific tools for specific projects, but will be aware of the constraints of specific tools, will be capable of considering

a space of computational possibility larger than any specific tool.

Licklider responds:

"Pete [Elias], I think the first apes who tried to talk with one another decided that learning language was a dreadful bore. They hoped that a few apes would work the thing out so the rest could avoid the bother. But some people write poetry in the language we speak. Perhaps better poetry will be written in the language of digital computers of the future than has ever been written in English." (p. 204)

What I like about this is the recognition that computer languages are expressive languages; programming is a medium. Asking that programming should become so "natural" as to require no special training is like asking that reading and writing should become so natural that they require no special training. Expressing ideas takes work; regardless of the programming language used (and the model of computation implicit in that programming language), leaning how to express oneself in code will always take work.

In Perlis' response he clarifies his argument as to the central importance of procedural literacy:

"Perhaps I may have been misunderstood as to the purpose of my proposed first course in programming. It is not to teach people how to program a specific computer, nor is it to teach some new languages. The purpose of a course in programming is to teach people how to construct and analyze processes. I know of no course that the student gets in his first year in a university that has this as its sole purpose." "This, to me, is the whole importance of a course in programming. It is a simulation. The point is not to teach the students how to use Algol, or how to program the 704. These are of little direct value. The point is to make the students construct complex processes out of simple ones (and this is always present in programming), in the hope that the basic concepts and abilities will rub off. A properly designed programming course will develop these abilities better than any other course." (p. 206)

Here Perlis makes it clear that programming is a medium, in fact the medium peculiarly suited for describing processes, and as such, a fundamental component of cultural literacy, and a fundamental skill required of new media practitioners and theorists.

## Procedural Literacy and Games

OK, assuming at this point that we agree that new media folk should be procedurally literate, how should we achieve this literacy? Just throwing new media students into introductory CS courses is inappropriate. Such courses tend to focus on abstract features of computation, such as recursion, environments, scope, and so forth, without relating them to the design and analysis of digital media. The examples used in such courses tend to focus on engineering, mathematical and business applications (e.g. teaching recursion using the Fibonacci sequence, teaching functional abstraction using examples from physics, teaching object-oriented design using simple database-like models of people with attributes such as name and age). And the culture of such courses, the implicit background against which the material is taught, tends to be the technophilic culture of the adolescent male geek, emphasizing narrow technical mastery disconnected from broader social and cultural issues. In addition to not emphasizing computation as a medium, the culture and assumed student background of such courses tend to alienate the new media student, further emphasizing the "two-cultures" divide, the gap between engineering/science and art/humanities that is precisely the gap we're trying to close.

It is important not to view computation for new media students as a dumbed-down version of the traditional computer science courses. Teaching programming for artists and humanists shouldn't merely be simplified computer science with lots of visually engaging examples, but rather an alternative CS curriculum. Traditional CS courses tend to emphasize programming as a kind of reified mathematics, emphasizing mathematical abstractions and formal systems. For new media students we need to emphasize that, while programming does have its abstract aspects, it also has the properties of a concrete craft practice. In a practice that feels like a combination of writing and mechanical tinkering, programmers build elaborate Rube Goldberg machines. In fact, the expressive power of computation lies precisely in the fact that, for any crazy contraption you can describe in detail, you can turn the computer into that contraption. What makes programming hard is the extreme attention to detail required to realize the contraption. A "loose idea" is not enough - it must be fully described in great detail before it will run on a computer. A New Media introduction to CS should be a difficult course, with the challenge lying not in programming conceived of as applied mathematics, but in connecting new media theory and history with the concrete craft practice of learning to read and write complex mechanical processes.

Games can serve as an ideal object around which to organize a new media in-

troduction to CS. Games immediately force a focus on procedurality; a game defines a procedural world responsive to player interaction. Additionally, unlike other procedurally intensive programs such as image manipulation tools or CAD systems, games force a simultaneous focus on simulation and audience reception. A game author must build a dynamic, real-time simulation world such that, as the player interacts in the world, they have the experience desired by the author. Unlike the design of other software artifacts that minimize the authorial voice, maintaining an illusion of neutrality, games foreground the procedural expression of authorial intentionality in an algorithmic potential space. Of course other kinds of software, such as image manipulation tools and network protocols, are not truly neutral, but rather can be unpacked in order to read the mark of the author, her implicit world view and ideology. But students may best understand computation as a procedural medium by starting with a software form, such as games, which makes this explicit.

Rather than using the computer as a playback device for more traditional media assets such as sound and still and moving imagery, games are a native computational form; code defines the game's response to player interaction. To describe the relationship between computation and media assets, Chris Crawford introduced the term process intensity (Crawford 1987). Process intensity is the "crunch per bit", the ratio of computation to the size of the media assets being manipulated by the system. If a game (or any interactive software) primarily triggers media playback in response to interaction, it has low process intensity. The code is doing very little work - it's just shoveling bits from the hard drive or CD-ROM to the screen and speakers. As a game (or any interactive software) manipulates and combines media assets, its process intensity increases. Algorithmically generated images and sound that make no use of assets produced offline have maximum process intensity. Process intensity is directly related to richness of interactivity. As process intensity decreases, the author must produce a greater number of offline assets (e.g. pre-rendered animations or video) to respond to the different possible interactions. As the number of offline assets required to maintain the same level of interactivity tends to increase exponentially as process intensity decreases, in general decreases in process intensity result in decreases in the richness of interactivity. Games such as Dragon's Lair that structure interaction primarily through media playback rather than procedurality are the exceptions that prove the rule. After a brief popularity driven by their graphic richness relative to contemporaneous games, such video playback games disappeared from the gaming landscape.

As described at the beginning of this article, procedural literacy is not just the craft skill of programming, but includes knowing how to read and analyze

computational artifacts. Because the procedural structure of games is the essence of the game medium (not mere "technical detail"), teaching procedural literacy through the creation of games is not intended merely as training for future game programmers, but as a process intensive training ground for anyone interested in computation as a medium. The fundamentally procedural nature of games can be seen by looking at the two sources of activity within a game: game AI and game physics (Mateas 2003). Game AI is a concerned with "intelligent" behavior, that is, behavior that the player can read as being produced by an intelligence with its own desires, behavior that seems to respond to the player's actions at a level connected to the meaning of the player's actions. Game AI produces the part of a game's behavior that players can best understand by "reading" the behavior as if it results from the pursuit of goals given some knowledge. Game physics deals with the "dead" part of the game, the purely mechanical, causal processes that don't operate at the level of intentionality and thus don't respond to player activity at the level of meaning. A complete analysis of a game requires unpacking the procedural rules behind the AI and physics. Squire's analysis in this issue of the boss Hulk Davidson in Viewtiful Joe is an example of a procedural analysis focused on the game AI.

To explore the distinction between game AI and game physics, consider a game that implements a nice water simulation. If the player throws objects in the water, they float or sink depending on their density. If a flow of water is obstructed, the water backs up or flows around the obstruction. When the player jumps into the water, they produce a satisfying splash. The water thus responds to player action – the water behaves differently depending on what the player does. The water simulation is part of the game physics, not the game AI, despite the fact that the water's response is beautiful and/or realistic and the simulation code is complex. In order to understand the water, the player doesn't have to read psychological motivations into the water. The water always behaves the same, doesn't act like it has its own goals or desires, and doesn't respond to the player's actions as if these actions had any particular meaning for it. Contrast this with the ghosts in Pacman. In order to make sense of the ghosts' behavior, the player projects goals onto the ghosts (e.g. "they want to get me", "they are running away from me") and interprets the ghost behavior in terms of these goals. The ghosts support a psychological, intentional interpretation of their behavior, which the water simulation does not, even though the code for the water simulation may be much more complex than the ghost code. Game AI lies at the intersection of player perception (the player is able to read part of the game behavior as alive) and the game code that supports this perception.

But in the case of both game AI and game physics, the game's response to play-

er interaction is process intensive, depending on algorithmic response rather than playback of media assets. Thus reading and writing games and game-like artifacts requires procedural literacy, making games an ideal artifact around which to organize a procedural literacy curriculum.

## Teaching Computation as an Expressive Medium

For the last two years at Georgia Tech I've taught the graduate course Computation as an Expressive Medium, a graduate-level practical and theoretical introduction to programming organized around the creation of game-like artifacts (the Fall 2004 syllabus can be seen at www.lcc.gatech.edu/~mateas/courses/LCC6317Fall2004/Syllabus.html). While one of the goals of the course can be described as "programming for artists", the course doesn't focus only on craft skills, but combines theoretical readings in New Media theory with a consideration of the affordances and possibilities of computational media; that is, it seeks to teach procedural literacy. For the readings I use The New Media Reader (Wardrip-Fruin & Montfort 2003), a nice collection of historically significant writings in both New Media and Computer Science. I consider this course a prototype of the game-centric approach to teaching procedural literacy that I describe above. While the course projects include games and game-like artifacts, they also include projects such as procedural manipulation of web pages. In all cases the projects require students to think about concept (What's interesting about their project? Why are they doing it?), audience reception (What experience and/or idea are you trying to convey? Can interactors figure out how to read and interact with the piece?) and programming.

Students come to the course from the master's program in Information Design and Technology, the Human-Computer Interaction master's program, and the Ph.D. program in Digital Media. One of the challenges in teaching the course is the diversity of backgrounds and programming experience students bring to the class; students come to the course with diverse backgrounds including psychology, fine arts, literary studies, graphic and industrial design, film studies, mathematics, computer science, physics and various engineering disciplines. Some students have never programmed before, even in scripting environments, while others have extensive programming experience. A simple way to reduce the diversity would be to excuse students with programming backgrounds from taking the course. However, I'm uncomfortable with doing this because the students with programming backgrounds are often unfamiliar with New Media theory and history and have not thought about programming in this context. Perhaps surprisingly, students with extensive programming backgrounds who have taken the course, including students with bachelor's degrees

in CS, have all described the course as rewarding. A number of them have said that in previous programming classes they only got to work on "boring" programs, and never had the chance to think about programming as a medium, nor to relate programming to New Media theory and history. This reaction supports the idea that procedural literacy is broader than programming competence, and requires a new curriculum.

There are six projects during the semester, each of which is designed to exercise new programming concepts, explore different issues in code-based art, and coordinate with readings from the New Media Reader. The six projects are:

• Display the progress of time in a non-traditional way. The goal of this project is to start students thinking about procedural generation of imagery as well as responsiveness to input, in this case both the system clock, and potentially, mouse input.

• Create your own drawing tool, emphasizing algorithmic generation/modification/manipulation. The students in this course have all had experience with tools such as Photoshop, Premier or Director. The goal of this project is to explore the notion of tool, how tools are not neutral, but rather bear the marks of the historical process of its creation, literally encoding the biases, dreams, and political realities of its creators, offering affordances for some interactions while making other interactions difficult or impossible to perform or even conceive. While the ability to program does not bring absolute freedom (you can never step outside of culture, and of course programming languages are themselves tools embedded in culture), it does open up a region of free play, allowing the artist to climb up and down the dizzying tower of abstraction and encode her own biases, dreams and political realities.

• Create a literary machine. Literary machines are potential literature, procedurally producing textual traces in response to interaction. Examples of literary machines include interactive fiction, nodal hypertexts, interactive poetry (often with animated typography), and chatterbots. For this project, the literary machine must include algorithmic elements, such as animated typography, generated text, or conditional responses as a function of the previous interaction trace. It must respond to external inputs (e.g. user interaction). With this project I want students to think about language and computation, including strategies for language generation, manipulation, and display (typographic manipulation).

• Create an applet that dynamically does something to one or more web pages

(e.g. collage, systematic distortion, re-layout, ironic superposition, etc.). Hypertext was conceived as a computer-aided form of reading and writing whose structure matches that of the human mind (a tangled web of association), thus enabling humans to make sense of the exponential growth of knowledge experienced in the 20th century. The World-Wide Web, while a rather anemic implementation of hypertext, makes up for these deficiencies by providing us a sneak preview of what it might be like to have a truly global repository of knowledge. But making sense of the world is not just a matter of structure, but of process, of the dynamic construction of meaning. With this project I want students to move away from a static, structure-based view of the web, to a process-based view. This project continues a concern with language (and juxtaposition of language and image) from the literary machine, but moves it into the web, to include link structure and dynamic parsing of web pages.

• Build a collection of Braitenberg vehicles that respond to each other, to objects in the environment, and to player interaction. Braitenberg vehicles (Braitenberg 1986) are a simple autonomous agent model in which sensors are directly connected to wheel-like actuators. Vehicles with different "personalities" can be built simply by manipulating the wiring of the vehicle, for example crossing sensor outputs and wheels (e.g. left sensor output goes to the right wheel), inverting sensor output and so forth. This project allows students to explore an artificial intelligence model of behavior, and how the complex, generative responses of AI systems can be harnessed for expressive purposes. As has already been discussed above, AI approaches are used extensively in games to build, for example, tactical and strategic opponents, non-player characters, and player modeling systems.

• Create a simple game. As a capstone project, students are encouraged to bring elements from previous projects into this one. Since students only have two weeks per project, the game should be a simple or "casual" game that is asset light (this also forces a focus on procedurality), easy to learn, but with gameplay depth that is revealed as you spend more time with the game.

Readings in the New Media Reader are coordinated with each of the projects. For example, while working on Project 2, the "create your own drawing tool" project, we read:

• Man-Computer Symbiosis, J.C.R. Licklider
• Sketchpad: A Man-Machine Graphical Communication Systems,
Ivan Sutherland
• Direct Manipulation: A Step Beyond Programming Languages,

Ben Schneiderman
• A Cyborg Manifesto, Donna Haraway
• The GNU Manifesto, Richard Stallman
• Happenings in the New York Scene, Allan Kaprow
• The Cut-Up Method of Brion Gysin, William S. Burroughs
• Six Selections by the Oulipo, Raymond Queneau, Jean Lescure, Claude Berge, Paul Forunel, Italo Calvino

Project 2 explores the idea of tool, how tools create new ways of relating to machines, how tools contain the dreams and biases of the designer and thus constrain as well as enable, and what it means to make your own custom tools. Project 2 also explores the tension between tools that support human creativity and tools that have their own autonomy. Thus, in Man-Computer Symbiosis, we look at the vision of the computer as an "AI research buddy" that collaborates with the user. In Sketchpad and Direct Manipulation we look at the vision of the graphical user interface as a transparent tool that leverages our ability to manipulate objects in the physical world. In the Cyborg Manifesto we look at how any tool is really composed of both technology and social practices surrounding technology, and how our subjectivities are defined by our tools. With The GNU Manifesto we explore what it means to truly own your tools, to be able to modify them in any way you want, and how procedural literacy is necessary to have this kind of control over your tools. Finally, in Happenings, The Cut-Up Method and Six Selections, we look at algorithmic generation via processes of recombination and constraint, preparing the way for both projects 2 and 3, which both explore the concept of autonomous generation.

One of the challenges with helping students to engage the readings is balancing the conceptual material with programming details. The urgency and anxiety some students feel with learning to program can make it difficult for them to focus on the readings. If significant mental energy is going into understanding class inheritance and event-based processing, it can be difficult for students to think about the historical origins of the graphical user interface and its relationship to cybernetic discourse while connecting this back to the nitty-gritty details of writing code.

Another goal of the readings is to introduce students to the styles of writing found in technical, critical theoretic and art discourse. Since being procedurally literate includes being able to unpack social and cultural assumptions of code (deep readings of code), to understand the relationship between creative expression and code, as well as being able to program, students must comfortable participating in a variety of discourses. For most students, one and some-

times two of the three genres of writing is new to them. Thus, just as there is variability in programming background, there is variability in people's abilities to read and discuss various genres of writing. Facilitating fruitful class discussions requires being able to situate each of the readings, providing the background necessary to allow the whole class to engage the readings and relate the readings to programming practice.

I used raw Java the first time I taught the course. One of the goals of the course is to introduce artists and designers to computation itself as a medium. Thus I don't want to teach the course within a scripting tool or programming environment that has been designed specifically for artists; such tools inevitably make a certain class of projects easy (e.g. web animation) at the expense of making other projects hard or impossible. Java, as a widely-used general purpose programming language for both stand-alone and web-based applications, with huge libraries of pre-written components freely available, allows students to experience the generality of programming and provides them with concrete skills they can use after the class. However, the overhead of using the standard Java classes for input/output, particularly the overhead of using the Swing library for graphical windows, turned out to be problematic. Before a student can open their first window and display something in it, they must become fairly fluent in object-oriented programming, as well as learn a rather complex class library (Swing) that even more experienced programmers sometimes have difficulty using. While students do learn object-oriented programming in this class, the complexities of Swing forced sophisticated object-oriented concepts too early in the course, and resulted in students only being able to complete four out of the six projects and a reduced number of readings.

The next time I taught the course I used Processing (www.processing.org), a programming environment and API built on top of Java. Processing provides a graphical window and drawing commands as built-in primitives, as well as a scripting-like programming environment that allows new programmers to quickly create straight-line code without classes. There is an active art community of Processing enthusiasts who share code, providing students with a community of practice within which to learn art-centric programming. And, since Processing is built on top of Java, it's possible to import classes from the standard Java API and to write arbitrary Java programs that make as much or as little use of the Processing-provided primitives as desired. With Processing providing scaffolding, particularly early in the course, students were able to successfully complete all six projects, and to engage the full set of readings I wanted to cover.

A down-side of using Processing is that it was definitely developed from a visual arts background (it was developed by grad students in the Aesthetics and Computation group at the MIT Media Lab); it is designed to support procedural graphics, but not other forms of procedurality such as text manipulation/generation, web parsing and recombination, and AI and Artificial Life models of behavior. For projects that required such capabilities, I gave students starter code to work from. Since Processing is built on Java, in future iterations of this course it would be possible to provide such capabilities as library extensions to Processing, though it's still useful to have students look at the source code so as to understand how such capabilities can be added.

