Games, Simulations and Virtual Environments: What are they and how can I integrate them in my classroom.

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Overview

- A journey into the understanding and definitions of games, simulations, and virtual environments being used in the classroom as educational technology.
  - Presentation based in part on forthcoming article by Warren, Stein, & Jones. Educational games and simulations: Improving communication in educational theory and research

- What are Games?
  - How is it different from how we define simulations?

- What are Simulations?
  - How is it distinct from virtual worlds?

- What are Virtual Environments?

- Issues and Concerns of Classroom Integration?
Defining Things: A Difficult Task

“Despite their everyday use, defining the terms simulation and game is a difficult task. Many activities and events are casually called either simulations or games (or both), resulting in a muddled set of characteristics.”

- Lloyd Rieber and David Noah, 2008

A review of the 2009 Gibson and Baek’s 24 chapter book on simulations for teaching shows 43 definitions on simulations, 17 definitions for games, and 9 different definitions for virtual environments.

- Warren, Stein, Jones, forthcoming
The Importance of Play?

- Play has been hypothesized to be one of the most fundamental forms of human activity and means of learning...it allows for the mind’s exploration of the rules and consequences of engaging with or breaking them. **Play** is the underlying construct correlated with willingness to engage in long periods of activities.

  Warren, Dondlinger, Stein, and Barab (2009)
What is Play?

- *Play*, has been described as a “pleasurable, light, uninvolved, uncompelled activity” (Adams, 1973).
- Vygotsky (1978) observed that children at play encounter a number of the rules to which they submit freely as part of the act of play.
- Jenkins states that play is experimenting with one’s surroundings in problem solving.
- Play is subtle. Players can examine the rules by slamming into them physically, learning their harsh consequences concurrently or gently interfacing with them (Warren, Stein, Jones, forthcoming).
The Four Freedoms of Play

- Freedom to Experiment
  - Player’s motivations are intrinsic and personal. The process is open-ended.

- Freedom to Fail
  - Losing is part of the process.

- Freedom to Try on Different Identities
  - Players aren’t necessarily limited by their bodies and surrounding physical context.

- Freedom of Effort
  - Children may scramble around in a game of tag, avoiding being caught for twenty minutes, and then suddenly stop and allow themselves to be tagged once they have reached a certain degree of effort or perhaps want to move on to another activity.

Scot Osterweil (MIT Comparative Media Studies)
Enter the digital game and simulation

- Two means of delivering play experiences that have become extremely popular in the past two decades are digital games and simulations. These have of late become part of a multi-billion dollar industry and video game usage among all age groups risen over the last ten years with one study noting that one in five gamers are individuals over age 30 are gamers.
Examples of Video Games
# ESA’s Top 10 Computer Games 2009

<table>
<thead>
<tr>
<th>Game</th>
<th>Genre</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Sims</td>
<td>Simulation</td>
</tr>
<tr>
<td>Word of War Craft: Litch King Expansion</td>
<td>Virt Env RPG</td>
</tr>
<tr>
<td>The Sims 2</td>
<td>Simulation</td>
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<tr>
<td>Word of War Craft: Battle Chest</td>
<td>Virt Env RPG</td>
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<tr>
<td>Call of Duty: Modern Warfare 2 (m)</td>
<td>FPS</td>
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<tr>
<td>Word of War Craft</td>
<td>Virt Env RPG</td>
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<tr>
<td>The Sims 3</td>
<td>Simulation</td>
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<tr>
<td>Spore (e 10+)</td>
<td>Simulation</td>
</tr>
<tr>
<td>Dragon Age: Origins (m)</td>
<td>Single-Player RPG</td>
</tr>
<tr>
<td>Empire: Total War</td>
<td>Turn-Based Strategy</td>
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Challenges to Play

- This conception of play as learning is problematic, because many teachers and administrators view play as off-task behavior to be corrected. This creates issues for acclimating teachers and administrators to the notion that play is part of a student’s learning process. As a result, teachers must be trained to recognize when play is productive and when it is not. (Jones & Warren 2011).
What is a Game?

- A game is “an activity in which participants follow prescribed rules that differ from those of reality as they strive to attain a goal.” (Heinich, Molenda, & Russell, 1993)

- Crawford (2003) and Salen & Zimmerman (2004) state that a game must include a.) a rule-based interactive system, b.) a quantifiable outcome characteristic, c.) artificial conflict and play characteristics, and may also include d.) a modeling reality characteristic.
Rule-Based Interactive Systems

- An activity in which participants follow prescribed rules that differ from those of reality as they strive to attain a goal. (Heinich et al., 1993)

- In the computer video game Neverwinter Nights, game interactions are between the player, non-player characters and monsters. These non-players can be acted upon and act in certain ways limited by their programming. (Loh & Byun, 2009)
Rule-Based Games
Quantifiable Outcome Characteristic

- One criterion often thought to distinguish simulations from games is that a **game has a quantifiable outcome**, while a simulation does not or is open ended.

- Some authors claim that a simulation just models a system (Salen & Zimmerman, 2004) and a game does more than a simulation.

- Chalk House, a role playing game focused on literacy, uses programmed interaction with a rule-based system the players play towards a quantifiable outcome. (Jones, 2010)
Example: Chalk House

- Single Player RPG
- http://created-realities.com/
Artificial Conflict and Play Characteristics

- Another common feature employed to distinguish between games and simulations is an artificial conflict.

