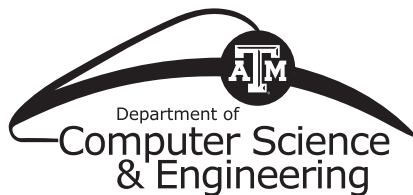


Texas Games & Virtual Environments Symposium 2010

Extended Abstracts
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Andruid Kerne, Zachary O. Toups, Anthony Elam, program committee

andruid@ecologylab.net, zach@ecologylab.net, anthony.j.elam@gmail.com



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Texas A&M Department of Visualization,
Interface Ecology Lab,
Houston Serious Games Research Consortium**

Time After Time: Development of a serious video game to reduce uncertainty in the treatment choices of men with localized prostate cancer

Lindsey Reichlin¹, Nithin Rajan^{1,2}, Amy Harris¹, Kara McArthur¹, Nithya Mani³, Clifford Dacso¹

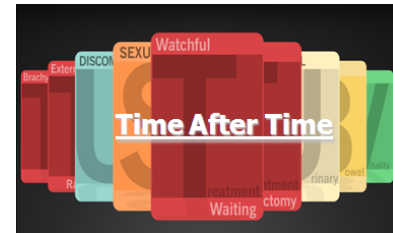
¹ The Abramson Center for the Future of Health, a joint effort of The Methodist Hospital and College of Technology, University of Houston, Houston, TX

² Bauer College of Business, University of Houston, Houston, TX

³ College of Arts and Sciences, Emory University, Atlanta, GA

LSReichlin@tmhs.org; NORajan@tmhs.org; AMHarris@tmhs.org; karamcarthur@yahoo.com; mani.nithya1@gmail.com; CDacso@tmhs.org

Background: Localized prostate cancer (LPC) is an ideal model in which to test the impact of interactive computer games on decision making. Patients diagnosed with LPC must choose among mutually exclusive treatments, each of which has similar survival outcomes but different combinations of side effects that affect post-treatment quality of life. LPC also provides an opportunity to study health games in older Americans—an understudied population in the realm of serious gaming. Game design incorporates a mode of play that is familiar to an older population, exposure to multiple treatments and side-effects in the short and long-term recovery periods, side-effects continually ranked by the user, printable questions for discussion with the patient's physician, and iterative play. We designed the Time After Time game to be a disruptive technology that transforms the LPC treatment decision from a bewildering, isolating process into an empowering experience that allows men to “try out” the different treatments at home with their families. The game emphasizes shared decision-making and seeks to increase health knowledge to improve the standards by which men with LPC make treatment decisions.



Time After Time: an interactive computer game to help men diagnosed with localized prostate cancer decide which treatment is right for them.

Objective: Determine the acceptability and usability of a serious game for men newly diagnosed with LPC.

Methods: We assessed the acceptability and usability of the game through a mixed-methods approach that combined qualitative focus groups with a quantitative, Likert-scale survey.

Results & Conclusions: 13 men who had completed LPC treatment attended 4 focus groups. The majority of the participants rated the game as an appropriate decision tool for LPC, and verified that it increases focus on side-effects and generates questions for the patient's healthcare team. However, participants also expressed concern regarding game usability and the game's ability to incorporate personal demographic and health information. Serious games are a promising approach to health education and decision support in men over 40. However, usability issues are a major concern for this demographic, as are clarity and transparency in game design and the ability to receive personalized results.

The InSpire System: Developing a Novel Application Suite for Improvements in Self-Management Behaviors of Youth with Asthma

Pierre Elias¹, Nithin O. Rajan^{1,2}, Kara McArthur¹, H. Farber, Clifford C. Dacso¹

¹ The Abramson Center for the Future of Health, a joint effort of The Methodist Hospital and College of Technology, University of Houston, Houston, TX

² Bauer College of Business, University of Houston, Houston, TX

pelias@rice.edu, norajan@tmhs.org, kmcarthur@tmhs.org, cdacso@tmhs.org

Background: Asthma is the most common chronic disease in childhood, disproportionately affecting urban, minority, and disadvantaged children. Despite 20 years of interventions to increase adherence, barely 50% of

US youth accurately follow care plans known to reduce morbidity and mortality. There is a clear and present need for novel interventions to improve self-management and care plan adherence.

