Games in Science Education Workshop

What your parents never told you about serious games....
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Anthony Elam (Tony)
Principal, Elam Consulting

anthony.j.elam@gmail.com, 713.859.9860
Anthony Elam (Tony) - GAMING

• Serious about Games
  — Chair, Houston Serious Games Research Consortium
  — Chair, Advisory Board, LoneStar Community College Gaming Program
  — Past Director of Games in Education, GAMA

• Player and Collector
  — 7600+ Games
  — Student of gaming history and gaming mechanics
Agenda

• Part I – Introduction
  — Current situation and “the” challenge
  — Define serious games

• Part II – Examples
  — Social Virtual Worlds
  — Simulations & Games

• Part III – HSGRC
  — Houston Serious Games Research Consortium

• Part IV – Future Technologies
  — New Human Computer Interfaces
PART I: SERIOUS GAMES
Today

• “Information Age” America
  - Significant leisure time
  - Strong technology availability and growth
    - What family does not have some form of gaming system?
  - Gaming generation is “coming of age”

• Great variety of gaming options! (and growing)
  - Over 400 gaming companies in business today
    - Computer, Video, Online, Board, Card, RPG, Etc.

• Computer gaming is actually driving technology development
  - Crysis/Uncharted 2 (graphics development)
  - Game platforms (IBM Cell processor)
  - Increasing online-network demands
  - Human-machine interface technologies
Driving Technology and Business

• **Wii** – Nintendo
  — User interfaces

• **Xbox360** – Microsoft
  — Development env.

• **Playstation 3** – Sony
  — High-res graphics

• **Personal Computers**
  — Complex heterogeneous systems

• $42B in 2007, projected $62B-2012
Military State-of-the-Art
Entertainment Software Association

- Sixty-eight percent of American households play computer or video games.
- The average game player is 35 years old and has been playing games for 12 years.
- The average age of the most frequent game purchaser is 39 years old.
- Forty percent of all game players are women. In fact, women over the age of 18 represent a significantly greater portion of the game-playing population (34 percent) than boys age 17 or younger (18 percent).
- In 2009, 25 percent of Americans over the age of 50 played video games, an increase from nine percent in 1999.
- Thirty-seven percent of heads of households play games on a wireless device, such as a cell phone or PDA.
Next Generation IS “Digital”

• Today’s young people:
  — On a typical day more than half use a computer
  — 72% instant messenger
  — 83% play video games
  — 50% create media content on the internet

• 25% growth (per year) in internet usage of kids in last four years

• 87% of kids (12-17) are now online, 24% in SVW

• User hours in 2nd Life: .5M hours in Jan 05 to 7M in Nov 06, 23M in Aug 08 (total now over 1B hours)

• Over 500,000 young people participate in SVW now and growing exponentially

• There are more text messages sent daily than people on the planet (almost 2 to one now)
Fantastic New Graphics!
Expectations....

Their world....

“Our” Challenge ...

Business/education world....
What is a Serious Game?

• Oxymoron…. Isn’t a game suppose to be fun?
  — All in the eye of the beholder…

• Is it a really a game?
  — Game: a physical or mental competition conducted according to a set of rules with the participants in direct opposition to each other to obtain a defined goal

• Is it a toy?
  — No - toys are free form and open ended, games have structure

• Is it a puzzle?
  — No - puzzles are static and have one solution, games are dynamic and require strategy

• Is it a simulation?
  — Simulation: the act of imitating the behavior of some situation or process by means of something analogous, especially for the purpose of study or personnel training
What are “Serious Games?”

“Serious games are solutions to problems. Any meaningful use of computerized games or game industry resources whose chief function is not entertainment are serious games.”

-Ben Sawyer, Founder Serious Games Initiative

“The only source of knowledge is experience.”

“I hear, and I forget. I see, and I remember. I do, and I understand.”
What is an Epistemic Game?

“What makes a game a game is neither ‘fun’ or ‘winning and losing’ but rather the fact that it has some particular set of rules that a player has to follow. In a game players are assigned particular roles…” – Shaffer, David Williamson. How Computer Games Help Children Learn. New York: Palgrave Macmillan, 2006. Print.

Epistemology is the study of what it means to know something – serious games can help people learn the epistemologies of what it means to be a biologist, a doctor, a city planner, a news paper editor, …
Unexpected “Side-effects”
Corrupted Blood – Virtual Plague in WoW

• Sept 13, 2005
• New Dungeon – Zul’Gurub
• “End Boss” Hakkar - HP draining spell
• Spell was suppose to last only seconds and be confined
• Via teleport it was spread both by accident and on purpose
• Pandemic ensued killing many players
• Player’s reaction of interest to researchers epidemiologists, CDC and DOD
PART II: EXAMPLES
Serious Games Applications

- **Education and training** (maybe bronze, not silver bullet)
  - K-12 ed
  - Higher ed
  - Life long learning
  - Corporate training systems

- **Business**
  - Modeling and simulation
  - Decision support

- **Social & organizational networking**
  - Communications

- **Careers...**
DoD Status

• PAST: tremendous investment in force-on-force models and simulations
  – Very fine grain modeling
  – Very complex systems

• PRESENT: role of the US Armed Forces has changed!
  – Modeling of biological, chemical, and radiological weapons
  – Social and political behaviors, impacts and options
  – Robust and creative combined arms (innovative approaches)
  – Communications and information simulations
  – Post-war – peace keeping?
    – Police and infrastructure security
    – Economic & humanitarian roles and responsibilities
  – EVERYTHING must be dynamic and flexible!
  – Flexibility to address quick turn-around What-If Scenarios!
Many Interesting Training/Edu Simulations

Pulse! - TAMUCC

GoVenture

SimuLynx Rig Skills

VRcontext

Flight Simulators

OilSim3
The College of Technology would like to thank the following sponsors for their generous support of PetroChallenge 2010:

- DRIL-QUIP
- Transocean
- ExxonMobil
- Schlumberger
- PetroComputing
- worldwideworker.com
- PetroChallenge
- Elam Consulting

We would also like to thank the following companies who have provided facilitators:

January, 2010 - UH (Jack Christiansen)
- 2 sessions - each 2 days
- 150+ high school students
- 150+ UH students
Second Life – Latest Stats!