- Although games are said to entail artificial conflict and play (Heller, 2003), conflict may also be found within simulation activities such as those designed to prepare for specific forms of war as found in the America’s Army titles and Microsoft’s Combat Flight Simulator series.
Example: Oregon Trail

- Turn-based RPG / Strategy Game
Example: Star Craft

- Real-time Strategy Game
Differences between video games and educational video games

- Can we define some?
- Engagement
  - A video game is designed for repeated engagement
  - A educational game is designed for mastery
- Fidelity
  - A video game typically has high fidelity
  - A educational game typically has lower fidelity
What is a Simulation?

- A simulation is “an abstraction or simplification of some real-life process.” (Heinich, Molenda, & Russell, 1993)
- Jenkins states that simulations are about interpreting and constructing dynamic models of real-world processes.
- Computer games are sometimes thought of in terms of being a sub-set of simulations with the main difference between the two are what elements are developed more fully than others.
- Harold Guetzkow (1963) simulation must include two essential features:
  - 1) it must represent a real situation and
  - 2) be ongoing and dynamic.
Example: simSchool

- Single Player
Example: America’s Army

- Multi-Player

![Image of soldier in a game environment]
 Discriminating Games from Simulations?

- Becker and Parker (2009) introduce the concept of game as being either the same or a subset of simulation. For example playing a Solitaire game with physical cards versus digital representations of those cards is a simulation.

- However, “many simulations do not intend to represent simulations found in the current reality,” the question must be asked whether a hypothetical system representation is then something other than a simulation?
Simulation or Game?

- Hockey Video Game where the hockey player can skate twice as fast as a normal player could?
- Physics game where you can change constants?
- simSchool where you can control the classroom and speed of the interaction?
- A MUVE that simulates using a rule-based system an ecosystem for students to understand?
Game and Simulations Continuum

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Warren, Stein, Jones (forthcoming)
What is a Virtual Environment?

- Virtual Worlds are based on created or simulated environments. The world may simulate rules based on real world or fantasy concepts.
- They can be single or multi-user and might contain social elements.
- Virtual Worlds are inhabited by one or more avatars (player or non-player) that the player interacts with.
- Virtual worlds are not just games any longer.
VE Example: Second Life (MMOSG)

- Molecular Visualization (Stony Brook State University)
VE Example: ECOMuve (MUVE)

- Environmental Virtual Environment
SnapShot of Virtual Worlds

* Stats from KZER Worldwide
Parents are allowing their children to spend more time in virtual environments

Expected to be over 1000 virtual worlds in 2013

Virtual World Revenues (USD) to exceed 10 billion by 2013

Majority users are Kids, Tweens, and Teens (Q1 2011)

* Stats from KZER Worldswide
MUVE: Focused more on Education

- MUVE
  - MUVEs can zoom in or out to display phenomena at various scales.
  - MUVEs can help students understand spatially distributed phenomena by enabling movement through space.
  - Students can collect data by placing simulated measuring tools into an virtual environment.
  - MUVEs can support microworld simulations in which students can make predictions, then change a variable or rule and observe what happens.

(Dede, 2011)
Proposed Definition for Educational Games

For a game to be educational, there must be

1. a form of play activity,
2. some conflict to drive play and cognitive activity,
3. rules readily apparent to the learner that mirrors a reality that governs,
4. interactivity between player and game that includes,
   - 5. feedback from the game system, and
   - 6. results in a win or loss for the learner/player.

(Warren, Stein, & Jones, forthcoming)
Proposed Definition for Educational Simulations

- Educational simulations should 1. model a reality with 2. authentic tasks, 3. authentic environment, 4. and model or imitate an authentic system, process, or activity that the instructor or designer wants the learner to internalize. Learning simulations must also include 5. interactions and explorations between learner and simulated models that include, 6. rules that reflect the reality being taught, and 7. feedback from the system to indicate success or failure at internalizing the model and its rule set.

(Warren, Stein, & Jones, forthcoming)
Classroom Integration – Why?

- Allowing students to engage in academics through fun learning activities increases the desire to learn.
- Adds rich and dynamic resources to barren classroom settings.
- Upon implementation, many educators are witnessing heightened student engagement, knowledge retention, and subject mastery.
- and more ….
Issues and Concerns?

- Lots of research that shows that this little part or that little part of the game or simulations works.
- No major studies that show games and simulations do better than other forms of educational technology.
- Can require a higher level of technical support
  - Bandwidth and Computer Technology
- Time Factor
- Technology Changes
Problems and Issues to Consider

- Most educational video games are developed with the intention to re-create the persistence and involvement as observed in video game players, **in hopes** of bringing that same intensity into the classroom setting.

- Standardized testing is an issue. These systems lend themselves to new ways of measures that current standards do not work well with. Longitudinal formative evaluation tied to summative evaluation.
Classroom Integration

- Games, Simulations, and Virtual Environments, for the purpose of classroom integration, can be defined as an educational technology and be designed into classroom activities using standardized instructional design approaches.

- Approaches that are known to work
  - Integrate in small stages
  - Large scale integration is more risky and potentially has less impact
  - Evaluate and access each change in order to judge what is and isn’t working
Questions ?
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