## Conclusion

Procedural literacy is necessary for new media theorists and practitioners. Without a deep understanding of the relationship between what lies on and beneath the screen, scholars are unable to deeply read new media work, while practitioners, living in the prison-house of "art friendly" tools, are unable to tap the true representational power of computation as a medium. The ideal of procedural literacy as necessary, not just for new media practitioners, but as requirement and right of an educated populace, has been with us for over 40 years. Yet the two culture divide persists, with artists and humanists often believing that programming is a narrow technical specialty removed from culture, and computer scientists and engineers often happy to pursue just such an unexamined and narrow focus. Computer games are a prefect vehicle around which to build a procedural literacy curriculum that spans the two-culture divide. Poised to become the primary interactive art form of the 21st century, games appeal across engineering, art and the humanities, uniting technical and expressive concerns. Games define a procedural world, foregrounding the relationship between simulation and audience reception. My graduate level course, Computation as An Expressive Medium, is organized around the construction of game-like artifacts, combining technical skills with sophisticated historical and theoretical understandings of computational artifacts. Students from technical, arts, and humanities backgrounds have successfully engaged the course, adding empirical support to the idea that games (and game-like artifacts) can serve as a successful organizing framework for procedural literacy courses, at least for students in new media programs.

To achieve a broader and more profound procedural literacy will require developing an extended curriculum that starts in elementary school and continues

through college. Encountering procedurality for the first time in a graduate level course is like a first language course in which students are asked to learn the grammar and vocabulary, read and comment on literature, and write short stories, all in one semester; as my students I'm sure would agree, this is a challenging proposition. In the same way that people engage language throughout their entire educational trajectory, so to should students engage procedurality. Only then will computation truly become an expression of culture on par with language, image, sound, and physical objects, adding process-based representation to the human conversation.

# Simulation insubordination: How simulation games are revolutionising elearning

*Siobhan Thomas*

## Simulations and the Future of Learning

If you were given the task of hiring someone to monitor the reactor at your nuclear power station (we're speaking hypothetically, of course) you'd probably ensure that they'd had hands on training in a simulator (among a whole host of other things) before they assumed their post. A nuclear disaster is, after all, something we'd all like to avoid. The irony is that while we can readily see the benefit of using simulations to train people who deal in matters of life and death—doctors, pilots, bomb disposal experts—we are less able to see the benefit of using simulations to teach content that has traditionally been classroom fare. Yet, it is this content that has a profound effect on our day-to-day lives. This is the concept that is at the core of Clark Aldrich's book Simulations and the Future of Learning: An Innovative (and Perhaps Revolutionary Approach to e-Learning).

If you've been around long enough to weather the rise and fall of virtual reality, then perhaps you'll take any book title that has the word revolution in it with a grain of salt.

Luckily, the revolution Aldrich is proposing is much more tempting than the prospect of appearing in public wearing a head-mounted display.

In fact, Aldrich is such a believable anarchist, you'll find it easy to sign up as a revolutionary. You'll believe that you can make profound changes to the learning environments under your care, because he'll show you how he's done it himself. And along the way you'll gain the confidence to think that perhaps you too could be instrumental in developing new genres of e-Learning.

Simulations and the Future of Learning relives the trials and tribulations Aldrich faced as lead designer for Virtual Leader, a leadership simulation that lets players experience leadership by managing bots (characters) in six different types of corporate meetings.

## The Problem with e-Learning

When e-Learning guru Clark Aldrich, turned in his whiteboard markers and left his position as research director for the Gartner Group in 2000, it wasn't without a slight amount of trepidation.

Things had got awkward. Aldrich was at the point where he could no longer be an enthusiastic spokesperson for an industry he knew was flawed. There were hundreds of thousands of e-Learning courses on offer; that was precisely the problem. Organisations were choosing suppliers of e-Learning content based on the volume of courses they could deliver, rather the quality of courses they could offer:

"The shortsightedness of most e-Learning buyers caused the equivalent of the arms race within the vendor market. They all began bulking up on content, building or purchasing titles as fast as they could. Vendors talked about hundreds or thousands of courses as being a good thing. Having fifty or sixty courses was considered competitively insufficient…" (35).

Aldrich attributed the e-Learning decline to a number of factors. The central of which was the mentality that e-Learning was an investment that could be easily quantified:

"I was asked a lot of great questions, but also a few goofy ones," says Aldrich. "One of my favorites was, 'What is the "return on investment" (ROI) of e-Learning?' 'Thirty seven point two percent,' I would reply jokingly. 'Could you send that study to me?' they would quickly ask, desperately, always surprising me, as if grabbing onto my answer like a life preserver, and I would have to mumble an apology" (31).

Aldrich watched as innovations in technology only served to make e-Learning worse. For many organisations, e-Learning became pre-reading. "Innovations" like synchronous e-Learning "eroded many of the early benefits of e-Learning including scalability and automation" (35) and so-called "blended models, where classrooms and e-Learning were used together, were just becoming popular because self-paced e-Learning content failed to be sufficiently useful" (36).

Aldrich wrote about the e-Learning market seven days a week. He meticulously evaluated content that vendors provided, looking at value and credibility. In his spare time he played the role of visionary, writing research notes to help

anyone who was considering being more ambitious. "I talked about simulations, computer games and the lessons that could be learned"(36). But there were no takers. Aldrich could see what needed to be done—someone needed to do things differently, someone needed to create a truly engaging, interactive, effective e-Learning program. But he couldn't find anyone to do it. "I don't think I motivated anyone to begin a simulation project, nor could I find anything existing that met my own criteria" (36).

Aldrich "knew the existing e-Learning market inside and out." He "could draw market diagrams on a whiteboard in multicolour." But, he could no longer deny it. The foundation of e-Learning was rotten to the core. So, he left Gartner and set out on his own, with his reason for existing wonderfully clear: he was going "to produce a single example of fabulous content that role modeled a new approach to building and using e-Learning" (37).

## The Beginning

Equipped with a lot of heart and a rolodex of contacts, Aldrich set out to achieve his dream. He was going to simulate the topic of leadership. Leadership is a key skill needed by any organisation and one which he was quizzed on time and time again when he was a Gartner analyst: "'We tried this and that, Covey and Kotter, and nothing works,' clients would tell me. 'The stuff is too confusing, too high level, too academic. There are too many charts that don't make any sense'" (38)

But, while he knew what needed to be done he had no idea how he was going to go about doing it: "Not only did I not have any answers to the tough questions, but I didn't even know what the tough questions were."

## The Problem with Experts

So he began where anyone else would: with the experts. After all, when dealing with the subject of leadership it only makes sense to find a few leaders to give you a hand.

But Aldrich couldn't find any experts to help him. It's not that there weren't experts around. It's just that the experts were "in the business of producing linear content—be it a speech, a book, or a lecture series…. Getting any of them to think of content non-linearly would be a huge undertaking, possibly impossible…. They had some white papers that could be pre-reading, so players could read fifteen pages if they made the same mistake twice" (42).

Aldrich asked the experts probing questions, and they shrugged their shoulders: If the experts accepted "The Simulation Way, they would have to accept the fact they were no longer experts. And that would mean no huge fees" (42).

Aldrich quickly discovered that there were few benefits to be gained from involving experts at all. "For most vendors, the simple act of procuring a brand name took months. Further, their involvement easily cost (in both time and money) 15 percent or more of the entire project's budget…. The content they provided tended to be war stories or notes from upcoming books and speeches. They routinely added months to development time. Most changes tended to be egocentric" (43).

## His Own Brand of Leadership

Anyone familiar with the canon of leadership theory will find Aldrich's definition of what makes a leader slightly foreign.

That's because he invented it.

Making a simulation of a system—for example, a flight simulator—is a relatively straightforward task: you simply model controls and functionality. Modelling a complex concept, like leadership, is considerably more difficult.

In order to create a leadership simulation, Aldrich first had to figure out how to define leadership in a way that would lend itself to being modelled in a simulation. He undertook a massive research campaign: "If we were to build a leadership simulation, we needed to start from scratch," says Aldrich. "Our first step was to locust-like devour every scrap of leadership content we could find" (45).

## Rules, Rules and More Rules

To make sense of the volume of material his team uncovered, Aldrich wrote leadership "rules" that basically outlined how a computer might view a leadership situation and what input and output it would need to react. "We didn't know whether it was a waste of time, but we hoped it would help us organize and focus," he says. "In the end we wrote more than one hundred of these [rules]. They ended up forming the deep logical structure for Virtual Leader's artificial intelligence" (50).

In the forward of Simulations and the Future of Learning, Gloria Gery states:

"I learned more about leadership by reading about the simulation than I have in thirty-five years of management training programs and book reading. These are serious accomplishments for what I expected to be a technical book."

As Aldrich outlines his leadership rules, you begin to see what Gery means. What is most interesting about the rules is that he doesn't just state a principle—"When it is time to create and maintain an environment conducive to work, increase tension"—he outlines what the principle actually means:

"When… not much effort or attention is being expended, there is no discipline, there is an insistence of focusing on easy fixes, and people come in late; You should…introduce provocative, contentious, controversial, challenging ideas, raise your voice, attack slackers, get personal, and make multiple quick attacks. If you do… you can become the enemy. But if you don't… work will not get done and complacency and a tendency to conduct business as usual will set in" (53).

In the book, Aldrich outlines only 12 of these rules. And as you read them you get the sense you'd not only like to read through all 100 of them, but you'd actually like to try them out as well, to see how they would play out if you were actually in the role of a leader. It is at this point that the genius of what Aldrich has done becomes crystal clear: Virtual Leader allows you to do just that.

But even though Aldrich and his team had put together a substantive collection of the rules of leadership—and been able to define four categories of skills required to lead, namely, power skills (e.g. negotiating), idea skills (e.g. brainstorming), tension skills (e.g. stress management), and work skills (e.g. time management)--the collection didn't bring them any closer to charting out Virtual Leader's "gameplay." An "aha moment" came when a member of one of their focus groups said: "So leadership tells me when to use my other skills."

It became clear to Aldrich, that the role of Virtual Leader was going to have to be to teach people when and how to use these four sets of skills—skills that, in most cases, they already had. They would have to learn how to gain power, generate ideas, and moderate tension, all while working with the group they were leading.

Still, Aldrich had to justify the validity of reinventing the wheel: "People had been studying leadership for centuries. Who were we to challenge everyone's

prevailing views? Who were we to redefine a concept this fundamental? And if our simple view of this was so true-to-life, why hadn't someone else come up with it?" (83).

The short answer, Aldrich explains, is that people had already come up with it:

"If you looked over almost any of the twelve thousand books on leadership, they contained our [power-ideas-tension-work framework]. But because the experts were thinking linearly, the simplicity and depth of this model was never too apparent, nor explored very deeply. Armed with our linear content, our cyclical content, and now our systems content, we had the framework we needed" (83).

## How to Make a Simulation: Design Principles

Buried deep in the pages of Aldrich's book are the design principles that guide the evolution he is proposing. These design gems include such concepts as simulations shouldn't feature a single system, but a series of subsystems. Simulations should leverage the power of modularity. Simulations shouldn't be slaves to reality, but, instead, be realistic interpretations of the world we live in.

## Subsystems

Worlds are simulated by allowing different systems to interact. As Warren Spector, producer of the massively successful Deus Ex, pointed out in a conversation with Aldrich: "What you want to do is create a game that's built on a set of consistently applied rules that players can exploit however they want…. In other words, rather than crafting single-solution puzzles, create rules that describe how objects interact with one another (for example, water puts out fire…) and turn players loose—you want to simulate a world rather than emulate specific experiences." (97).

In order to create these types of situations, you have to make systems that can talk to each other. Systems are able to communicate when they share a common goal. Tom Meigs, an independent game consultant who's worked for Walt Disney Company, THQ and others, calls this the game's heartbeat. "No doubt, this heartbeat will suffer many palpitations and skipped beats," says Meigs. "Your game's heartbeat should be kept in mind to help guide the thousands of decisions that will be posed… If you forget about a game's heartbeat, the game

can grow into a surly five-headed beast almost overnight" (Meigs, 2003).

Getting a game's heart to beat is, without question, a formidable task; however, it's helped by the fact that there exists genre-specific techniques game designers can use for typical game processes such as pathfinding and collision detection.

Unfortunately, generic components weren't a luxury that Aldrich benefited from. Designing computer games that feature movement and shooting and physical exploration of game space was one thing, designing systems that reflected something as philosophically complex as leadership theory was something completely different. All the subsystems needed to reflect and enrich the learning of leadership. There were no genre-specific techniques for Aldrich to fall back on, because the genre he was developing for did not exist.

## The power of modularity

Another consideration that drove the development of Virtual Leader was even though it was intended to be used as an off-the-shelf simulation, all of its systems needed to be easy to customise.

This meant that everything needed to be modular. Virtual Leader's design team wanted to be able to offer to the world of leadership what Star Wars's Jedi Outcast game offered to its players: "a player battles against thousands of… villainous storm troupers across twenty-five huge levels and forty hours of game play. But by switching out just one file with another, every storm trooper on every level will look different, talk differently, and even behave differently" (99).

Because it had a modular architecture, Virtual Leader was extensible. Not to mention it offered learners endless opportunities for customisation and offered organisations, whether they were pharmaceutical companies or non-profit fundraisers, the chance to personalise their leadership training programs. An organisation could make one change and watch it cascade through the entire simulation. They could add new characters, change the voices of characters, or add and remove dialogue.

## Role-playing Phobia

Admittedly, Aldrich's readership will not be 100 percent appreciative of his entire gamut of design principles, especially supporters of educational role-play and massively multiplayer online role-playing games (MMORPGs).

Aldrich writes, "Many assume a multi-player educational simulation would be a better learning experience than a single player one. They assume that other people participating would make the simulation more realistic, more subtle, and of higher value. Mostly, they assume wrong" (100).

Aldrich's dismissal is understandable, but shortsighted. Yes, roleplaying environments might be highly public; yes, players might not act "normally"; yes, the logistics of getting people to meet at the same time might be hugely expensive and time consuming. But they also might not. Ignoring the benefits of community gameplay (and community learning) by designing all future simulations as single player endeavours, undermines the revolution that Aldrich is leading.

Aldrich is right when he points out that real people do have failings when they play the role of opponent. They "act erractically." They get tired, frustrated, and bored. But they can also undertake a complexity of behaviour that AI can't even come close to emulating. Just as there is value in designing simulations that put learners in situations where they can repeat things over and over, ten, twenty, one hundred times; there is also value in putting learners in one-off situations. Unscripted, complex trials that exploit the learning opportunities of social interactions.

## Accuracy

The perpetual question asked of simulations is "How accurate do they have to be able to teach effectively?" This is referred to as the "issue of fidelity." The overriding assumption is the more realistic simulations are the better the learning experience will be. In other words, we assume that a high level of fidelity is needed to allow learning transfer to occur. Game designers are incorporating increasingly complex levels of realism into their art forms, continually experimenting with graphical techniques that ensure, for instance, virtual grass looks like real, live grass. The difficulty with realism though is that the closer you get to "actuality," the easier it is for players to see the flaws. Players are more than familiar with the nuances of the world around them. Immersion—the holy grail educational designers and commercial game designers alike strive for—is easily disrupted by lighting or shadows that don't look quite right or discordant frame rates.

Simulations work better when they interpret reality. This requires designers to analyse the base learning required in any given learning situation, rather than blindly modelling real-life. In other words, simulations need to be about the

learning rather than about the simulation. For instance, MIST (www.mentice.com) is a simulation that teaches surgical skills. During development, designers drilled down to uncover the core learning required when carrying out key surgical techniques. Instead of replicating human tissue on screen, they ended up designing a simulation that saw learners manipulating basic geometric shapes—spheres and cubes among others—because this allowed learners to concentrate on the development of the key psychomotor skills required during surgery.

Can we be induced to abandon our penchant for perfect realism? Aldrich warns it might be wise to do so: "Given that people are part of the equation, in simulation design, perfection is not always as perfect as you might hope. Part of the goal of any simulation is to focus the end-learner on a finite, not infinite, set of relationships. While the number of relationships will grow both as simulations become more powerful and as we become more used to learning from them, simulations will never reach the infinite subtlety of life, nor should they" (103).

## The Animation System

The "bots," the animated characters that feature in Virtual Leader's simulated meetings, were constructed from skeletal animations. "The models we built of all of the characters had working parts," says Aldrich. "They had joints and bones…. The nice thing about this approach is that the same animations could be used on all of the bots. (Well, almost all of the bots. We actually had to use different animations for male and female bots.)… This made it very easy to change a small animation in one place and have it be changed in all bots, in all meetings" (123).

Virtual Leader used a state-based framework to control the animations. And, while Aldrich points out that using a state-based framework is "hardly ever interesting enough as the primary calculation engine for a simulation," (122) it is well-suited to playing a supporting role. In total, the animation system had 15 states and, because Virtual Leader featured meeting room scenarios, these states included typical meeting room movements such as "sitting up to table, distance normal" and "leaning forward with pen in hand." Further, each state had several animations associated with it: the bots listened, squirmed, and coughed.

How a bot shifted from state to state was dictated by probability. If the artificial intelligence system told the bot that it was nervous, there was a 10 percent

chance it would pick up a pen and start tapping, a 30 percent chance it would stand up, and a 60 percent chance it would continue doing whatever it was it was already doing.