• Now over 1 Billion User Hours Logged since 2003
  — All time high of 126 Million hours in 2nd quarter 2009

• Over 16M Residents
  — 75,000 concurrent users, 1250 text messages/sec

• Now over $1B (USD) on virtual goods and services!
  — 54% increase in user to user transactions over last year

• Over 1.75M square kilometers developed
  — 270 TB of content

• Users driven – innovations/creativity
  — Land speculation, art & fashion, merchandise & goods, protests, fund raising, embassies …

• Academic test-bed (over 300 universities involved)
  — eLearning (online classes, workshops, conferences, etc.)
  — Social interaction research
Second Life K-12

- TerraWorld, an island in Second Life, is helping students learn geology in an interactive ways. Seeing different life forms, like this dinosaur, indicates which time period their avatars are in.
  — Courtesy of Kansas State University department of geology and collaborators

- An Introduction to Second Life for Educators
  — http://educ.queensu.ca/e-services/it/second-life/intro/IntroToSLforEd.pdf
NOAA and NASA in Second Life
Second Life Top Eight Health Projects

#3 - The Gene Pool: far the best genetic educational place in Second Life. Quizzes, animations, and you can even wear your favorite chromosome.
# Virtual Worlds/Environments

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Part III: HSGRC
Houston Area - Serious Games

• Houston Serious Games Research Consortium
  – BCM, LoneStar College, Rice, TAMU, UH, UTHSC-H, UT- MDACC
  – CMH, HARC, HMNS, HISD, TMH
  – Archimage, Bouncing Pixel, CompeteSoft, Elam Consulting, ExxonMobil, Famigo Games, Hess, HP, IBM, Konstruction Zone, Microsoft, SAIC, Smilex, Tietronix, TimeGate Studios
  – Affiliations with Houston Technology Center, National Space & Technology Association
  – 150+ Members

• Mission – explore, promote, share, and develop the emerging field of serious games

• Goals:
  – Build a serious games community in Southeast Texas region including both academia and industry
  – Exchange ideas and share knowledge
  – Explore and development opportunities for its members

• Quarterly meetings and annual conferences
Archimage
Designing what’s next.™

We Are A Design Firm
Serious Video Games
Online Games for Health
Computer-based Interventions
Animations
Graphic Design
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Partial Client List
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Nintendo
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Contact
Melanie M. Lazarus, MPH
Director of Marketing
4200 Montrose Blvd, Ste 330
Houston, TX 77006
mlazarus@archimageonline.com
713-523-3425
http://www.archimageonline.com
http://www.playnormous.com
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Health Animations and PSAs

Computer-based Interventions

Interactive Websites
An open content repository for educational materials, an open repository for tools to use the materials, and an online community for learners and teachers.

Connexions - www.cnx.org
Joel Thierstein, Director
   Joel.Thierstein@cnx.org

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Games for Science and Health Education

http://web-adventures.rice.edu

PROJECT FUNDERS

- National Institute on Drug Abuse
- National Institute on Alcohol Abuse and Alcoholism
- National Science Foundation
- National Institute of Allergy and Infectious Diseases
- Centers for Disease Control

Leslie M. Miller
713-348-5352
lmm@rice.edu
Houston Advanced Research Center

Super Energy Apocalypse

Energy 365  Food 5  Smog 69

Survive the zombies

Time: 1

Wind Low  Sun Dark

Power Plant  Farm  Defense  Nuke

Repair All
PART IV: FUTURE TECHNOLOGIES
Human Computer Interface Challenges
Wii Interface Devices...
New Human Computer Interfaces

- Play Movie
Natal from Microsoft
MindFlex, Mattel – 2009 ($80)
Cognitive Interfaces

Mental Typewriter and Gaming Interface
By Cognitive Labs (Berlin Brain Computer Interface)

Emotiv Systems (California) - Project Epic - Electroencephalograph Cap

Emsense has developed a sensor-laden headset that is used in market research studies, includes EEG sensor, breathing rate, heart rate, blink rate, temperature...
Understanding why we make the decisions we do...

- Trust game: The investor receives $20 during each of the 10 rounds of the game. That person decides how much money to give the other subject (the producer). That sum was then tripled. The producer then decides how much of the money they will keep and how much they will return to the investor. Each interaction of this type completes a round.

- Patterns can be detected:
  - prediction of future actions
  - recognition of regret

- Promising avenues for research in understanding autism and schizophrenia
Coming to a store near you....
Fusion of Learning Science & Technology

Cognitive Science:
- Learning Methodologies
- Instructional System Design
- Cognitive Task Analysis

Technologies:
- Gaming Engines
- Virtual Environments
- HCI
- Web 2.0/3.0
- Workflow Engines