Methods: Surveys and likert scales were administered to the subjects. The experimenter presented the current intervention standard for spirometry as well as completing a tutorial of the InSpire system with the child. InSpire's system encourages youth to monitor their lung-function correctly and follow care plans through games that incorporate spirometry maneuvers, quizzes for increasing "Asthma Locus of Control", weather reports on asthma triggers in the child's community, care-plan-based instant-messaging, lung-function tracking, and rewards for adherence.

Results: A pilot study of InSpire assessed likability of the graphical user interface as well as children's interest in our incentivizing system. Nearly 100% of children surveyed said they would play games like those in InSpire if they involved breathing into a spirometer. Two-thirds said they would prefer InSpire over the Piko-6, whereas one-third would prefer having both. No children said they would prefer the Piko-6 over InSpire.

Conclusions: Developing interventions with the interests of the target demographic has proven critical to overcoming current barriers to adherence. By collaborating with youth, we are best able to develop an engaging system that improves competency and evolves the self-management paradigm associated with asthma.

A Novel Way to Conduct Human Studies and Do Some Good

Pradeep Buddharaju¹, Yuichi Fujiki¹, Ioannis Pavlidis¹, Ergun Akleman²

¹Computational Physiology Lab, University of Houston

²Visualization Sciences Program, Texas A&M University

pkbuddha@mail.uh.edu, yfujiki@uh.edu, ipavlidis@uh.edu, ergun.akleman@gmail.com

In this work the authors describe a novel way to conduct large-scale human studies achieving the maximum outreach and impact with the minimum cost. An iPhone health application, 'Walk n' Play', was developed and released for free in the App Store. The application measures calories spent due to walking activities through the iPhone's accelerometer. It is a real-time awareness tool that helps people to keep their sedentariness in check. Furthermore, it uses motivational mechanisms based on buddy support/competition and social networking to increase daily physical activity. The anonymous data gathered from thousands of users around the world, reveal patterns of human behavior at a resolution and scale not feasible before.

Games as Moral Systems

Clayton Whittle

Department of Communication | Texas A&M University
claytonwhittle@neo.tamu.edu

With advances in the videogame industry constantly increasing the realism of gaming, those who game are finding themselves rapidly transported into new worlds. The Combination of the elements of narrative transportation, character identification, a videogames ability to enable mediated experience create a situation in which players may be able to rapidly learn very complex concepts.

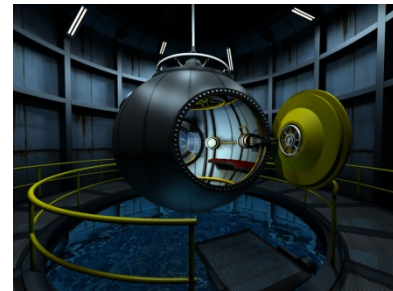
This project begins with a classification of videogame moral systems, both on a theoretical and logistic level. Given this understanding of how videogames themselves define moral involvement, the project then seeks to answer how the players understand their own moral involvement in the game by directly involving player/participants in the conversation. The data produced strongly suggests that videogames have great potential to teach even the most complex concepts of right and wrong to players.

***Rigglefish*: A Virtual Environment on Genetics for Middle School Students**

Susan Pedersen, Jennifer Myers, Christine Shimek

TAMU Educational Psychology
spedersen@tamu.edu

Rigglefish is a virtual environment designed to engage middle school students in learning about genetics. Students are tasked with breeding a fish that makes Omega X, an enzyme that can be used to protect against a deadly new bioweapon. Only some *Rigglefish* make Omega X, and they have a number of characteristics that make them difficult to breed in captivity. Students must breed *Rigglefish* through multiple generations to get one with the desired characteristics. The virtual environment includes a bathysphere students use to collect fish from the ocean, sample tanks where they label the phenotypes and genotypes of individual fish, a pressure tank where they can determine whether specific fish are able to survive in low pressure environments, a PCR and gel electrophoresis where students determine the genotypes for a wiggle trait, and a breeding tank where students can breed fish to get the target fish. Tools that students use to support them in this include information resources such as one on *Rigglefish* traits and another on genetics, and organizational tools such as a fish log.