While this flexibility gave the animations a healthy dose of unpredictability, it caused a few design issues, at least initially: "When we first finished the program, the animation system was not tuned well at all. The bots would stand up, then sit down, then lean forward, then lean back. They were exhausting to watch. They all looked as if they had just had about six double lattes" (127).

As you make your way through Aldrich's case study, you get the sense that half the point of building simulations is the pure unadulterated joy that the process of building brings. Aldrich makes it clear that while discovery is powerful and rewarding and enlightening for the learner it is equally or more so for the creator, particularly when it reveals unplanned, yet positive, outcomes: "Do you realize," one of Aldrich's team members asked him late one night, "that we will be presenting more information than a week-long course on body-language, and that's not even the point of the simulation?" (126).

Suddenly, debugging a bot's animated quirks became a much more palatable exercise. It became even more worthwhile later, when body language turned out to be one of the simulation's major selling points.

## Dialogue

When it comes to revolutions, a good healthy dose of fear is enough to spur any wilful recruit into action. On the other hand too fear much can cause catatonic paralysis. Aldrich's chapter on dialogue is not only terrifying, it gets dangerously close to scaring off anyone who might be interested in undertaking her very own simulation project.

Aldrich refers to dialogue as "the ultimate hurdle." And for good reason. Computer games, which do so many things so well, are stuck in the Dark Ages when it comes to bringing to life the spoken word.

As game gurus Andrew Rollings and Ernest Adams point out in their book On Game Design, "unfortunately, in most games the dialogue is even cornier than 1970s television shows, and the acting is as bad or worse" (Rollings and Adams, 2003).

The majority of games use dialogue judiciously—and relatively sparing-

ly—to get their messages across, mostly during cutscenes or in the form of sound bites.

Aldrich provides valuable insight into the rationale behind this behaviour. Every word of dialogue is expensive, he says, both in terms of paying the voice talent to record the dialogue, and in terms of taking up space in the simulation. Dialogue simply hasn't got the attention it deserves because it isn't cost-effective for commercial developers to add it into their development models.

At first Aldrich thought it was going to be easy to create a satisfactory dialogue system. He started to become concerned when he began planning out the dialogue and realised that at minimum "satisfactory" entailed writing 420 quotes. Concern turned into panic when his 420 quotes increased to 630 and then skyrocketed into the thousands. When the number reached more than 3000, enormity had become a reality:

"The task of writing non-linear dialogue turned out to be much harder than anyone, especially I, imagined…. I was informed by my co-workers that I approached this task with a bit of a bad attitude. I just wanted to get it over as fast as possible, which already didn't seem that fast" (140).

But as Aldrich laboured away, he had an epiphany, which translated into a positive behavioural change. He had been overlooking a "basic simulation truth": Everything you put into a simulation, no matter how small, adds value.

"I'd originally looked at the dialogue system as a necessary evil, a low-impact tool to advance the action," says Aldrich. "As I started writing, I realised how much could be accomplished…. I could define characters. I could make some characters sarcastic and others earnest. I could write some amusing lines…. I could also role model some debates about big ideas. I could put in some inspirational and editorial comments" (142).

What's more, because the dialogue system—like all of the simulation's other systems—was designed to be modified, it gives organisations using the game considerable control:

"If an organisation does not like a line they can delete it outright. Virtual leader will automatically compensate for the line not being there. Or if an organisation wants to add some dialogue, Virtual Leader will automatically cycle it in and play it at the right time" (148).

Still, Aldrich says that Virtual Leader's dialogue is the single area where the

simulation is most criticised. Some players want the freedom to choose exactly what they want to say by writing their own phrases or picking them from a list. Others say the dialogue sounds unnatural. Players eventually come to terms with the fact that the dialogue, while a "departure from reality," is a design convention.

"Part of our challenge is not just to reset expectations to prefer an interactive environment over a linear one, and not just to stress real-time interactivity, but also to keep the audience focused on the learning objectives… The point of Virtual Leader is not to say the right thing. It is to focus the conversation the right way… we didn't want people to focus too carefully on what was said, but instead why it was said" (149).

## Recruiting Revolutionaries

The written word is an ideal weapon for the earnest revolutionary.

Sometimes books are like rocket launchers; they propel you forward with explosive force. Aldrich's book more closely resembles an impact grenade. You admire its untapped power, but know its force won't be realised until you've got enough smarts to pull the safety pin. There's a certain expectation that later on, down the road, the effect will be devastating.

The survival of e-Learning depends on mobilising a groundforce to take action. "So many groups assume that studying a problem will bring them closer to a solution, when so often it has the opposite effect of consuming vast resources without producing anything," says Aldrich.

Aldrich proves that it is possible to produce effective, interactive e-Learning. He provides inspiration for anyone interested in taking up the challenge to forge new simulation genres.

Simulations and the Future of Learning is subversive writing at its finest. If you're already a believer in the power of games and simulations but haven't been able to convince the people around that it's the way forward, leave this book under the nose of your most vocal opponent. After reading it, he'll start recruiting the people you need for your next game simulation project.

# Games/Gaming/Simulation in a New Media(Literature) Classroom

*Scott Rettberg*

I direct the undergraduate New Media Studies track in the Literature program at Richard Stockton College in southern New Jersey. My interest in and use of games, gaming, and simulation in the classroom is more marginal than that of most of the other teachers and developers contributing to this discussion. My students don't develop games, and games and gaming are on the periphery of the primary focus of our shared experience. My own background is as a creative writer, literary scholar and advocate of electronic literature (narrative and poetic reading experiences specifically designed for the computer and the network). I've written or collaborated on several narrative projects published on the network, including The Unknown, a hypertext novel, and Kind of Blue, a serial novel for email. Most of my own work is text-centric. Nonetheless, games, gaming and simulation are playing an increasingly important role in the courses I teach and in my practice as a creative writer. In this essay, I will describe the New Media Studies track in which I teach and the students it serves, and outline some of the ways in which games intersect with the content of my courses. I feel that many of the ideas and practices involved in developing electronic games and in the academic study and analysis of games inform the practices of reading and writing electronic literature.

## The New Media Studies Track at Stockton

Richard Stockton College of New Jersey is a small public liberal arts college that primarily serves undergraduate students from New Jersey. The college does very little out-of-state or international recruitment. Although the college is highly selective, a high percentage of my students are first-generation college students, who come to college with specific pragmatic career goals in mind. The majority of the students enrolled in the Literature program intend to become elementary or high school English teachers upon completion of their undergraduate education. A lower percentage of our students pursue careers as technical writers, creative writers, or editors. A few of our graduates every year pursue graduate studies, typically in M.F.A. creative writing or Ph.D. literature programs.

Literature is a popular if understaffed major at Stockton. Five full-time faculty

teaching 3/3 loads serve 233 majors. The LITT program faculty had an interest utilizing technology to support traditional literary studies well before my arrival on campus last year, using weblogs, bulletin boards, online chats and a variety of collaborative online research and writing projects for years. The New Media Studies track and my line of Assistant Professor of New Media Studies were created in order to bring an additional text and technologies layer to the program. The New Media Studies track at Stockton focuses on:

• Reading works of electronic literature.
• Writing and creating for the network.
• The study of the network and digital culture writ large.

The undergraduate track that we've designed is laid out as follows:

• NMS students are required to take three core courses: Literary Methodologies, Literary Research, and a Senior Seminar. NMS students are also required to take six other courses in Literature or a related field.

• NMS students also take two courses taught by Art faculty: The Computer as an Art Tool (a lab course familiarizing students with Photoshop, Flash and Illustrator and with design concepts) and Web Design (a lab course teaching students the basics of web design).

The courses that I teach in the track include:

• Introduction to New Media Studies – a course that familiarizes students with some of the history of New Media theory and with some of the evolving genres of electronic literature (including hypertext fiction and poetry, kinetic poetry, interactive fiction, and weblogs).

• Hypertext – a course that describes connections between twentieth century print genres (modern and postmodern fiction) and hypertext poetry and fiction.

• Internet Writing & Society – a course in the study of networked culture, examining social networks, legal issues, identity concerns, etc. – essentially examining the ways that the Internet is affecting contemporary textuality.

• Multimedia Production – a course in collaborative writing for the Web.

Students completing the New Media Studies track might pursue several dif-

ferent careers after graduation: they might become web designers, writers, or editors, they might become high school teachers with a technical skill set, they might work in advertising, they might pursue graduate studies in one of the New Media programs which are currently springing up in literature, art and communications programs at various universities.

Although the track I've described differs from the programs that most of the rest of the collaborators on this project work in or are forming, games, gaming and simulation play important roles in the majority of the New Media courses that I teach, in the following ways:

- Teaching Games as Literature, and Teaching Literature as Games
- Collaborative Writing as Gaming
- The Cultural Study of Gaming and Simulation

## Teaching Games as Literature, and Teaching Literature as Games

Most of my students are goal-oriented learners. The first question they ask is how studying a particular subject will help them to get a better job after graduation. Electronic literature can be a tough sell to students trapped in this mindset, just as, for instance, philosophy would be. After my students have interacted with a particularly engaging work of hypertext fiction or poetry, I'll inevitably hear the question "How do people make money doing this?" When I explain that most of the writers and artists creating work for the network are not, in fact, motivated by the promise of great fiscal rewards, but are creating engaging experiences for the sake of purely artistic motivations, an air of puzzlement settles over the room. Why would anyone (at least any grown-up) do anything for which they are not directly remunerated? Yet these same students will spend hours of life in the Sim-verse, building imaginary civilizations engaging in imaginary interactions with other people's avatars, or slaying simulated trolls or terrorists in their dorm rooms – activities, I point out to them, for which they are never likely to be paid. In addition to the "if it doesn't pay, it's a waste of time" objection, I also have to confront the objections of those students, my dedicated book-loving lit majors, who can't get past the idea that the only proper interface for the contemplative act of reading is the codex book. These objections are not foolish or trivial – it's indeed difficult to explain why anyone would want to be an artist in a capitalist society that privileges Humvees over bicycles, and difficult to explain to a young book fetishist why anyone would want to read or write in non-paper mediums. We are able to find a meeting place, however, in the logic of computer games.

At the start of the New Media Studies course, I explain that many of the works that we'll encounter during the course of the semester will require work on our part as readers, and an additional type of work to that of close reading and interpretation, the usual focus of Stockton literature courses. When reading a work of electronic literature, before we get the task of interpretation, we first need to negotiate the process of how to get the text to deliver its contents (or some of its contents) to us. It is as if each time we were handed a book to read, we would first need to decode its rules of operation, to figure out how a book works. The codex book doesn't come with a manual because it would be unnecessary; we have been trained in the operation of the book since preschool, to the extent that its technology is transparent to us. Yet no gamer would expect to be able to leap into Everquest or Ultima without facing a learning curve on the game's rules of operation, both in terms of the basic operations of the interface and in terms of the constraints and social compact that the player enters into when playing the game.

As Espen Aarseth elucidates in Cybertext, any cybertext operates on an ergodic level, as well as at the level of traditional literary interpretation. Works of electronic literature are both reading experience and computer programs that the reader must "play." With this in mind, in my class we talk about reading with a strategy in mind. Even in the case of something as simple (in terms of its use of the computational properties of the computer) as an HTML web hypertext fiction, such as Robert Arellano's Sunshine '69, it pays for students to develop a strategy for engaging with the text. In a nonlinear narrative, the arrangement of the text itself requires the reader to make choices that determine, to a certain extent, the content of the reading experience. Rather than simply wandering around the world of potential texts which the hypertext represents, I encourage students to develop particular goals (e.g. to become knowledgeable about one particular character or one particular cluster of plot events) and to think of their reading of the hypertext as a kind of game played between themselves, the text, and the author of the work.

Although the works that we discuss in the New Media Studies and Hypertext courses are primarily textual, we do spend a couple weeks each semester with works of interactive fiction, the genre that evolved from Adventure, Zork, and the text adventure games published by Infocom. A quite large community of enthusiasts has been developing and playing IF works for more than a decade since the commercial collapse of the genre. Because we have quite limited time to work with the IF, we discuss the experience of playing IF within the context of some of the early work in artificial intelligence, reading essays by Alan Turing and Joseph Wiezenbaum alongside the experience of playing some recent

works of IF, and discuss the strengths and limitations of a "conversational" or "natural language" interface. Although we visit IF only for a short while in this course, the dynamics of these hybrid text games/exploratory narratives could easily be the subject of a course in their own right. Electronic authors and IF advocate Nick Montfort has just published the first book-length study of interactive fiction, Twisty Little Passages, in which he makes the case for studying IF in the context of literary studies, and in particular in their relationship to the history of riddles. I'd recommend this work to anyone interested in the genre.

## Collaborative Writing as Gaming

I've always been fond of writing games. With or without a computer (pen and notecards will do), I think that thinking of writing, particularly collaborative writing, as gameplay, is useful for creative writers to loosen some inhibitions and unlock some doors, to explore some narrative paths that they might not have otherwise chosen to pursue. My own entrée into new media, the experience of collaboratively writing The Unknown, a hypertext novel, was essentially a writing game that lasted several years. Before writing The Unknown, William Gillespie, Dirk Stratton and I worked collaboratively on several writing projects that are best characterized as play (improvisational radio and a variety of writing games, such as the simple 3x5 notecard game – one writer writes a title on a notecard, another writes a short text that in some way fits the given title). The Unknown was a prolonged writing game in which we accepted certain constraints (the setting was a book tour, the characters were in a sense avatars of each of the three of us, and we had free hand to write from each other's points of view). It was a kind of sophisticated game of the dozens, each of taking turns lambasting each other's characters, of writing each other's avatars into various corners and then challenging each other to write our eponymous characters out of the given situation. I don't think of the experience of writing The Unknown as "work" in the same way as I do other things that I've written. Perhaps the fact that The Unknown was a comedy helped, but I remember nearly every moment of writing the hypertext as a form of intensive collaborative play.

The idea of writing as play, and specifically of writing games, stretches back very far in literary history – courtier poetry, for instance, was essentially a writing game of politics, seduction and power, with very formalized writing structures and rules of conduct. In more recent memory, the works of the surrealists, the Oulipo, and others such as William S. Burroughs have utilized ludic approaches in creating literary texts, writing under constraints and writing

using random elements. The mathematicians and writers of the Oulipo pose writing assignments to each other in the form of mathematical and combinatory challenges. In my experience, writing games, or writing with agreed-upon constraints, is a useful in collaborative practice, in that the arbitrary boundaries established by the rules of the game free collaborators from having to negotiate story elements, allowing them to focus on the writing itself – transforming the work of collaboration into the play of collaboration

I use writing games in the Multimedia Production course that I teach. Although a great deal of the course content is simple practical writing, design, and editing for the Web, the course is not focused on teaching any particular piece of software, but on creative collaboration. I'm more concerned that students have the experience of working with each other, of defining their own strengths and roles in a collaborative production environment, than in teaching them the Dreamweaver or Flash manual. One of the writing assignments for that class is a simple writing game. I pass around five hats, each containing a different element of a character (first name, last name, age, occupation, and hometown). Each student pulls a strip of paper from each hat, and the resulting combinations form each student's character. I then provide the students with a scenario, placing their characters within an established plot situation. The decisions involved in creating characters and plotlines are thus determined arbitrarily, and the process of writing the project becomes a kind of role-playing game. Along the way, we are learning about XHTML and CSS, but the acquisition of those skills is wrapped around the fun of collaborative play. My MMP students in spring 2003 wrote the web fiction Atlantic City Murder using this game, and in the summer of 2003 created Liberty Lockdown in the same fashion. Many students who entered into the creative component of the course with trepidation, taking me aside to let me know that they were not creative writers, turned out to be quite good fiction writers when the activity of writing fiction was framed as a role-playing game.

## The Cultural Study of Gaming and Simulation

Computer games, having surpassed Hollywood movies as the highest-grossing entertainment medium, are clearly influential "texts" in contemporary culture writ large. The ideology of games, the sociology of gaming culture, and the narratology (alternatively ludology) of games are all rich subjects of study that should have a place in the new media curriculum. Many of the same types of theoretical approaches that critics in cultural studies have applied to literary texts, films, television and other popular media are now being applied to gaming. In the past couple of years in particular, many working in the game stud-

ies community have become more explicitly aware of the ideological and persuasive capacities of computer games. Gonzola Frasca's simulation Sept. 12th is one example of a game that is an explicit form of political discourse, as (in another fashion) is the US Army's freely distributed America's Army, a game that simulates basic training and battlefield action and is which is used as a recruiting tool in malls and in front of computer screens across the country. The various Shockwave games that were circulated on the Internet after 9/11, usually involving some variation of killing Osama Bin Laden, were also clearly ideological statements. Computer games, whether explicitly ideological or not, are now important texts in our culture, which can and should be read through the lens of critical theory. While Games Studies is evolving as a discipline in its own right, I would argue that computer games and simulation have a place in the literature classroom as well, in the same way that other texts from popular culture (film, television, and rock lyrics, for instance) are now studied alongside traditional literary texts. If film was the predominant popular art form of the twentieth century, all indications are that networked games will be the predominant popular art form of this century.

In my second year of teaching new media in a literature program, I'm frankly still working out what role games should play in the curriculum, how my students should be "reading" games in the way that they read literature. While it's clear to me that the language of cybertext, the terminology of ludology, is quite useful for students of electronic literature, in that it provides us with a descriptive terminology to discuss these works as text-machines, I'm still working out the logistics of how to integrate gaming experiences into the classroom. I'm considering a project in which students in my Internet Writing & Society course will spend several weeks in avatar/gameworlds (such as There, Second Life, Sims online, etc.) and then write about the experience from a sociological perspective. I'm also considering developing a general studies course that is more specifically focused on computer games and contemporary culture, but I'm still working my own ideas of what the boundaries are between literature/narrative/games/simulation/art, and how permeable those boundaries should be. It's strange to say, but I feel like I'm behind in my primary source research – that I've spent too much time reading books, and not enough time playing games. Like anyone teaching new media at this early stage, I'm still moving slowly outward from my home discipline. While I've spent much of my life studying literature, most of my associations with games are of a different nature – they call to mind the sounds of quarters cling-clanging out of the change machine, and waiting in line at the arcade to play Missile Command, Centipede, Galaga or Pacman. I'm still wrapping my head around this strange interzone between Hamlet and Galaga.

# Weblogs: Learning in Public

*Jill Walker Rettberg*

## Introduction

By March, my students had been writing weblogs for several weeks. They knew that the weblogs were publicly accessible on the web, but didn't seem to believe that anyone would actually read their writing. Their teacher required it of them, so they would do it, some enthusiastically, some with trepidation or diligence and some with barely veiled disgust. Adding new rules to the game? Give a student a blog and you'll hear all about it:

"Setting up this blog is one of the most boring things I've ever done. And my site looks incredibly ugly! I can't see why anyone would bother to read this. Far less how it'll do me any good to write my ideas about the course here. Except that I have to have 1500 words here before they'll let me take the exam." ("Nora", Jan 30)

Studying is a complicated game. Some of the rules are explicit, others you figure out as you go, but everyone knows that it's not real life. Nobody except your professor will read the papers you write. Once you graduate, only your grades – your winnings – will count. This is one of the challenges of teaching: only exceptional students will do work for the joy of learning and not simply because it's required.

What happens then if we make the game more real? What if we connect the day to day work of studying to the world outside of the university?

## Becoming visible

After those first weeks of the semester, some of my students had taken to blogging like ducks to water, writing with great enthusiasm and adapting the templates almost daily to reflect new skills and new inspirations. Some of the students absolutely hated being forced to blog. Sometimes this led to great creativity, as when one young woman not only christened her site Furyblog and developed a furious writing style that swept from post to post, but also spent hours changing the standard template into an inferno of black and red, com-

plete with a manipulated image of herself snarling at the reader. Other students simply wrote as rarely and with as little investment as they could get away with, leaving their weblogs to fend for themselves when their writers weren't forced to post in class.

The majority of students, however, embarked upon their weblogging careers without expressing any particular enthusiasm or distaste. They did what I asked them to do, more or less. They listened to my lectures on the network and the new literacies that it requires without questions. I explained the concept of trackbacks, in which links become bi-directional so that readers of a post in a weblog can see when other bloggers have written about and linked to that post. I showed them how this allows readers to follow links back and forwards, exploring a networked discussion. I talked about how Ted Nelson, who coined the term hypertext in 1965, proposed a global, hypertextual network that would have been far more sophisticated, in some ways, than the web is today, and how a foundation of Nelson's dream was bi-directional links, which are very different from the standard one-way links of the web (Nelson 1987). I offered that Steven Johnson's suggestion that the web cannot be self-organising or truly emergent because you can't easily see who links to a site may be surpassed by trackbacks and networks of bloggers. Organisation in a network without hierarchical control requires visibility and feedback, Johnson writes:

"Relationships in these systems are mutual: you influence your neighbors, and your neighbors influence you. All emergent systems are built out of this kind of feedback, the two-way connections that foster higher learning." (2002: 120).

That's what blogging is about, I said. It's about taking control of your own learning, finding your own voice, and expressing your own opinions. It's about responding to the world around you and listening to the responses you receive in return. The class was silent, patiently waiting for the break.

## Mental workouts

My use of blogs in the classroom was based on my own experience in blogging while I was researching a PhD (Mortensen and Walker, 2002). I started my blog on a whim, just to see what this "blog" thing was. I rapidly found that the daily writing was helping me become more confident about my research, and that I was developing a clearer voice of my own that carried through into my dissertation writing. As colleagues began to blog, I developed a research

network at least as important to me in my everyday research as my local colleagues were.

Many webloggers have had similar experiences. Part of the advantage of weblogs is the same advantage as can be found in the conventional journal or learning log: daily practice in writing and formulating thoughts. Rebecca Blood was one of the first and most prolific bloggers. In her oft-cited essay "Weblogs: a history and perspective", she writes:

"Shortly after I began producing Rebecca's Pocket I noticed two side effects I had not expected. First, I discovered my own interests. I thought I knew what I was interested in, but after linking stories for a few months I could see that I was much more interested in science, archaeology, and issues of injustice than I had realized. More importantly, I began to value more highly my own point of view. In composing my link text every day I carefully considered my own opinions and ideas, and I began to feel that my perspective was unique and important."

Although Blood doesn't mention the importance of having an audience, it seems likely that her "careful consideration" is influenced by her awareness of having a readership. In my own blogging it became clear to me at an early point that writing for readers, however few, meant that I took far greater care in my writing than I did when scribbling notes in a notebook for my own eyes only. When you blog, you know that others will read what you have written. That means that you write with an awareness of the possibility that others may disagree with what you have written. Steven Johnson is an author of books on science, including the book on emergence that I told my students about early in the semester. In 2003, after keeping a weblog for some months, he wrote an end-of-year post about his experiences so far as a blogger. His first point is similar to Blood's: blogging is a good way of practicing writing and expressing your opinions. His second point deals with blogging as debate:

"[Blogging has] been a great stimulus for me, working out new ideas in this public space – I've actually been about twice as productive as normal since I started maintaining the blog. The more I keep at it, the more it seems to me like a kind of intellectual version of going to the gym: having to post responses and ideas on a semi-regular basis, and having those ideas sharpened or shot down by such smart people, flexes the thinking/writing muscles in a great way."

This is similar to a recent post by graduate student Austin Lingerfelt, who after

writing an excellent essay giving, among other things, a useful overview of research on blogs and teaching (Lingerfelt 2004), wrote the following reflection on how his own weblogging had impacted his research:

"I blogged to write and, as I did, I was constantly aware that many of you who know more than I do would read this work. Your responses also helped me to revise. While I would have revised based on in-class feedback and response, online response offered me further opportunities for revision and the development of my thinking about this topic." (December 12, 2004)

If weblogs are so valuable for these writers, students and researchers, I thought, surely this "intellectual version of going to the gym" can be harnessed and used with students. So I required my students to blog.

"I didn't imagine anyone would care what I wrote!"

During the class where I talked about trackbacks and bidirectional links, I had also shown the students some online diaries. The students were shocked at the openness of the diarists. Why on earth would people make this public, they asked, wide awake. I suggested they read some personal weblogs and write a post in their own blogs about what they found and what reasons people seemed to have for writing in public. "Inga" did. She found a diary written by a young man who was going to Oslo to visit his ex-girlfriend and her new boyfriend, and who wrote with great honesty about his grief at having lost her and his anxiety about meeting her again. Inga wrote a brief post about his blog in her own blog, immediately following her first post with a more reflective post characterizing personal weblogs as egotistical.

The next morning, Inga was astounded to find that her blog had new comments and a trackback pointing to it. The diarist she had written about had written back! He'd responded to her post on his own weblog. Because he had linked to what Inga had written, his readers also found Inga's weblog, and several of them had written comments to her post.

Inga wrote me an email: "But how did he know I'd written about him? I didn't imagine anyone would care what I wrote!"

The next time the class met, we talked about Inga's experience. I showed the students some of the many ways in which you can find out who links to your website and what kinds of readers visit you. Still, the amazement in the classroom was palpable. Strangers might read what they wrote! People outside of

their classroom might seriously engage with what they write in class! Their work might matter, beyond simply getting a grade and being one step closer to having a degree.

## How to get them to write

In my experience, most students don't "get" blogging on their own, without considerable assistance from teachers. In a recent essay about a blogging course that went wrong, Steven Krause admitted: "I was disappointed that my students didn't 'just write,' if given the opportunity." (Krause 2004) His students were graduate students, and I understand his disappointment. Like him, I had expected my students to take to blogging instantly, but I found that most of them needed not just coaxing, but practice before they understood how to use this new medium.

When I started using blogs with students I assumed that the writing would happen outside of the classroom. That turned out to work well with a few students, the students who took easily to blogging, but most students didn't write enough on their own to learn how to use weblogs. There were technical difficulties, of course, because I insisted that the students work on changing the way their blogs looked throughout the semester, which meant that they not only had to learn the HTML they'd signed up for (this was a course in web design and communicaton online, after all), they also had to deal with the proprietory tags you need to customize the look and functionality of a blog that uses MovableType, the blogging software we were using. After two weeks of struggling to make his blog look the way he wanted, "Lars" almost gave up:

"I've come to hate my blog: he looks like hell, he's lousy company, he's difficult and cryptical, communicates in riddles, makes me mad, tired and miserable whenever I spend time with him. "Why do you hang out with him then?", some may ask, well, because my teacher says I have to play with him." "On the bright side at least I can say he doesn't smell bad, and since my relationship with him is completely superficial so far it's possible he'll turn out to be decent enough after all, if we get better acquainted. So far I must confess I don't understand him at all and I've rarely come across such a capricious character, I wish I'd never been introduced to such a boring and static A4 creature as [title of student's blog]" (February 4, 2003)

Yet Lars and the other students kept going. I made them keep going. Finding

that most students were not writing at home, I began to give them very explicit exercises in class. When we were in a computer lab, I sometimes gave them the last ten minutes of class to write a blog post about the points in today's discussion that interested them most. Other times I would give them a few minutes to google a term we were discussing, and to post a link in their blog to the best site about the topic that they could find. A few times I asked them, in class, to read another student's most recent posts and leave at least one comment. On other occasions I asked them to write a post in their own blog that continued a discussion started by another student. Often I would ask them to discuss questions assignments in groups and then write brief posts about their thoughts in their weblogs, as a step towards writing more carefully edited responses, which might become part of their portfolio at the end of the semester. My in-class assignments aimed to foster strong individual writing as well as a solid networked discussion between students.

I also tried to model the kind of weblogging I wanted to encourage in the blog I wrote for the class. I drew connections between posts students had written, helping them to see how discussions were growing forth between them. I linked to particularly well-written or unusual posts, like Lars's, which had a musicality in the original Norwegian that doesn't come through in my translation, and I also showed the class interesting posts when we met.

Students are used to a learning environment where nobody will see their work apart from the examiners. As my blogging students realised that their writing was actually being read by other students and even by people outside the university, their writing changed. I was most impressed by the way in which they began teaching each other. For instance, a color blind student wrote a post carefully explaining other students and readers how to design sites that can be read by color blind people – an important point when designing websites, since you'll have more color blind readers than readers using Opera or Netscape or needing websafe colors or any of those other elements of web design that we fret about. Other students explained technical skills they themselves had just mastered: how to make skins for your blog, how to use php to join up separate html files.

These posts turned out to be very popular among the other students. Students linked to each other's how-to posts, and leave comments asking for more assistance, or suggesting alternative ways of doing things. A certain pride was evident as students mastered a topic and shared it with their friends, and a pleasure in sharing that was contagious and seemed to encourage the others to write more as well. This is a kind of writing that is experienced as valuable, and

not simply because the teacher requires it. As Charles Lowe and Terra Williams note in their article on educational uses of weblogging, "With the teacher no longer the overly predominant active reader and responder of student texts, students, as a community, take more ownership of their writing." (Lowe and Williams, 2004).

## Harnessing the walkthrough

Elsewhere in this text, Mia Consalvo writes about how videogame players find walkthroughs and hints and cheat codes when they're stuck in a game. Watching my students write tutorials for each other – or walkthroughs, if you like – it occurred to me that this is a kind of learning that embraces the collaborative possibilities of the internet. Instead of struggling to understand the details and rigors of traditional academic citation practices, or copying and pasting with blind abandon, or worse, buying their papers, these students were sharing freely and generously. They were creating content and learning the pleasures of a gift economy where writing a careful tutorial that is useful for others earns you goodwill, recognition and a good chance of others returning the favor.

We need students to learn traditional ways of writing, certainly, but we also need to help them discover new ways of writing, and especially of writing online. I am surprised at the beginning of every semester how few students have really explored writing and debating online. Almost all of them download music from peer to peer networks, circumventing the music industry, and studies have shown that most young people don't think there's anything wrong in that, despite the threats of the music industry. What if it is the same ethics that is at the root of the increasing problems with plagiarism? Like the music industry, with their clumsy attempts at locking the system by imposing technical and legal limitations on copying music, we teachers have generally attempted to fix the problem by increasing punishments, setting up technical barriers (like turnitin.com) and insisting on students using traditional citation techniques to cite web sources. While I certainly don't condone plagiarism, it does seem to me that we might also explore the possibility that there might be some merit in a promiscuous sharing of content.

One advantage of using weblogs is that they come with a built in code of conduct that has grown from this very collaborative spirit. You read a lot when you blog, and you use other peoples' words all the time, and instead of writing out a citation in a form that many students find very complex, you link to

the website where you found the words. This is a writing environment that can help students learn how to connect to the ideas of others while being explicit about the connections they are making. At the same time, it is important to help blogging students to understand that while the links they are making in their weblogs constitute a good citation practice in this genre, in other genres, such as the conventional term paper, the explicit connections must be made in other ways, not by linking, but by using conventional citation techniques.

## Students researching in public

The second semester I ran the weblogging class, I asked each student to write a review of another blog. This assignment open up a can of ethically problematic worms that I had not at all expected.

I had taken the inspiration for this assignment from Scott Rettberg's new media studies class the previous semester. While Professor Rettberg had pre-selected a list of blogs and allowed his students to choose one from the list to review, I wanted my students to explore the web themselves, and so I allowed them to make their choice completely freely. Perhaps I should say "required" rather than "allowed", because many of the students complained bitterly at having to seek out a blog to discuss.

The students clearly learnt a lot from this assignment. They learnt something about how to write a review, and they also had to figure out which qualities of a blog were most important to them. They learnt how to find weblogs on topics that interest them.

They also learnt that bloggers have real feelings, even the ones you've never met. Writing a review of a weblog is not at all like writing a review of a movie or a novel. If you review a novel in the student newspaper, you tend to assume that the author will never read what you wrote. The likelihood of the author actually responding to a review, even in a large newspaper, is minute. It is considered unseemly for an author to protest a review, and there is little space anyway for newspapers to print such responses. The reviewer of a novel is generally in no immediate danger of having to confront the author of the novel.

If you review a blog, however, the blogger is very likely to respond – especially if you publish your review in a blog and link to the blog you're writing about. You're writing in the same space as the writer of the text you're reviewing.

You're at the same level. Unless you review one of the superstars of the blogosphere, the kind of blog that has thousands of readers, chances are the blogger will see that you've linked to his or her site, and will read what you've written.

Sometimes this is wonderful, as when Inga's comment about the personal diarist's site got reasoned responses from him and his readers allowing her to rethink her understanding of blogging. There were several examples of this in the blog reviews my students wrote. One student wrote in Norwegian about the English-language blog Stupidevilbastard.com, a popular blog, yet not too popular for the blogger to notice and comment on other blogs that link to his site. The writer of Stupidevilbastard wrote a post wondering what the review meant (April 2, 2004), and after someone posted a very bad autotranslation, a reader who actually had some knowledge of Norwegian wrote a translation in summary in English. The blogger and his readers discussed the review, calling it thoughtful and interesting. A day later, the student who had written the review emailed me in excitement: "Look!" I have rarely seen a student so happy with the reception of a paper.

A less fortunate response came from a local blogger whose blog was reviewed by another student, Karina. Karina had selected a blog written by a man living just a few suburbs away who appeared to write about his depression and unemployment with very few filters. He also gave his full name in his profile. A few days after Kristina posted her review of his blog, this man wrote an anxious blogpost titled "Help, I'm under surveillance and being analysed!" where he explained how he came across her review of his blog and was horrified at the idea of strangers not only reading what he wrote but dissecting it. "Maybe I should stop blogging? I don't know. I liked emptying my thoughts onto the net, but I never dreamed it would go this far."

This is not a game. Performing in public means performing with real people, who have real feelings and real lives. Students' writing means something outside of grades and credits. This can lead to exceptional learning opportunities and great empowerment, but it also requires caution.

I had approached student writing about weblogs as a humanist, not a social scientist. I had considered what it would mean to my students to work in public, but it hadn't occurred to me that other people would become involved or that other people could feel hurt. I approached weblogs as deliberate publications and as texts, much as I would a short story or a movie or the letters to the newspaper we were sometimes asked to analyse in high school. Writing a review of a blog was as natural to me as writing a close reading of a poem. But while this

is a perfectly legitimate assumption, it's clear that not all bloggers understand that their writing is, in fact, published, openly accessible and that it will be archived. Though my students knew that their work was publically accessible, the extremity of the dialogue was not clear to all of them. Their work wasn't just going to be read by their teacher and their classmates and random strangers – the people whose work they discuss were going to be reading them. Vegard Johnansen, a Norwegian blogger whose blog was amonged those reviewed by my students, was comfortable with having his work reviewed, but argued that out of consideration for the individual writing the blog, you should avoid reviewing blogs about which you can't write a positive review:

"When you review a blog or a personal website there's always an individual who wrote it, so you should write a positive review of a site you enjoy rather than a lukewarm review of a site you dislike or aren't interested in." (Johansen 2004)

To what degree should we protect students from the world? If their weblogs had not been publicly accessible, the people whose blogs they wrote about would never have known and they would not have responded. One blogger would not have had his feelings hurt, but then again, he would have mistakenly continued to think that his writing on the web was somehow private. My students would not have experienced that writing online requires you to think about your entire audience, which will likely include the people you're writing about.