The Bathysphere, where students can collect fish to breed



The Breeding Tank

Rigglefish is the most recent module in the VELscience series. In the VELscience project, we are developing a series of six modules that immerse middle school students in virtual environments for learning (VELs), where they take on the role of a scientist engaged in a complex task. The virtual settings presented in the VELs support students in designing and carrying out their own investigations. Students use virtual scientific instruments that resemble those used by scientists in the real world, but scaled to suit their age level. Each module begins with an opening scenario which sets up the task.

Modules in the VELscience series are all supported by the Module Management System (MMS) which teachers can use to register their students, configure the module, plan lessons, monitor student progress, and grade student artifacts from the program.

The development of these modules is supported by the National Science Foundation. To learn more about them, please visit our project website at www.velscience.com.

Classes

Manage Students

Configure Module

Plan Lessons

Monitor Progress

Assess Artifacts

Sites

Reports

Research

How many days will your classes use *Rigglefish*? 10

Day Order	Lesson Title	Recommended For
<input type="checkbox"/>	► Introduction	All Classes
<input type="checkbox"/>	► Concept: Genotypes and Phenotypes	All Classes
<input type="checkbox"/>	► Punnett Squares	All Classes
<input type="checkbox"/>	► The Sample Tanks	All Classes

The Module Management System (MMS)

Computer Harpoon, An Original Serious Game

Don Gilman

TEES – Texas A&M University System
dgilman@tamu.edu

In 1989 the original computerization of the naval miniatures game, Harpoon, was shipped to Mac and PC users. Squeezed into 640kb of RAM, 640x350x16 color screens, and without hardware floating point support, the simulation was an instant hit with the Cold War public, but the military.

It was an open secret, a \$50 commercial "game" was able to provide education and training to naval, air and land forces around the globe. The multi-million dollar systems were officially embraced but in the ward rooms, ready rooms, and analysis cells, Harpoon was widely used to achieve mission objectives.

This presentation presents the product's history, illustrates features of particular use to today's military professionals, and outlines future directions. A hand-out includes anecdotes from past and present military on how they used the product over the last twenty years.

Simulation for Disaster Response Training

Jim Wall, Ph.D., CMSP

Texas Center for Applied Technology
jim-wall@tamu.edu

The use of simulation for training in the defense community is well-established and has evolved over many years as acceptance among service members grew rapidly based upon the high payoff results in real-world operational settings. Similar results are now being experienced by the disaster response community by producing "*virtual veterans*" of large scale disasters. One very successful example is the use of simulation to support the training of incident managers from around the country at the Texas Engineering Extension Service's (TEEX) Emergency Operations Training Center (EOTC) in College Station.



Incident managers participate in a simulation-supported exercise at TEEX's Emergency Operations Training Center.

More than 5500 emergency responders have been trained at the state of the art simulation center located in the EOTC using a purpose-built simulation called the Emergency Management Exercise System (EM★ES). This simulation features interactive displays for shared situational awareness, a simulation engine, and an exercise management module. The presentation will cover the process of eliciting requirements from the user community, developing the simulation, and using the simulation as a stimulant for the training audience. Designing a simulation that can be tailored to compensate for differing organizational structures or doctrine and that can fit a range of possible exercise needs offers a number of challenges. These challenges as well as lessons learned will be addressed.

Finally, by adopting a design philosophy that is based on well-known command and control models it is possible to "blur" the line between operations and training by developing environments that will support both functions. Other design considerations related to user interfaces and implementation architectures will be discussed using two additional examples related to animal disease outbreaks and an on-water exercise conducted by the U.S. Coast Guard with a focus on the interdiction of a watercraft carrying restricted materials.