Is it ethical not to provide students with opportunities to perform in public? My eight year old has been learning to play the violin for just over a year, and has already played at five public concerts. Why should learning writing or thinking be different?

## Continuing blogging

By the end of the semester, most of my students said they enjoyed blogging and had found it valuable. There were still some who hated it, and most of the students stopped blogging when the semester was over, but about 20% continued. Now they post about the new courses they're taking, about politics, about books they're reading, about partying after exams and going to Spain or Asia for a summer or a semester. These students have learnt a way of supporting their own learning. They've learned about a new tool for thought. Probably

weblogs aren't the ideal way of "flexing intellectual muscles" for everyone, just as playing football or aerobics classes don't suit everybody's needs. I think that it's important to expose students to a broad variety of methods for thinking and learning so that they can adopt the methods that suit them the best.

Most important, though, is the need to teach our students is network literacy. We need to work out how we can teach writing in a distributed, collaborative environment, because this is the environment our students are going to live in. Network literacy means linking to what other people have written and inviting comments from others, it means understanding a kind of writing that is a social, collaborative process rather than an act of an individual in solitary. It means learning how to write with an awareness that anyone may read it: your mother, a future employer or the person whose work you're writing about. Yes, it's difficult. The internet is not a game.

# Self, video games and pedagogy

*Jenny Weight*

In 'We can remember it for you wholesale' by Philip K. Dick (2000) a short story reconceived in film by 20th Century Fox as Total Recall (1990), the protagonist Quaid ceases to know how to distinguish between simulated and historical experience. This results in confusions and complexities surrounding his identity. We live in a culture characterised by moral panic about this ontological confusion, as explored by Baudrillard (1994) among others. Identity and reality are meant to be coherent, integrated and stable. If we decouple identity and a naïve concept of reality, we face ontological disintegration if not moral decrepitude, both being the result of a relativism born of a more complex concept of the real.

In media contexts, this moral confusion about reality and identity results in questions about what types of immersion we should value. Newer forms of media, such as video games, often bear the brunt of this question. The sorts of questions posed in mainstream media surround whether privileging experience in video games under-values non-mediated experience; or whether immersion in video games is different (or even worse) than immersion in other media.

Your attitude to whether teachers should harness the video game as a pedagogical tool is flavoured by your attitude to reality and identity. This is not just a question about content, it is a question about what types of experience should be valued. As a tertiary teacher, I value video game experience because it offers a performative way to explore the nature of human identity. Through video games, self-identity can become the subject of a student's experiment, as the possible real is almost infinitely expanded in a range of possible worlds limited only by a programmer's and a designer's imagination (roles that the student her/himself will increasingly fill).

Ultimately, our questions about the real are answered by the identities that result from our experience in the world/s that we explore. I will argue that creative people such as my students explore and expand their own creativity if they are better attuned to who they are, which is always contextualised by other people and the world/s they are immersed in. This is where video games are helpful.

## A technosocial pedagogy

We are always immersed in worlds, including worlds that are partly created by technology. Any computer-mediated exploration of identity is a collaboration with the affordances of the device, and that itself has an impact on ideas about identity. As we inhabit, explore, create and communicate our identities via the apparatuses that pervade our media-saturated lives, a technosocial nexus comes into operation which simultaneously challenges our ideas about social relationships and self. We feed the results of our technosocial engagements back into the system that creates the terms of those engagements, and the self dynamically evolves. Programmed media such as video games offer a prime venue in which identity, community and the apparatus are explored. A liberal education would include such exploration in its curriculum.

I teach undergraduate and postgraduate courses in the media discipline. Before you can create interesting, engaging media for other people, it is necessary to have a clear idea of who you are. Many of my courses thus involve a level of self-exploration, in which media-making is explicitly tied to positionality: whatever you express, you ultimately express yourself, so you may as well make this overt. Video gameplay can help students develop a sophisticated sense of self, and furthermore, a self that is more easily available for sophisticated theorization. Video games can act like a side-show mirror: you see your self, but it is a self distorted, and as a result you explicitly contrast and compare what you see with what you understand to be 'really' the case.

Video games possess a range of material, symbolic and interactive affordances in which users make choices to progress the game scenario. This is a performative experience, and a feedback loop between game and user emerges.

The experience of game play establishes a very different relationship with the player than media such as film. Playing a video game requires collaboration with the apparatus (and possibly with other human players). The relationship between programming-apparatus-player establishes an ontological 'vanishing point' (immersion) in which the real becomes indistinguishable from the simulated. As immersion takes hold, the simulated world becomes the (only) world; that which vanishes is 'nonmediated RL' (external, physical, geographical reality), and with it, ideas about the separation of audience from spectacle. Depending on the simulation, what remains is self, community and world (gameverse). So what learning can be done in these environments?

## What do we learn from video games?

Elsewhere in this volume, Ian Bogost describes traditional approaches to education which promote 'schooling not education'—that is, teaching conformance to approved knowledge. He continues:

"Ironically, the real promise of videogames seems to come almost entirely from the ways in which they do not participate in the traditional processes of institutionalized education, ways that upset the very notion of what it means to study."

James Paul Gee's concept of critical learning underwrites the nontraditional education that video games provide:

"…the learner must see and appreciate the semiotic domain as a design space, internally as a system of interrelated elements making up the possible content of the domain and externally as ways of thinking, acting, interacting and valuing that constitute the identities of those people who are members of the affinity group associated with the domain." Gee 2003 p. 40

A critical learner is a highly self-aware individual able to critically assess, compare and contrast the various environments ('semiotic domains') s/he finds her/himself within. In other words, the side-show mirror reflection of him/herself that the video game provides is not naively accepted, but critically examined. This type of learning is at best implicit in the Army Science Board Summer Study (2001 quoted by Macedonia (2001, p. 158); discussed also by Mindy Jackson in this volume) which lists skills that video games promote like multiprocessing, context switching, and information literacy. Such skills may further give rise to:

- discovery-based experiential and example-based learning;
- concrete as opposed to deductive and abstract reasoning;
- organised intelligence organized in easily accessible databases; and
- community of practices through knowledge sharing;

all skills which are pertinent to critical learning. However, while the Army Science Board Summer Study may give passing recognition to critical learning, this type of learning is not generally harnessed in learning contexts. In humanities pedagogy, the belief that video games privilege 'functional knowledge over declarative knowledge' (Kurt D Squire in this volume) means they are doubly undermined as a pedagogical tool. Not only are video games consid-

ered to hinder acquisition of traditional academic skills, but critical learning is eschewed in conservative humanities curricula in favour of content-specific, well-defined, canonical bodies of knowledge. Clark Aldrich (in this volume) points out that video game-based learning 'is emotional'. Video games require interpretation of detailed and subtle real-time feedback about unpredictable gameworld scenarios; they result in post-play reflection of experience. Such emotional, personal experience undermines the acquisition of the rational, dispassionate skillset of academic argumentation in favour of development of a subjective, emotionally-engaged and explicit positionality.

## Identity work

For students in the creative industries, exploration of personal identity is the prerequisite for creative, sophisticated, engaged production: understanding who you are, your own strengths and weaknesses, your privileges, blindspots and disempowerments with regard to broader society are prerequisites to being able to speak to that society. Understanding the communities that you belong to and don't belong to allow you to develop a sophisticated sense of the relationships you have with other people. Seeing how other people see you is part of this self-understanding.

Experiencing the self in other environments is often a seminal experience for young adults when they first go overseas. Playing video games similarly engages a sophisticated and complex meditation on individual and collective identity, in the face of evidence about alternate ways of being.

The extent of identity work available through video games is too broad a subject for this paper. Certainly, it is a chaotic, 'fuzzy' style of learning that George Siemens (2005) suggests is one of the characteristics of life-long learning. I will confine my discussion to two types of video game identity work.

1. Identity work via mythic themes

In role-playing games (RPGs) players assume an heroic avatar and reprise mythological heroic figures, which are 'universal archetype[s] recognizeable across all the variations of culture, author, and medium' (Murray 1997, p. 137). The heroic avatar is placed at the centre of the gameverse, a similar situation to theorist of mythology Mircea Eliade's (1959, p. 65) description of the mythic hero at 'the very source of absolute reality, as close as possible to the

opening that ensures him communication with the gods'. That is, the player, through her heroic avatar, assumes responsibility for creating the world and ironing out chaos, much in the way mythic heroes do.

Players in RPGs perform in mythic scenarios via super-human avatars. For example, Eva Liestøl (2003, p. 340) draws a parallel between the game Duke Nukem and the myth of the minotaur and the labyrinth. The game performs a myth of rebirth of masculine identity, like many myths before it (p. 342):

"Although the masculine body of Duke is absent, his voice reminds us of his masculinity and of his role as combatant. If we hesitate to realise this role, our inactivity is responded to by Duke's ironic remark that tells us that questioning our role is ridiculous".p. 347

Thus the player learns to perform and conform to a set of behaviours and values associated with this type of mythic figure.

Playing an RPG, a player feels herself to be a witness to meaning creation and universe generation. On the other hand, she is also co-conspirator in the creation of the world - the events that unfold and the pace at which they unfold. She is radically integrated in the world. In a good RPG, her avatar is pivotal, responsible and able to evolve. The learning required is not merely how to use the available weaponry: it is also about ideals of social behaviour articulated within the moral universe of the game. Learning a gameverse triggers explorations surrounding the coherence of the world and its scenarios. The player needs to understand the purpose of the hero, and agree to the moral universe that surrounds the hero. If the player cannot conform to that moral universe (for example, because s/he finds the gameverse too violent or too scarey or too sexist), s/he may not be engaged with the game and its hero. That, too, is a learning experience about identity. Learning an RPG happens on many levels, and engages ideas about identity in many ways.

Similar mythic and heroic narratives exist in films and novels (Eliade 1957, p. 35). However, narrative alone can't 'carry off' the immediate, experiential aspects of being a hero in a mythic universe. Although RPGs have cornered the market for mythic experience in contemporary media, the RPG hero-avatar experience can be compared to another type of culturally produced immersive experience. Here is an extract from a Swampy Cree Indian narrative poem called 'Wichikapache goes walking, walking' (Norman, 1982, p. 138). This poem follows the adventures of Wichikapache, a trickster character with shamanic abilities.

He went walking.
It became winter then.
The forest
was covered with snow.
Ahead,
he saw some huts.
Children were playing around them.
He called to one, 'Come here little brother
I need your help.'
The child came over.
'Tell me,
where is the head man's hut?
Which one is it?'
The child pointed at one.
Wichikapache went to it and walked in.
The man inside said, 'Welcome,
sit down.'
He was given some food.
'Don't get too comfortable,'
the man said.
'We move around a lot.
We've moved four times in the last five days
In fact, in the morning we'll move again.'
But Wichikapache undressed.
He took his clothes off
and hung them
over the fire to dry
from wet snow.
Smoke went into them.
Then
he lay down and fell asleep.
In his dream
he went walking . . .

This narrative is reminiscent of the experience of assuming an heroic avatar in an RPG. Like Wichikapache, players spend a lot of time 'walking' to find characters to kill or learn from. A common trope of both types of text is the attainment of superhuman powers by coming to terms with the environment.

The sense of achievement you gain from becoming an expert manipulator of any environment is addictive and affirming. When performed in its cultural context, 'Wichikapache' is intensely immersive, as Norman (1982, p. 134) reveals. Video games can also achieve high levels of immersiveness. In both types of text/performance, the lack of an omniscient narrator and the enhanced powers of the player character/trickster have implications for the position of the major character. As Wichikapache announces:

I made this world ... Norman, 1982, p. 140

Roy Ascott has argued that the Internet is a potentially shamanic environment (Ascott 1990; Shanken 2001), however, RPG immersion is often an isolated, individual experience, without the revelatory and cathartic cultural reverberations of culturally sanctioned shamanic performance. Networked, community-based simulations such as Second Life may offer environments that better replicate the psychological conditions for truly mythic experience, however most of the behavior encountered there is not structured in terms of identifiable mythic themes.

2. Identity work in digital communities

Second Life (1999-2007) is a massively multi-user possible world - that is, it's not really a game with quests and conclusions, unless they are self-imposed. In Second Life identities and lifestyles can be invented. Whole islands and everything on them can be designed. People communicate in varied ways via their avatars. Second Life sits at the interactive 'rich media' end of a continuum of social software which includes blogs, media sharing sites, and friend-making sites.

Elsewhere in this volume, Tom Abeles argues that 'second generation e-learning' is an arena in which education institutions must engage contextually, with community in mind. In social software networked environments, issues of identity and community are concurrently explored; the ramifications of experience there can be strongly coupled with life offline (if such a distinction remains meaningful).

Some 90 educational institutions, including my own, are currently experimenting with using Second Life in the classroom. In my own courses, I am encouraging students to create symbolically meaningful self-portraits using the available tools to build not only avatars, but also environmental features. This project is inspired by Ulmer's description of a 'wide image' (2003, pp. 10-19), which is a symbolically-rich image students create about their own identity. My students are required to create this image within Second Life. The point of this activity is not only to create media and experience these creative, networked communities, but in the process, and almost 'by accident', to create self-reflective professional practitioners.

Reflective practice is a significant strategy in critical learning, and one role of the teacher is to implement reflective exercises which encourage it. Built into

my Second Life assessment are tasks about explaining and justifying activity with a range of social software in terms of its relevance to a student's development of his/her wide image.

As Ulmer (2003, p. 1) points out, the first thing to notice about this activity is that it is public. Instantly, the student has a different relationship with their learning, and is responsible for it in a different way than if the work were seen by the teacher alone. The evolving technosocial self learns that it is always contextualised by the various mediated communities in which it is immersed. Your sense of the multiple real impacts on your sense of self, and as such facilitates the development of contextual subjectivity and identity 'mashup' (Berlind 2006; Shapiro 2006).

Second Life is used in relationship with other forms of social software in my classes. My students and I form communities of interest using networked social software; we publish (text, image, audio and video) on topics of common interest on the Web (most commonly to our blogs). Such media-making can even be published back 'into' Second Life and gifted to other Second Life avatars.

Posthuman identity blues

The struggles my students have with networked publishing often concern identity. On reflection, even the MySpace generation finds the process of creating a public self somewhat confronting. The idea of responsibility for what they publish to a community of interest becomes more complex the more it is explicitly made an issue; as a result student identities expressed in social software evolve and generally become more complex.

Users of social software – whether they are students or not - often make identity into the explicit theme of their publications. A famous recent example is Geriatric1927 (2006) who posted a video about himself to YouTube, a networked video sharing website. In that video, Geriatric1927 announces he wishes to 'bitch and grumble about life in general from the perspective of an old person whose been there and done that and hopefully you will respond in some way by your comments and then I might be able to do other videos to follow up your comments…'

According to Goldsmith (2006), Geriatric1927 received a half million viewers in the first week. His success is an example of a strong prosuming impetus to make identity public and therefore perhaps convert life itself into a work of art (Bauman 2000, p. 82). Indeed, Zygmunt Bauman goes so far as to suggest that

for the users of social software, camcording your life makes it real (p.84).

Perhaps if 'the search for identity is the ongoing struggle to arrest or slow down the flow, to solidify the fluid, to give form to the formless' (p. 82), our social software use faultily grasps towards this essentially elusive goal. However, I suggest that such engagements concern the manipulation of fluid identities and multiple realities, and any hope that social software users entertain about making a permanent archive of the self quickly recedes.

What are we assuming when we make the topic of the self central to our mediated experience? Placing importance on the construction of self identity is an aspect of the Western humanistic tradition, one of its sign-posts being the development of the concept of authorship. My students seek to be professional media-makers; the concept of authorship is very important to them and appears to be part of their motivation. When collaborative forms of authorship, or work whose copyright is difficult to enforce, are suggested as viable creative outcomes, my students quite often profess disdain for types of creativity which seem to down-play authorship.

In other words, contemporary (particularly networked) media-making heralds a period of conflict about personal politics and motivation. Collaboration may always have been necessary, but increasingly we are obliged to collaborate with the apparatus, and it is a collaboration mediated by networks. Such decentralised collaborations may allow individuals to wrest some control of the media from dominant media corporations, but the price exacted questions authorship and decenters an individual's importance. In using video games to develop personal identity, are we not therefore reverting to a hierarchy of values that are increasingly out-of-date?

This is a conflict of values that many students find difficult to even entertain, and one that I have not resolved in the classroom. While educators interested in establishing life-long learning practices can use video games to reveal to students the value of learning about the self, we thereby assume things about identity that may remain under-explored.

The way forward does not appear to lie in neo-romantic ideas of immersion, or indeed, in the rage of postmodern ideas that depict identity as a series of more fluid positions. It perhaps does engage a phenomenology of relationships, in which relationships with other entities such as our apparatuses are re-defined. Those relationships may be explored in future video games, but they probably won't be games which belong to either the RPG or the community simulation tradition mentioned above.

# Diving in to Peter Plantec's Brave New World of Virtual Humans

*Bill Crosbie*

Peter Plantec is an incredible salesman. He doesn't desire that you purchase expensive software, specialized hardware or servos and actuators to build robots. He is not attempting to sell you anything more than an idea; the idea that the future interface to the technology which surrounds our lives must become more human. He is not seeking to improve the interface to our devices through more easily interpreted affordances, as Norman and Neilsen desire, but by making our interactions with technology more literally human like. He demands that his readers become active participants in building the first generation of this world, and that is what sets Virtual Humans apart from other books imagining the future. You are not alone in this endeavor. The book along with its accompanying CD contains the necessary software and guided inspiration that you will need to make it happen. This is not a book meant to be read casually while curled up in a cozy chair, unless you also have room for a laptop. It is meant to be delved into while at your computer, installing the included software packages and playing with this technology. It is only through working with the agents, as both user and creator that you can start to appreciate the zeal that permeates the author's words on the subject.