Teaching Team Coordination to Fire Emergency Responders with Non-Mimetic Simulation Games

Zachary O. Toups, Andruid Kerne, William A. Hamilton, Nabeel Shahzad

Interface Ecology Lab | Department of Computer Science & Engineering | Texas A&M University
{ zach, andruid, bill, nabeel }@ecologylab.net

Essential to fire emergency response is gathering and sharing information with a team while under stress. Learning team coordination is necessary for success. The present research designs the non-mimetic simulation Teaching Team Coordination Game (T²eC) based on ethnography of fire emergency response work practice at Brayton Fire Training Field.

Non-mimetic simulations are alternative operational environments in which learners practice skills that are essential in a target domain. Such simulations capture the human-centered aspects of the domain, rather than directly mimicking the target environment. In the present work, we build a game for teaching team coordination that eschews simulating fire and smoke, focusing on processes of transforming and sharing information in a high-stress environment.

We show that the present T²eC game design engages firefighter students in cooperative activities in which they are forced to communicate. Through play, they learn to coordinate more effectively and apply what they have learned to burn training exercises. The evidence supports the value of non-mimetic simulation as a supplemental educational activity in fire emergency response.



A group of firefighter students perform a night burn training exercise on an industrial prop (top). Multiple teams need to coordinate to put out the fire. The T²eC game (bottom) uses alternative perspectives to engage players in team coordination and communication.

Skin It and Spin It: Designing Games for Reuse, and Deploying them across Different Learning Platforms

Dan Hoyt, Carlos Monroy

Rice University Center for Technology in Teaching & Learning
{ danhoyt, cm13 }@rice.edu

The presentation explores modular game engine design and reuse as a model for deploying health and science-oriented serious games, and focuses on benefits and challenges in practice. We briefly introduce components pioneered in the early days of computer game design, such as dialog with virtual personalities, inventory trays, and wealth rewards, and show how they can be transformed into platforms for abstract learning concepts such as the scientific method, as well as for modeling science careers. From the perspective of engine design, we cover a few of our existing games as they progress from a linear guided learning model towards an open-ended discovery experience, confronting the restrictions of the former, and the time constraints and option paralysis of the latter. Finally, we combine the most effective techniques of both approaches in our more recent online games, and demonstrate the labor-saving reusability and rapid prototyping capabilities of a robust game engine, offset by its potential pitfalls.

The presentation concludes with a shift from modular design to modular deployment, showcasing our ongoing efforts at integrating existing serial games into highly-trafficked social networks and virtual environments.

Multimodal Rummy: Designing Multimodal Games

William A. Hamilton¹, Cody Green², Bret Hlavinka², Andrew Johnson², Gus Zarych²,
Jon Moeller¹, Android Kerne¹

¹ Interface Ecology Lab | Department of Computer Science & Engineering | Texas A&M University

² Department of Computer Science & Engineering | Texas A&M University
bill@ecologylab.net, cody@library.tamu.edu, brhlavinka@yahoo.com, limeyjohnson@gmail.com,
guszarych@gmail.com, jon@ecologylab.net, android@ecologylab.net

Multimodal interaction in game design enables creating games with rich human-human interaction not possible through individual modalities. A modality is a particular means by which people can exchange information within a system: private displays of information, public displays of information, a channel of communication with other people engaged with the same system, etc. The use of separate modalities affords the performance of private and public game mechanics while co-located, enabling face-to-face communication. Co-located play allows people to actively engage in natural impression management. In Multimodal Rummy, we use private and public displays that present different elements of the state of play to each player. In addition, information about the game is conveyed through social inter-player interactions.



A player moves sets of cards from his private display on the iPhone to the public display on the iPad.

We describe the design techniques specific to multimodal games discovered during the development process. We present the game's models of interaction that define the process of transferring resources between displays. We explore the use of private and public notifications to enforce as well as convey the rules of the game. Finally, we describe the differences in information representation between the electronically mediated and traditional physical forms of the present game and how this was observed to affect play. These concepts may be re-applied to serious games that involve the distribution of private and public information among players in a local environment.

What Zombies Have to Teach Us About Energy and the Environment

Lars Doucet, Vinod Srinivasan

Department of Visualization | Texas A&M University
lars.doucet@gmail.com, vinod@viz.tamu.edu

This talk will present the story of how an indie, casual game about fighting zombies evolved into a serious game about sustainable energy. In the process, it converted its creator from global warming skeptic to environmental advocate, became the subject of a Master's thesis, and launched a career in serious games. Empirical evidence from the research study will also be presented.

The game uses real-world data to create a simulation of an energy economy (think SimCity). Ravenous zombies attack the player's base. Players build defenses that use natural resources. Production can pollute, making zombies stronger. Players must learn how to produce enough to defend themselves while minimizing environmental impact.

Fun and learning are tightly linked. The talk will show how to maximize both by applying the rules of game design to a real-world topic. The talk will also show how real-world topics can be used to create exciting new game mechanics.

Developing Educational Games for Engineering Education

Vinod Srinivasan¹, Karen Butler-Purry², Susan Pedersen³

¹ Department of Visualization | Texas A&M University

² Department of Electrical and Computer Engineering | Texas A&M University

³ TAMU Educational Psychology

vinod@viz.tamu.edu, spedersen@tamu.edu, klbutler@ece.tamu.edu

In this talk, we will present our experience with the development of an educational game focusing on digital systems design for undergraduate electrical engineering students. The project was motivated by the ineffectiveness of traditional instructional methods, particularly in engineering education, and research indicating that educational games have the potential to improve learning and motivation among players. The talk will give a detailed look into the process by which we approached this project, starting from obtaining funding for the project to the actual design, development, implementation and assessment of the game itself. Our emphasis will be on the challenges that we faced and the lessons that we learned in this project. A brief demo of the latest version of the game will also be shown.

Developing Entrepreneurship with Serious Games

Joel Hobbs

ViaVivo, Inc.

joel.hobbs@viavivo.com

Entrepreneurs must take calculated risks in pursuit of uncertain outcomes. Developing the ability to make complex decisions with limited information can be a costly and time-consuming process. However serious games provide unique opportunities for aspiring entrepreneurs to test their abilities and hone their skills. Emerging leaders greatly benefit from practicing complex, nuanced problem solving in a time-compressed simulation of real-world challenges. ViaVivo, Inc. has been working in collaboration with the Acton Foundation for Entrepreneurial Excellence to innovate serious games that are being delivered as part of the Acton MBA curriculum. Each of these games has been specifically crafted to target a significant challenge that entrepreneurs face. Presented with a simulated business challenge, players interactively discover the underlying principles through experimentation. Through discovery, feedback and reinforcement, cooperation and competition, and repeated practice, these virtual CEOs quickly become agile in overcoming problems that commonly sink real-world businesses. By developing these skills rapidly in a low-risk environment, aspiring entrepreneurs immediately attain invaluable skills. Furthermore, as these players develop an understanding of the fundamental concepts and relationships at work within these complex systems, they have heightened interest and ability to learn more.

In this session, participants will learn how carefully crafted serious games are being used as an effective sandbox for emerging leaders to visualize complex problems, experiment with trade-offs, and hone decision-making skills.

Exploring Gaming Technologies for Industrial Education, Training and Business Application

Anthony Elam

Elam Consulting

anthony.j.elam@gmail.com

Serious Games have been used by the Military for decades to help train its soldiers with simulators for weapons and vehicles to extensive war games (simulations) for decision support (what if) and operational planning/rehearsal. But can these same technologies be use in other industries? Can we use the power of games to engage employees and enhance their educational and training experiences?

This talk will be segmented into three components. The first will be a short introduction to the basic concepts involved in serious games (including virtual environments) relevant to industrial needs. We live in a digital age driven by new "social media" with constant communication and access to information. We will explore the potential use of some of these technologies in education and training for industry . The second part of the talk will focus on two particular serious games: OilSIM and GoVenture. OilSim was developed by Simprentis as an educational tool focused on the upstream oil and gas industry. GoVenture was developed by MediaSpark and is an entrepreneurial business simulator. An overview of the main features of both of these gaming simulations will be covered. The third and final segment of the talk will explore the vision for the future of serious games and virtual worlds in business. Can these emerging tools and technologies be effectively used to capture expert's knowledge and accelerate one's experience?