The foundation of this work is the realization that it is not presently possible to create anything on the order of a true personality or intelligence. Furthermore, given current research into the quantum nature of consciousness(Plantec, 2003), and the incredible complexity of our language faculties (Pinker 1999), the likelihood of ever being able to accomplish this task is slim. The author permits, in fact encourages, his readers to skip over sections of this chapter to prevent them from getting bogged down early in the book. My admonition to you is to ignore this advice and to cling to the argument presented, by your fingernails if need be. The argument is difficult, but it has a remarkable liberating effect. Since there is no way to realize an actual virtual consciousness we are free to employ artifice instead.

The bulk of the book focuses on the incredible complexity of developing "the illusion or personality". The face we present to the world is a product of genetics combined with an amalgamation of all of the experiences of our lives and our choices in dealing with the events, big and small. Through our experiences we possess a shared vocabulary that transcends language, knowledge of cultur-

al idioms, capacity for empathy, knowledge of how to emote, how to behave and self censor as situations warrant. How daunting a task it is to approximate this in a series of rules starting from nearly nothing? Fortunately, the technical "heavy lifting" has been done through years of research, experimentation and programming. The CD-ROM included with the book and referenced websites are loaded with tools that handle the daunting task of interpreting and generating speech, but they are just tools. What stands before those who accept Plantec's challenge is most intimidating, a white canvas, a blank page, a tabula rasa, software devoid of any recognizable humanity.

Virtual Humans focuses on assisting you in developing the character you want to create. While there are sample files provided to jumpstart your explorations, it is clear that Plantec's intent is that the reader will move beyond working with pre-built agents and begin to let her own creativity manifest. This is a difficult task for the uninitiated. Thankfully, the pages are filled with exercises and techniques that encourage her to step back and challenge her perceptions of her interactions with others, to contemplate the nature of conversation, to observe the language of the body as well as the spoken word, to become a student of humanity that she might more accurately represent it in her creation.

It is interesting that when confronted with the problem of synthetic actors, science fiction author Neal Stephenson opted to place real actors behind virtual characters in his novel The Diamond Age, allowing the communication to take place person to person and relegating the technology to the role of virtual make-up artist and set designer (Stephenson 1995). Confronted with the idea of virtual actors able to respond to a person, Stephenson rejected the idea as too farfetched for his world. The current levels in our technology require us to be bolder, to attempt to anticipate every conceivable response, and like game level designers, to try to prevent users from seeing the edge of our imaginary space while providing the illusion of limitless exploration.

The path the creator walks is more like that of a novelist or screenwriter than that of technologist. Imagine a situation where a woman, Silvia, wishes to develop a character, Andrew, as an interface to her personal information management software. Following Plantec's advice ,she wants her character to be more than a software interface. Andrew needs depth Life for a character begins with motivation. Who is he? Where did he come from? What does he enjoy? What does he dislike? Are there any mannerisms that he has? How will he represent them? How does he respond to a compliment or to rudeness? The author utilizes over half of his book to equip Silvia to inhabit the mind space of her creation, to get to know Andrew as well as she knows herself. In this she can start

to understand how he will speak, how he might respond to a given question. This is of utmost importance, because she will be providing every comment that will issue from his mouth in the underlying speech database.

While the bulk of the book focuses upon the textual, there are nods toward the importance of the visual aspects of the virtual humans as well. Once again invoking The Diamond Age, Stephenson envisions salons where actors have grids embedded in their flesh that allows their performance to be read and instantly mapped to control points of virtual characters, controlling not just gross body movement but also nuanced facial expressions, a permanent, real time version of the performance capture exemplified in the Polar Express, but without the unnatural creepiness evoked by that film's descent into Masahiro Mori's uncanny valley (Stephenson 1995, Clinton 2004, Bryant). At present it is difficult to imagine actually reading body language and facial expressions of a virtual human, but the technical and cost barriers will fall over time. At present the software included with the book allows static images to be mapped as textures to 3D models, and the resulting images to be morphed between key frames. This allows our aforementioned creator, Silvia, to select Andrew's facial expressions, providing the targets through which his image will morph to visually represent pleasure or dissatisfaction. The next likely evolution will be to model facial muscles to achieve greater emotion. Valve software is pushing the envelope of expressiveness in game characters with the animation capabilities of Half Life 2. It has been reported that the facial animation tools allow for such nuanced manipulation that they are being considered as a way to teach autistic children to recognize facial expressions of emotive states.

As costs drop and computing and rendering power continue to increase, virtual humans will need to learn to emote, possibly with entire virtual bodies, and as such will need to learn this from people skilled in this area. This brings to mind the technical expertise that WETA Workshops brought to bear in creating Gollum for the Lord of the Rings trilogy. The technical and artistic know-how was immense, but it wasn't sufficient. There is a great gulf between the initial visualization of Gollum visible for a moment in the mines of Moria and the menacing emotive Gollum of the latter movies. The major difference between the two was not more advanced technology, but increased collaboration between accomplished technical artists and a gifted actor, Andy Serkis. While most developers will be unable to afford the impressive talents of Mr. Serkis, calls to his agent went unreturned, and most users are unlikely to want Gollum as a trusted advisor, it would be nice to be able to examine and interact with a character that was as emotive in real time. In developing agents that must act it is important to draw upon the experience of actors, and in this Plantec steps

aside and encourages his readers to explore the work of Ed Hooks, author of Acting for Animators and an acknowledged expert in helping animators derive true performances from their creations.

When all of the techniques described by Plantec are implemented to their fullest capability, the result is still a very elaborate virtual doll. How might virtual humans be incorporated into society for its benefit? Some ideas espoused in Plantec's work include providing corporate directory and transactional assistance, aiding teachers by being able to provide individual attention to one child, providing companionship for shut-ins and lonely individuals, acting as a personal assistant, interfacing to domestic control systems, and providing deeper, more engaging entertainment experiences. It is already possible to complete a transaction via the phone with some corporations, relying solely upon speech as your input device, and the author shares anecdotal evidence of virtual bots being used in education and of seniors who have developed a strong affinity for virtual personalities with which they have interacted. Home automation systems are starting to be more widely deployed and the costs are dropping for new comers to enter and experiment with computer controlled lighting, heating and appliances. With minimal additional programming it is possible to interface the A.I. bot engines to feed commands into the control software.

From the reviewer's perspective perhaps the most intriguing, or perhaps it is merely the safest, possibility for virtual humans is in the realm of entertainment. In this environment the user/player is entering the world of the virtual rather than asking the virtual to be accepted into our world. Within the "magic circle" of play we are more forgiving and willing to accept some of the limitations of a virtual character. Sadly, most current games that have non-player characters (NPCs) suffer from abysmally short dialog trees with a minimal number of responses (Spector 1999). The NPCs exist solely as dispensers of information and as mild plot devices, not as living entities within a realistic world. Providing interesting motivation for the characters is in direct conflict with their role as a device for furthering game play. It is imperative that they not stray from their scripted spot, their virtual feet either nailed to the floor or placed upon some predetermined path, cursed to walk until their job is complete.

Massively multiplayer games attempt to mitigate the arbitrary nature of virtual people by allowing real players to interact with one another. Unfortunately the world and the NPCs that inhabit it are still dispensers of items (phat lewt), quests and experience. Players are incapable of using their avatars to express

real emotion, locked by pre-determined animation keys and non expressive facial textures. Consequently players have little incentive to buy in to the fiction that there is anything grander occurring in the world apart from the quest for advancement. Also, the act of introducing other human players to the game world introduces conflicting play styles, which may diminish the entertainment experience (Yee). Where is the drama, the humanity, the pathos? As Warren Spector famously stated at the Game Developers Conference, "I haven't cried because of a video game since Floyd died." Can fully realized virtual humans provide the bridge to something other than physics and projectiles based gaming experience?

Michael Mateas and Andrew Stern have attempted to answer this question through the creation of Façade, an interactive drama in which you find yourself at the wrong place, your friends, Grace and Trip's apartment, at the wrong time, the moment when their relationship begins to crumble not just before you, but in response to each and every action you take, place that you look, and word that you speak during your visit (Matteas & Stern 2003). Under development for more than five years, it is ambitious in the way it breaks new ground in the genre. Here are two characters that interact and emote not only with the player, but with each other in ways determined by the multilayered speech and emotion engines. When all systems are working well it is possible to forget that these characters are not real. Of course, the sense of immersion one feels in interacting with Grace and Trip owes itself, in part, to our willing participation in meeting them in their world. In this virtual apartment, Mateas and Stern have imbued the virtual objects of their creation's virtual lives with meaning, allowing not just our words but our actions in this space to alter which conversational and emotive rules will fire and drive the arc of the story. If only this kind of depth could be found in the world of NeverWinter or Norrath. The complex interaction of systems provides a compelling example of what will be possible, if not commercially viable, within entertainment software in the near term, but extremely difficult to implement if the virtual actors need to be able to break through the 'fourth wall' of the monitor and interact in our space.

## A critic's eye

The possibilities do appear fascinating, but these are fanciful dreams of a future which may be long in coming. The present reality is that there are flaws in current implementations of agents, not just in games, but across the spectrum. A

perusal of the sites on the Microsoft Agent web ring revealed that we are still at a cautious experimental stage. The agent websites were mildly interesting, but none of the sites were using the agents in its capacity as an agent. They instead had the virtual human (or parrot or robot) speaking text which could have been more quickly read. The act of speaking the text in a mechanized voice did nothing to improve the delivery of the information. The majority of the sites were also using agents generated by someone else. This led to a limited palette of actions and expressions. The agents were forced to display scripted animations that often did not fit the actual sentiment of the text and resulted in distraction rather than deeper engagement with the agent and the information the agent was providing.

In these sites the agent didn't seem to have a life of its own at all, and this is Plantec's point. If these things are ever to become more than interesting technical toys on the fast track to obscurity then developers need to get to the point where the agents are actually acting and interacting with one another. Incorporating Plantec's ideas about generating personality for the bots is necessary, but not sufficient to realize his goals. The challenge is to provide a level of interaction similar to those provided by Mateas and Stern in Façade, but in an environment where the agents have to perceive and interact with the "real world." The difficulty is that to allow for this to happen the systems must have the capacity to interchange data via a common language or protocol, and an acceptable level of trust across systems at the back end of the interactions must exist.

In his book, Plantec blithely envisions a situation in which he is traveling to a city in a country he hasn't visited before. Upon arriving at his hotel he uses his personal virtual assistant to handle the act of checking in, his software interfacing directly with the hotel's systems. The virtual guide then suggests local restaurants that he might like based upon the restaurants he has visited in other locations and reminds him of gifts to bring home to his family, including suggestions for what they might like and where he might find the items. Instead of having to build up a database of preferences entered manually like software that is currently available, this information was entered and indexed through conversations with the virtual agent. While the book provides the tools to handle the generation and storage of his local preferences, Plantec doesn't describe the technology that sits behind the scenes that allows the agent to know how to interface with the hotel's systems to select a room that will be to his liking and the details of restaurants and shops of this unknown city, but it is likely that it would have to be of similar size and scope to the semantic web specification drafted by the World Wide Web Consortium (W3C).

Plantec's vision ties back to Tim Berners-Lee's desire for the software agents to communicate smoothly via a "Semantic Web". In a Scientific American article in 2001 of that name Berners-Lee posits the following situation:

"The entertainment system was belting out the Beatles' "We Can Work It Out" when the phone rang. When Pete answered, his phone turned the sound down by sending a message to all the other local devices that had a volume control. His sister, Lucy, was on the line from the doctor's office: "Mom needs to see a specialist and then has to have a series of physical therapy sessions. Biweekly or something. I'm going to have my agent set up the appointments." Pete immediately agreed to share the chauffeuring." "At the doctor's office, Lucy instructed her Semantic Web agent through her handheld Web browser. The agent promptly retrieved information about Mom's prescribed treatment from the doctor's agent, looked up several lists of providers, and checked for the ones in-plan for Mom's insurance within a 20-mile radius of her home and with a rating of excellent or very good on trusted rating services. It then began trying to find a match between available appointment times (supplied by the agents of individual providers through their Web sites) and Pete's and Lucy's busy schedules." (Berners-Lee, 2001)

This is clearly in line with Plantec's goals for intelligent software assistants that can act as agents for their master. What the author removes from this picture is the necessity of the handheld web browser and has replaced it with a virtual majordomo who will act intelligently in its stead, freeing up Pete and Lucy, and us if we allow it, to work on other matters. Honestly, when compared with the scope of the W3's scope for how agents will communicate, phones anticipating the needs of the user and controlling the surrounding audio devices, automatic filtering of data based upon agent to agent interaction, the human agent interface seems somewhat trivial, but these initial impressions are incorrect. I am certain that there are many computer users who either don't fully understand the technological environment in which they find themselves and would appreciate a human interface and others who are simply too busy to enter manually all of their details and preferences into a database, but who would love to learn that the information had been recorded and was available after a brief series of conversations that took place at their convenient. The addition of a human interface allows users to interact with and query data stores in a more natural mode. Many users would welcome the appearance of a trusted guide. But would there be real trust? And what happens when that trust is breached?

Suppose a forward thinking company decided to implement some of the sug-

gestions espoused by Plantec and modified their automatic voice system to respond with some sassiness, perhaps flirting with the customer, or making small talk during the lag times. Such a system, properly implemented could generate interest in the company, the elusive buzz of viral marketing. It is conceivable that people would start calling just to interact with the system because it is amusing and engaging. This is innocuous enough, but what if responses were being recorded and analyzed to determine if you fit a desired target demographic? Would your opinion change if the analysis was being performed to determine the ease with which the caller could be persuaded to purchase the desired product? What if you the caller was singled out for a meaningful "heart to heart" with a witty, engaging corporate representative who bantered with and flattered him as an important customer? Would it matter if he couldn't tell that he was speaking to a machine?

While this sounds alarmist, there are already implementations of bots that interact with humans and use the resulting conversation to determine their personality type. (ALICE Artificial Intelligence Foundation) While this bot is explicit in its purpose, others could be created where the interaction is recorded and analyzed secretly. Plantec doesn't ignore these issues in his book. As we start down this blurring of the real and the virtual he wants us to be aware of the pitfalls that arise. The technology is not predetermined to lead us to a desirable end, and for every good application of engaging virtual agents there are unscrupulous and exploitative possibilities to consider.

"Virtual Humans" appears at a critical juncture in the development of agent technology. The crux of the matter is that many present implementations, while interesting on the technical level, is not terribly interesting on the human level. Plantec wishes to advance the field further by encouraging designers to get creative, to have fun in developing back stories and personalities for their creations, to see them as characters and not technical implementations, and as a result to create characters that people will want to not just use, but interact with. This is the right encouragement at the right time. I am looking forward to adopting his design methodology and introducing my students to my first bot, but I am more eager to see in what directions they will take this technology.

Once you get past the "gee whiz" factor that the virtual person is in fact responding to your typing or, even your voice, you begin to realize that the creative work has been done by the design team. This is what makes the promise of virtual humans intriguing for education. It affords us the opportunity to interweave technology, logic, programming, psychology, art, creative writing

and linguistics in a compelling package. This technology shines when the designers surprise an unsuspecting user by anticipating a thread of conversation and allowing for it, even though it may only be tripped one time in a thousand. When a character responds in this way is catches the user off guard with its humanness. The creators know that it is a testament to their masochistic tendencies, their willingness to spend long hours digging into their character's psyche and the production of a rich, deep database of conversational possibilities. To the user, however, it is one more step along the path to believing in the ghost in the machine.

# Why Create a Media and Game Center?

*Drew Davidson*

Game and Media Centers are increasingly being started at universities around the world. Back in 2002-2003, I worked with my colleagues and successfully established the Applied Media & Simulation Games Center (AMSGC). The AMSGC is housed in the Communications Media Department, in the College of Education and Educational Technology at Indiana University of Pennsylania (IUP) in Indiana, Pennsylvania.

The following seven sections provide an overview of the ideas and initiatives that went into the creation of the AMSGC:

- Why Create a Media and Game Center?
- Student Involvement / Student Experiences
- Hands-on / Project-based Learning
- Interdisciplinary Involvement
- Mission/Focus
- Research / Funding / Organization
- Process / Collaboration

## Why Create a Media and Game Center?

The original inspiration for the AMSGC stemmed from my involvement with Dr. Sandy Stone's ACTlab (the Advanced Communications Technology Lab) at the University of Texas in Austin. Dr. Stone has created a place that continues to serve as a beacon for motivated students to gather, learn and do amazingly creative work together.

The defining drive behind the proposal and work for the AMSGC was to create a center for the students in various departments, colleges and IUP as a whole. We wanted to create a space and place for students to do hands-on, project-based media and game work. At the same time, we believed that a center would serve as a locus and focus for this type of work on the campus. It would enable IUP to better illustrate its technology and media capabilities to recruit students and win grant and research work. So, the AMSGC is there for students and faculty to apply what they learn and teach through media and game projects.

Creating a center helped lay the foundation for growing, both in prestige and acknowledgement, but also in advancing on IUP's capabilities to create, and teach, cutting-edge applications and techniques. Without a center, this type of advancement could occur, but with its mere existence as an entity, it can enable more opportunities to facilitate growth at IUP than would have been possible without this focus.

The name for the center is meant to honor the history of media work that has been done in the Communications Media department and highlight games as a new direction of focus. With AMSGC officially recognized, it can be a base to continually draw interested students and offer them engaging learning experiences in which they work together and apply their ideas to create media and game projects.

## Student Involvement / Student Experiences

As I've mentioned, the AMSGC was created primarily to serve the students at IUP, but it also needs students to become involved. Without students there wouldn't be a center because there wouldn't be any energy or people in which to populate the projects and help complete the work.

A large part of the effort was to run a university-wide PR campaign to garner and increase student involvement. This campaign was organized with the help of students, working to understand the general interests of the student body and how to craft the center to meet those interests. While communicating with students, we discovered several interesting and prevalent misconceptions about that center that we quickly worked to correct.

First of all, many students assumed that they had to have a major in the same department that housed the center. So, we announced that the center needed and welcomed students from other disciplines across the university to get involved.

Second, students thought they had to be a production media specialist and/or a computer programmer. While we needed students with these artistic and technical skills, we worked to communicate how we also needed students who are interested in communications, operations and management.

Third, students assumed if they missed the first few general meetings, then it

was too late to get involved until the following semester. So, we made more public announcements letting them know that they were welcome to get involved at any time.

Fourth, students believed that it was solely a game center. While the AMSGC has a strong emphasis on creating and studying games, it is an applied media center first and foremost. So, we worked hard to also emphasize all the types of media work that could be done through the center (films, television, musical cds, games, simulations, etc.)

Finally, graduate students thought it was for undergraduates only. We quickly worked to let graduate students know that their involvement was greatly encouraged. Both graduate and undergraduate students could learn from each other working together on projects.

This PR campaign helped us get close to 75 students from all around IUP involved initially. We then planned to build on this involvement so that more and more students would understand how they could participate if they're interested.

While the center definitely needed the students, it offers them invaluable experiences in return. They have the opportunity to meet other students and faculty and create engaging media and game projects and get real-world-applicable work experience.

## Hands-on / Project-based Learning

The primary reason for the center is to allow students to apply what they learn in courses through hands-on, project-based learning. This gives students invaluable learning and working experiences. They learn the ins and outs of how to collaborate on a team. They also learn project management skills as they work with timelines, deliverables and the process of designing and developing media and games.

We worked to highlight existing courses at IUP that offered students the information they needed to better apply themselves on projects. We also worked to illustrate the interdisciplinary nature of projects by highlighting courses offered in various departments around campus (Computer Science, Business, Art, Journalism, Communications, English, etc.).

Concurrently, we worked to develop new courses that would enhance what the university already offered and give students more courses from which to choose and build their skills and knowledge.

The goal was to have AMSGC enable students to construct their own learning experiences by working directly on projects together and creating engaging media and game experiences. This hands-on, project-based work would also give them portfolio-worthy material as they moved forward to begin establishing their careers.

## Interdisciplinary Involvement

The AMSGC developed out of the interdisciplinary support of students, faculty, and administrators from departments and colleges around the university. We worked hard to garner this university-wide support and input.

This was a strategy with several objectives. One, we believed that applied media and simulation game projects require a wide diversity of skill sets and knowledge bases. Also, the projects running in the center would need, and benefit from, interdisciplinary expertise and involvement. Two, it greatly facilitated and expedited the political and bureaucratic processes that had to be traversed in order to establish the center. There was always the potential of opposition to the idea of a center, and having a wide base of support helped work through it. We had some initial opposition at IUP, but our interdisciplinary approach gave the proposal credibility and helped to assuage concerns. The more university-wide support we were able to show, the better our proposal was received and considered.

Specifically, we noticed that the following college areas had vested interests as to the perceived area of study of a media and game center; computer science, business, math, art, and communications. We worked to include all of these areas and created a collaborative effort with our proposal.

In the end, interdisciplinary involvement helped ensure that we could create truly engaging media and game experiences across a vast range of genres and subjects areas. It exposes students to faculty outside of their majors and fosters a culture in which working together is encouraged, and the benefits are seen in the creation of a projects that sum up the strengths of all involved.

## Mission / Focus

It was a great help to have a strong mission statement and center focus developed early in the process. Having both of these facilitated the approval of the center by giving concepts for people to discuss and to which they could give their support. It served as a solid first reference to give to faculty and administrators and helped introduce them to the idea of the center.

The initial mission statement was composed in two parts; one focusing on the bigger picture and the other on the benefits for the students involved. Our mission statement is:

AMSGC is dedicated to exploring current and emerging multi|media technologies | including all communications media | audio | video | graphics | etc. | to enhance communication experiences and environments | the interdisciplinary juxtaposition of entertainment and education, teaching and technology | critical thinking | conceptual foundations | concrete skills

AMSGC students will get | a conceptual understanding of communications media | theory and practice | a practical knowledge of the development of multi|media | humanities and technologies | an interdisciplinary grounding in their field | experience and expertise | a grasp of how to apply what they have learned

Our center focus is a series of connected concepts which is also composed in two parts: playing | learning | working | communication and media | applied theory | open source | enabling people to use technology | exploring concepts and developing skills | empowering people for change

AMSGC succeeds through collaboration | through groups of people working together to achieve more than one could alone | learning how to communicate | collaboration internally and externally | with each other | with other groups | with the world |

This expressive mission statement and center focus served as a spark for the ideas, shaping how we developed the goals and objectives for the center.

## Research / Funding / Organization

To advance the initial focus of having the AMSGC provide a new learning outlet for students, we organized research initiatives to encourage faculty involvement and start a process of securing regular funding and projects in which students would have the opportunity and responsibility of working with clients. This afforded research opportunities for faculty, and good PR for the university, as well as providing learning experiences for the students.

We also develoed processes to work with internal and external projects, and organized how students would get trained and promoted from working on volunteer-based projects to client-based projects.

For our volunteer-based projects, we set up an ongoing project that is essentially a student-operated and student-run multimedia station. This station would serve a dual purpose of enabling students to get together and work on projects as well as being a training ground. Students would have the full support a faculty advisors and technical equipment as they work with timelines and deliverables. They would also learn the process of project management and how media and games are designed and developed. Newer students would be working under more experienced students who would mentor and provide support. Students who stay involved and are interested can take on more responsibilities at the station and begin leading station projects.

Client-based projects are funded through grants or contracts. For these projects, faculty would be able to work with students from the station who already have experience and are prepared to accept the opportunities and responsibilities of working with clients. These funded projects would offer students work experiences with financial compensation and direct interactions with industry professionals and other clients.

So, the AMSGC would help coordinate faculty research efforts, which in turn would give students great learning experiences working on projects through the center.

## Process / Collaboration

As seen in the AMSGC focus, collaboration was a keystone to the center. Throughout the entire process what enabled the initial approval, and allowed for opportunities in the future, was the openness to collaboration.

It was crucial in developing the growing community around the university, and on local, national and international levels. By simply looking to include anyone who was interested and working to create a system that helped organize and maximize everyone's contributions we wee trying to foster an environment in which students learned how to share their expertise and experiences as they worked together applying what they've learned.

To help shape our efforts we created two advisory boards. The internal board was comprised of students, faculty and administrators from around the university. The external board was made up of leaders from areas of education, academics, game development and media. These boards helped expand the community while also helping to guide growth.

We strengthened the community further by reaching out to create affiliations and connections with other centers, labs, universities, companies, organizations and associations. One of the goals was to create a synergy of connections and a workforce that would attract more industry development in the region. The network formed through these connections would enable each node in the network to benefit from the articulations and in turn the entire network would benefit from the successes of all the nodes.

Personally, I have since moved on from IUP, but the AMSGC is still thriving and growing. Looking back, I believe that starting a university center is a great way to help focus on an area of study such as new media and games.

# Educational Software Development Sites

*Marc Prensky*

I am writing here about a Big Idea. The idea is that the educational software we use (all of it – games, non-games and anything else, at all levels, pre-school to adult), should be created by the "world mind," should not belong to any of us, and should be available, for free, to anybody, anywhere, who wants to use it. I know this is possible, and I believe it will lead to things being far, far better than what we have today. I also believe it can be done at very moderate cost and at no harm (except perhaps to those now selling educational software for exorbitant prices.)

In a nutshell, the idea is this: universities, colleges, teachers colleges, and other schools around the world each pick a subject and level. For example, I know one school that wants to do Psychology 101. This is a fairly broad topic, as is 3rd grade math, or calculus, or nanotechnology or bioethics. So in some cases the topics could be something narrower, like photosynthesis, or fractions, or second order differential equations. If there are not enough colleges worldwide to cover all the topics we need, we could then let the best executors do multiples.

The school that picks each particular topic (we can hold lotteries, if necessary) becomes the "home" for all educational software developed in that field – by everyone in the world working together. All development and serving would be done by software on their own systems (when this gets big, they may need grants). But starting relatively small, with some simple, open-source internet-based software initially created for the project (not much more, probably, than internet-based frameworks, tags and extensions useful to learning and gaming), each school would post its own material.

The absolute requirement, however, would be that everything every school does be open, in at least 3 ways:

1. They will required to constantly comb the world for good things that are out there and add them to their system, organizing them in useful ways for learning and teaching.

2. Their software (and organization) will all be Wiki*, (or some variation) so that anybody can add to it. All teachers and students around the world in the

subject would be encouraged to do so. (With Wiki it is easy to keep the good stuff and screen out the bad stuff, and more tools would be developed over time to make this easier.)

* A Wiki site is a web site that all can access with administrative rights and therefore change. A good example of wiki in use is the Wikipedia, a free encyclopedia written by people on the internet, at http://en.wikipedia.org/ . For more, see "Digital Immigrants Remedial Vocabulary" at www.marcprensly.com/writing/default.asp .

3. Anything good and useful (idea, tool, content or anything else) developed by any of these sites anywhere in the world would (because the system would require it) be quickly adopted by all the others, so that the software at all the sites would remain at the state-of-the-art.

What would this give us? First, an educational technology system that is worldwide and where everything works together. Second an educational technology system that everyone in the entire world interested in education (student, teacher, expert) contributes to. (If a teacher in a remote place has developed a great way to teach the division of fractions, they can share it, potentially, with every learner in the world!) Third, an end for schools having to decide which proprietary system to "go with," only to forfeit the benefits of the ones they don't pick – our free, open system will have all the best components of all of them. Fourth, a way for classroom teachers, home schoolers and all students and learners around the world to have access to the best and latest ideas and technology for free!

Sound fantastical? Pie-in the-sky? It's NOT! This is what the Internet brings (or should be bringing) us! (MIT has all of its content online already. This just takes things a bit further.)

Let me quickly run through some potential objections:

1. Nobody will pay for it.

I strongly disagree with the premise that that learning software needs to be paid for by the people who use it, or even make money. Who says so? In my view, that's like saying education needs to make money. The education of our young people is a public service. What we do need is a way to support education and its tools, and support creativity in their creation. But there are many potential models for this. One of my current projects is to explore new business models

for educational software: see the article "New Business Models for Education" appended here. It is possible to design into this ways for business, government and private foundations to all contribute. (If any reader is particularly interested in this, please write to me directly at marc@games2train.com).

2. You need a company to maintain software in usable form.

Maybe we will need a small one (not-for-profit), or perhaps a standards organization, like the Internet has. But not much beyond that. Look at Linux. That, game modding and other projects demonstrate that people will do enormous amounts for free for something they believe in. We just need to channel their work. Of course developing good educational software, and particularly good educational games, takes creative, experienced teams and people. But these already exist, and many are disposed to contributing pro bono to education. So that an IBM, for example could take this under its wing in a similar way that it has done for Linux, but as a public service.

3. No one will post or input anything

"What people put into the Internet is much more important to them than what they get out of it," says Tim Berners-Lee, the creator of the Word Wide Web. Anyone who believes there won't be input is living in a pre-Internet world – the problem will be too much input. What teacher wouldn't want his or her favorite method, trick, game, etc. seen worldwide? In addition to creating software for content and methodology, a major part of the project's challenge and effort will be creating software to classify, order, link, and facilitate users' finding exactly what they want and need.

4. Then we'll need a lot of help organizing and controlling it.

Yes, and this is where the colleges come in. This is work that is both important to world education, and appropriate for college students, and students should certainly get credit for doing it. As an added incentive, their input will be instantly seen and used around the world to improve education – what better motivator? And who better to write the software than the world's best engineering students? Anyone who doesn't think college students will be excited by the opportunity to help improve the world's educational system doesn't know today's kids.

5. How do the creators get compensated and incentivised to continue to create?

In this system, the creators don't get compensated; the incentive to create and contribute comes out of individuals' interest in educating the world's youth – people under 25 now constitute half the world's population. Creators and contributors will have to get paid for doing something else, – e.g. teaching, doing the same thing for industry, or an unrelated job. They need to be doing this in their spare time (i.e. the time they devote to their volunteer efforts.) We are not asking anyone (other than students, who are compensated in credits) to devote their whole careers to this. In fact, the reason it works is that rather than a few people doing this full time for pay, we have many millions each putting in a little for free.

Not all creators are motivated by money. The experience of the Internet is that people –many of our very brightest people, in fact – will do amazing amount of work and accomplish amazing things for free if they believe in the cause. Tim Berners-Lee, a world-class scientist, not only created the World Wide Web because it was something he though should exist, he deliberately rejected the financial siren song of the Internet bubble. Teams of gamers make entire huge games (i.e. mods**) for free, both because they enjoy the process, and because they want to show that they can. In fact, I submit that if everyone who is in the educational software business to make money – or even "to earn a living" – got out, we'd still have more than enough people, and possibly the best people, to do the job.

** Legal "game modifications," using software tools that ship with many commercial games. For more, see "Digital Immigrants Remedial Vocabulary" at www.marcprensly.com/writing/default.asp .

6. What is the business model, then? Where does the money come from?

This is what we need to, and are trying to design. See the attached piece, "New Business Models for Learning," for some ideas. It is clear to me that if we do this right, business, government and private foundations will all help when needed, since it is to all of their benefit to have a better-educated population.

## An Example

Here's an example of how I see such a system working in one area I know well: educational games.

Say College X takes on Psych 101 as its topic. They put out a call on their soft-

ware for game ideas, presenting the major curriculum topics of the standard Psych 101 course and asking, rather than for a whole game, for game "levels" to be designed for each main topic.

This call is publicized to psychology departments worldwide through the usual academic Internet channels. (In the long run everyone will know to come to www.psych101.college.edu , or whatever it is called.) Teachers announce it to their students. (We might provide some incentives here, like "If a good idea comes from your student body…"). There are also other channels, such as game sites to reach students directly. (Note: This part is not pie-in-the-sky either. The Liemandt foundation, which recently announced a contest for college students to create games for middle schoolers had thousand of hits on their site the day of their official announcement.) Teachers, of course, can also contribute.

Hopefully the college (perhaps in conjunction with its computer science department) creates (or finds) some good open-source software for talking in submissions and sorting them in a useful way. This software becomes part of what is now shared with every college for every subject and is used by all – until someone improves it or comes up with something better. In this way the underlying software, at all schools and in all subjects, always remains state-of-the-art.

Using this software, users from around the world post their submissions (originally in English, but eventually translation – human and machine – could be made part of the system), and College X invites users to comment and vote on them.

After an appropriate time, the call goes out on the site for people to unify the best topics into a game – again with submissions and voting. In the meantime, some of the levels may be exciting enough for people to want to begin to create them – they are invited to submit and post online prototypes.

And once those prototypes are online, they can be, and will be used and field-tested in classes or by anyone studying or teaching or interested in Psych 101 topics. Every student in the world taking Psych 101 will have an incentive to come and use the site, because it will help them understand better/faster. Hopefully some of the world's experts in the field – with their kids – will also chime in here with ideas and contributions.

In time, some of the prototypes will be deemed so good, via usage, voting and comments from teachers and students, that they will be sent out for "profes-

sionalization." This will be done either by the big game companies working pro bono, or by designers, programmers and artists interested in education who have already made their millions, or by anyone who has the skills and wants to contribute. It could also be funded by foundations, or by companies like Microsoft, which has already given money to colleges for educational games. Instead of taking a chance on one small group's idea of what might work, the funders will be backing the improvement and upgrading of something proven to work.

(Note: since the sites aren't only for games, every online teaching and learning aid in the world related to Psychology 101 will be posted, subject to the review by the college for suitability and correctness (but not for presentation – new ways of presentation is precisely what we're looking for!) Another thing the colleges would be involved with is measurement and evaluation of the software on their sites – again sharing their methodologies with all the other schools for replication and continuous improvement.

## The Principle

Here's the underlying principle: We allow no proprietary ideas in education, and we get the world to develop the ideas into products which anyone can use for free. Can there be proprietary executions of ideas? Sure, if you think you can compete with the entire world working for free, go ahead. Let the best model (for the students) win! But where sites already exist that do some of this (and they already do), those sites should be either consolidated voluntarily into our model, or copied and usurped to the very limits of the law (and some – of course not me, here – would advocate beyond) in the name of all our kids.

## Getting Started

It shouldn't take much to get started implementing such a system. All it will really take is for 2-5 colleges or universities to volunteer (I already have two.) The schools would agree to assign teachers part-time to the project (i.e. the school pays the teachers – not a grant), and to offer a course or courses in educational software development as a part of the standard curriculum, for which the students would receive academic credit. Each school would need to decide on a topic for its specialty, and to coordinate between its department or school of education, its department of computer science, and the department of the

school's specialty (and any other relevant departments, such as psychology or learning science) to create an implementation team.

Seed money, of an amount to be determined, would be used:

- to help set up the initial web sites,
- to create some common base software,
- to pay an initial coordinating team, and
- to publicize and offer rewards for breakthrough successes.

During the first two years, the coordinating team would work with the implementation teams at the various schools, together and independently, to get things started.

The pace of the project would be a business pace, not an academic pace. The goals would be to have the overall designs coordinated by month 3, to have the sites up and running by month 6, to publicize the sites by month 9, and to determine the program's future needs by month 12. Only people willing to work at this accelerated (for academia) pace would be accepted on the teams. Student team members would be solicited from day one.

By focusing each participating school on one single academic topic (with no duplication) we will retain the competition we want among different ways to learn the material (they are all up on the site), but avoid wasteful duplication and competition we don't need between schools (i.e. my Psych 101 site is better than yours.) However all schools will still compete to create better ways to present, display, share and evaluate online teaching and learning – ways that they will be given "bragging rights" for having invented, as these better ways are shared with all other schools in the program.

Teachers and individual learners will be able to use the sites as soon as they are up, in what ever ways they see fit. At all points their suggestions for improvements (and for what they need that isn't there) will be solicited, and there will be as many opportunities as possible for users to send feedback and for collecting users' success (and failure) stories.

Our goal is the best learning software in the world, produced by the world, for the free education of all our youth. The half of the world that are learners deserve no less from the rest of us.

# Videogames and the Future of Education

*Ian Bogost*

"A general State education is a mere contrivance for moulding people to be exactly like one another; and the mould in which it casts them is that which pleases the predominant power in the government, whether this be a monarch, a priesthood, an aristocracy, or the majority of the existing generation; in proportion as it is efficient and successful, it establishes a despotism over the mind, leading by natural tendency to one over the body." - John Stuart Mill, On Liberty

In this pointed rejoinder, John Stuart Mill teaches a lesson that remains poignant almost a century and a half later: there is a difference between being well-schooled and well-educated. Being well-schooled means being expert in the process of schooling, the requirements and conditions of doing well in school, so as to ratchet up in the system. Being well-schooled means understanding how to stand in line, how to speak when acknowledged, and how to follow direction. Being well-schooled means understanding how the system works and serving as a well-oiled cog in its machinery. But being well-educated means being expert in human improvement, so as to ratchet up in life itself. Being well-educated means understanding how to read and write, how to advance arguments, how to think independently, and how to express and improve yourself. Being well-educated means understanding how systems of all kinds work and disrupting them with new improvements.

In the United States, more and more parents and students are entertaining a rather terrifying notion: our educational system seems so focused on creating obedient, well-schooled masses that free-thinking, well-educated individuals have become the exception, freak accidents that somehow survive schooling well enough to get an education. Some vocal detractors have even given a lurid name to these battlegrounds where the underdogs of education struggle against the armies of schooling; they call them concentration campuses.

Recently, many designers and researchers have become interested in how videogames can serve as forms of cultural expression beyond entertainment alone. As part of this series of discoveries, more and more evidence seems to suggest that videogames are helping people become well-educated, especially through contextual experimentation with complex systems. But, we have paid little attention to videogames' role in the broader disparity between the well-schooled

and the well-educated. If we want to get serious about the future of educational videogames, then we need to recognize and promote videogames' role in the broader overhaul of our current educational situation.

In this spirit, at the 2004 Electronic Entertainment Expo (or just E3 — the apotheosis of videogame tradeshow swank) , two-hundred people packed a small theater in the LA Convention Center for the Education Arcade conference , a two-day event organized by the MIT Comparative Media program. Above the floor where convention center drones wielded NVidia pixie banners, faux-armor bustiers, and other artifacts of videogame swagger, these mostly thoughtful, certainly curious participants considered fundamental questions like Are games educational? The conference would have been noteworthy in any venue, but the fact that it brought education to E3, the mothership of the videogame invasion, served as a small coup in the minds of the conference organizers and attendees. Was an industry often subject to dubious but very public criticism (damaging representations of violence , indolence and obesity , addiction without benefit , precocious sexuality ) finally ready to embrace the potential educational power this medium that moves more money than the movie box office?

The answer was an obvious, but conditional "yes." Obvious because the most thoughtful leaders in the game industry recognize the need for videogames to participate in a multitude of human activities. Conditional because the industry is precisely that, an aggregation of businesses seeking to maximize material growth. Videogames have enjoyed rapid, massive, and consistent growth during a period of general economic decline. I have argued elsewhere that the videogame industry, like any, cannot hope for all of its innovation to come from predictably useful investments alone. But for better or worse, unless game publishers can see a return on investment one to three financial quarters hence, videogame R&D is practically non-existent. Having moved some $7 billion worldwide in 2003, the videogame industry may have no motivation to expand its horizons. Well-known game and interactive narrative designer Chris Crawford offers a oft-cited, if curt summary of this situation: "[Games] abandon all pretense of becoming a mass medium." A mass medium, says Crawford, "reaches a broad demographic: people in their 60s, working mothers, stock analysts, janitors, and so on. Games appeal to NONE of these people; they appeal to a single demographic: young males. They are a big medium, but not a mass medium."

So, the future of educational games starts with an industry that, by and large, isn't really interested in figuring out how, when, why, and to what end videog-

ames might serve the ends of educators. If educational games prove useful, and therefore profitable, then no game publishers will complain. But they certainly won't expend any of their own warchests to pave the road to such a future. And while some exceptional companies will stand out for a genuine interest in the educational power of games, for most such benefit will merely serve as a saccharine nod to stockholders accustomed to double-digit annual growth.

This, in large part, is the current status of videogames. What about education?

As a political issue, education consistently ranked in the top four subjects that most concern Americans in advance of the 2004 Presidential election. A few broad positions on education emerge from the general soup of ire in which the issue simmers. Here's a brief but effective summary:

"Liberal advocates often argue that more money needs to be spent on education, hiring more teachers to reduce student-teacher ratios and raising teacher salaries to levels comparable to other professions. They also argue that educational resources should be distributed more equitably, so students in poor school districts are not left behind. Conservatives often counter that a great deal of money is already being spent with little to show for it, and that control over education policy needs to be returned to the state and local level. Many further argue that private or public school choice will bring market pressures to bear on a system that suffers due to lack of competition."

Despite these general trends, recent years have witnessed an increased federalization of education in the US. Shortly after entering office in 2001, President G.W. Bush introduced a $47 billion educational reform plan that faulted the federal government for its lax participation in educational responsibility. Formalized the following year as "No Child Left Behind" (NCLB) the legislation imposed additional standardized testing demands—especially on primary schools—and increased penalties for local districts that fail to meet national standards. Critics of NCLB most commonly cited problems in funding, accountability, and the utility of standardized testing.

Interestingly, the despondency facing education and videogames seem to have a lot in common. The videogame industry focuses on a core group of proven but unremarkable customers and demonstrates little interest in supporting long-term growth into new gaming products that might expand the horizons of players. The educational establishment focuses on a core group of proven but unremarkable students and demonstrates little interest in supporting long-

term growth into new educational strategies that might expand the horizons of learners. The status-quo must be distilled, not enhanced.

Given the bleak outlook on both the education– and the –games side of educational games, the Education Arcade conference might seem like a train wreck of an idea, the foggy-night meeting of two black behemoths billowing forward on their own inertia. At the conference, critic and veteran educational software designer Brenda Laurel launched into a brisk harangue on the subject, which I paraphrase here:

"School teaches basic skills. It used to do a pretty good job, but now we have a crisis. Starting in the 20th century, school also provides socialization and, more importantly, also babysitting while parents go to work. School teaches test taking behavior. And school teaches about authority: teachers know more and have more power; students have no power. Students' ability to express agency is limited to "petty transgressions" or "achievements of excellence" within the structure provided by the school." "… the teaching of hierarchy is the primary function of public education in America — designed to create an efficient underclass (even if there's not a conspiracy to do so). School trains kids to be good workers and buyers. …" "… Public education does not teach young people to meaningfully exercise personal agency, to think critically, to use their voices, to engage in discourse, or to be good citizens."

These arguments trace a broader trend made most famous by Louis Althusser, who cited the education system as the most important example of "Ideological State Apparatuses" (ISA's), state institutions that function specifically to reproduce the process of production.

More specifically, Laurel raises complaints similar to those of more recent educational critics John Taylor Gatto and Brian Jackson. Gatto is a former public school educator and the author of The Underground History of American Education and Dumbing us Down ; Jackson wrote Life in Classrooms, which argued that there is a "hidden curriculum" in public schools that has converted education into a socialization process rather than a knowledge transmission process. In her Education Arcade presentation, Laurel effectively echoed the sentiments of critics like Gatto and Jackson; education encourages students to conform and identify valid knowledge so they can continue to ratchet up through the system. It promotes schooling not education. Laurel points out that schools teach hierarchy and consumerism; schools are necessary in order to release parents into the working world, where they contribute to the GDP

while taking on greater and greater debt that perpetuates their need to continue to conform in the role of complacent citizen. Recent, more disturbing trends like mandatory preschool seem driven by the need to maximize adults' productivity and economic activity, not to promote educated young people.

Many educators and parents feel that videogames are a threat to education — after all, when kids are playing all those videogames, when do they have time to study? Ironically, the real promise of videogames seems to come almost entirely from the ways in which they do not participate in the traditional processes of institutionalized education, ways that upset the very notion of what it means to study. James Paul Gee, author of What Videogames Have to Teach Us About Learning and Literacy, tracks ways in which commercial off-the-shelf games (COTS) facilitate learning in new ways. Gee has argued that games like Ninja Gaiden teach mastery skills better than just about any other tool we've come up with; games like Pokémon motivate kids to learn reading at a far higher level than the educational resources offered to them during the same ages; games like Rise of Nations teach systematic thinking because they coalesce individual gestures into broader contexts; games like Harvest Moon create sandboxes in which success comes through endorsed experimentation and failure. Gee articulates over 30 "principles of learning" that games enact, including moving toward goals experimentally rather than directly , judging failure as challenge rather than dismay , articulating understanding in relation to one's own specific goals , understanding the interrelations of complex systems , learning in the context of holistic processes , learning content embedded in a knowledge domain , and learning to change embodied action rather than just mental states. Few if any of these strategies become fungible in traditional educational contexts.

Let's review. The videogame industry is risk-averse even if creatively rich, motivated by wealth over art or social change, and riding on a wave of unprecedented success that only justifies its primitive strategy. The education establishment is bureaucratic and self-propagating, endorsing the production of complacent citizens over courageous creators, and riding on a wave of ideology that citizens reinforce. Chris Crawford argued that games abandon all pretence of becoming a mass medium; Brenda Laurel argued that the kind of learning kids need is not going to come up in schools. Laurel goes even further, suggesting that the introduction of games into schools won't help either:

"… Schools are incredibly immune to change. Gaming can't change schools. The kind of learning kids need is not going to come up in schools. When used in classrooms, games become an accessory to the

same hierarchy; they don't puncture the spectacle of culture of politics." "… We don't need computer games in the schools, said Laurel, we need "affordances for young people to exercise meaningful personal agency." We need to engage in a kind of discourse and critique that can make them creative culture makers and future citizens."

Is there any hope for these two sorry specimens of human culture?

Videogames and education are caught in similar whirlpools, and I believe these commonalities suggest commensurate ways to revolutionize both fields simultaneously. If the mass-market purpose of videogame publishers blinder their eyes to education as subject of official endorsement and research, then we must abandon the mass-market sentiment toward videogames and focus on their individual educational utility, as Gee suggests. If the mass-control tactics of educational institutions simulate education while teaching acquiescence, then we must abandon educational institutions and focus on other ways of bestowing educational value.

Put otherwise, the very notion of "Educational Videogames" represents a massive rejection of the customs of both videogames and education. I'm serious about this. If we want to have educational videogames, we are using games against the grain, and education against the grain. And the fact that the one fight takes on two standards at once suggests that there may be some utility in combining those conflicts together.

I want to be clear about how strongly I feel about this. Anyone who believes that games can be educational tools that challenge and expand the horizons of knowledge transfer must also reject the 20th century-style institutionalized education that stands opposed to them. And anyone who rejects institutionalized education in its current form must also embrace videogames as part of an alternative. This means that videogames serve a deliberate and disruptive role as agents of educational reform. And educational reform serves as a medium for the disruptive uses of videogames.

There are a few immediate inferences I draw from this scenario.

First, education and games must become individuated activities, not bulk activities. Initiatives like NCLB purport to leave no child behind by advancing all children, but threaten instead to create a vortex of functional mediocrity into which all children would sluice. If this is what public school classrooms are supposed to look like, then the best place to work with games as educational tools is certainly not in a public school classroom. Classrooms are overwhelm-

ingly bound up in the old guard of education as social training. This means that parents, educators, and game developers must shift their understanding of the use of educational videogames from broad to narrow application.

At the close of the Education Arcade conference, designer of The Sims and Sim City Will Wright put forward part of a vision for education that further clarifies this point. I paraphrase it here:

"Imagine if every student could pursue independent study, and if their interests wander, whatever resources they needed would be available to them. If there were some system observing them, sorting them, accruing credits, without forcing them to do something for a certain amount of time every day, and then try to apply metrics to it, what would that world feel like? I think a lot of kids are doing that right now, when they get home from school, online. But it's invisible education to us."

Wright casually called these individual trajectories "landscapes of learning," pathways that require individual attention to culture and traverse. That kind of attention cannot come from the sluicing vortex of institutionalized education; it has to come from volunteers, outreach organizations, and especially parents.

Second, videogames must become a partner in the much broader discard of current educational practice. Those who value the aggregate effects of better educational horizons and who believe that videogames can serve as part of such horizons would do well to pursue their interests in educational videogames as part of a much more vocal campaign against public education in its current form. That means that educators, developers, parents, and kids who have witnessed the educational promise of videogames must not be content with a vision of educational reform that subordinates valuable educational activity to destructive social homogenization.

To fulfill this charge, parents and educators must consider videogames a part of a set of educational reforms, including exploring alternative options for primary and secondary education. It has become almost heretical to criticize the current American educational system — despite its widely recognized flaws — even though that system is largely experimental and scarcely century-old. Instead, parents and educators should become versed in the multitude of other options available to them and consider these options seriously for their children and careers. Parents, educators, and game developers must become active supporters of these "alternative" educational horizons and active detractors of "traditional" education.

Only then should anyone consider how videogames can become a part of an alternative pedagogical plan. Alternatives include charter schools, school voucher or community organized schools, Montessori, classical and neo-classical academies, and partial or total homeschooling, in which parents can combine many educational strategies. Such systemic approaches to understanding are often heralded as one of the main educational benefits of videogames.

This proposal may sound elitist — who has the time and money for all this anyway? Private education is expensive, and home education demands that parents make massive changes in income and work goals. Many argue that strategies like school vouchers subordinate the educational needs of the disadvantaged to those of the wealthy. Indeed, an approach for a more universal application of this strategy is both worthwhile and important. We need to try to develop a concept of communal interest in education, one more sophisticated than just sending our children off to schools to facilitate productive opportunities for parents.

I can only touch on a solution in the context of this article, but I would suggest that it is a grassroots project. These changes will be very hard to make through legislation; to start, we must focus on communities of learners, in both their classroom and home contexts. One promising option is to consider Paulo Freire's approach to learning reading and writing in underprivileged society. Freire suggests that the best learning takes place in a dialogic process between multiple interlocutors. In so doing, Freire rejects primers and other lowest common denominator approaches to learning in favor of nonformal and participatory strategies that take into account the uniqueness of each learner's place in the world.

Third, the people who make and advocate educational videogames must recognize that they are participating in a controversial process of social reform, whether they like it or not. We cannot tiptoe around the fact that videogames threaten current educational sensibilities. As Brenda Laurel reminded us at the Education Arcade conference, videogames endanger the educational status quo, and as such they are risky, even dangerous tools. In the rare cases when they do take on the medium directly, government and industry may try to homogenize videogames into current modes of educational practice; such strategies are essential to fuel predictable social conditions and quarterly earnings results. As such, it is up to the users of educational videogames — kids, parents, educators, researchers — to relate videogame learning to other forms of educational reform and to follow through on those goals. Such action demands new resources for developing and sharing educational techniques that circumvent the broken educational system.

Fourth, any users of videogames as a part of postsecondary education — college or continuing education — must contextualize their approaches in reference to the deficient system by which they have been hitherto imprisoned. Thrusting adults into radically new learning environments can be daunting, and educators need to take the educational formation of their students into account. Before we can imagine educational horizons for postsecondary education, we have to consider how primary and secondary education shapes adults as they enter college and then progress into the workforce.

Videogames and education are at the cusp of commensurate revolutions. We have begun to recognize the need to create well-educated rather than well-schooled kids in broader numbers. We have begun to recognize the potential of videogames for educating; now we need to understand and embrace the ways they undermine schooling. This is a revolutionary gesture, and an unpopular one. Educators who subscribe to this mindset can expect criticism, even censure. Parents can expect condemnation. Game developers can expect pulled funding and PR headaches. Nobody said this was going to be easy.

As a videogame researcher, I certainly hope articles like the present one prove useful. But I am aware that such materials threaten to fester as academic exercise. Talk is cheap, and having laid out all these accusations I feel compelled to describe what I'm doing personally and materially to contribute to their remedy (even at the risk of self-aggrandizement). While I commit at least a portion of my videogame design work to educational content, and while I have invested (significantly for my modest station) in an educational publishing company that produces materials for alternative-education, my most important contribution comes as a parent. My wife and I actively teach our own young children through a combination of neoclassical homeschooling and supplementary local classes in arts and sciences. While we consider ourselves lucky to be in a position to provide such educational experience for our children, the cost of educational materials and supplementary courses comes out of our own pocket; they are not subsidized by our local governments. So, to avoid self-irony, I have tried to practice what I preach in both my private and public lives. We must all become more than theorists, we must be producers, educators, and most of all activists. That is the future of educational videogames, and the future of education.

Note: For an expanded version of this argument, See Bogost, Ian. Persuasive Games: The Expressive Power of Videogames. Cambridge, Mass: The MIT Press, 2007.