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# 11.127/252/CMS.590 - Computer Games and Simulations for Education and Exploration

Teacher Education Program

Spring 2010

TR 1-2:30 (9-554)

**Computer Games and Simulations for Investigation and Education**

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During the past two decades, simulation, especially as it helps people to understand complex systems, has become a mainstream use of computational technology. The widespread popularity of “edutainment” software like SimCity and Civilization gives a clear indication of the extent to which simulation games have permeated popular culture. As these and other games have found places in the classroom, researchers have tried to ascertain what and how students (or people more generally) learn from these environments, and what implications this has for software and curriculum design.

In this project-based course, students from all disciplines are encouraged to understand how we learn from interactive computer environments, and delve into the process of designing and understanding simulations and games for learning. In the first part of the course we will explore the design and use of Commercial Off the Shelf (COTS) games in the classroom, and how they have been and can be tailored to learning, including technical, practical and pedagogical advantages and limitations. This will be combined with scholarly readings from the emerging field of learning games. We will then design non-digital games, and study both the design process and learner outcomes. Next we move into the realm of the digital, again studying the design and use of digital games and simulations in educational contexts. Finally, we will also study what and how people learn from games (including focus groups and user feedback), and how these media can be implemented in educational settings. All levels of computer experience welcome. Graduate students are expected to complete additional assignments.

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[Assignment Overview and Grading](#)<sup>[3]</sup>

<sup>[4]</sup>Open Lab Hours

TBA

## **Feb 2nd – Introduction and Overview of Course**

- Overview
  - The course will explore educational games and simulations in both digital and non-digital forms. We will focus on design and research issues pertinent to learning through simulations and games. Throughout the course we will explore concepts in simulation and gaming common to many domains, and investigate specific applications to learning.
- How do we make educational video games? ([Video](#) [5])
- Game Brainstorming - What have you played?
  - Categorization of Games

## **Feb 4th – Introduction and Overview of Course (cont'd)**

- What is a Game?
  - Initial Game Definition
- Casual Physics Games
  - [World of Goo](#) [6] (Download Demo)
  - [Crazy Machines](#) [7] (Download Demo)
  - [Color Infection](#) [8] (Online)
    - [Editor](#) [9]
  - [Portal](#) [10] (Flash Version Online)
  - [Shift](#) [11] (Online)
  - [Incredibot](#) [12] (online)
  - [Fantatic Contraption](#) [13] (online)
  - [Launchball](#) [14] (online)
  - [Waker](#) [15] (online)
- [Crayon Physics](#) [16]
  - [NPR piece on Physics and Crayons](#) [17]
- **Readings Due**
  - [Lit Review on Games and Learning](#) [18]

## **Feb 9th - How to we combine games and education? Edu-tainment?**

- Introduction to Learning through Games
  - World Of Warcraft
    - Orientation
    - Play
- **Readings Due**
  - [Chapters 1, 2, & 3 What Video Games Have to Teach Us About Learning and Literacy](#) [19] - Gee
  - [Teaching with Games](#) [20]
- **Assignments**
  - Paper - [Designing Curricula for Games](#) [21] (**Due Mar 2**)
  - Create a character in World of Warcraft - your class will be chosen in class.

## **Feb 11th - How to we combine games and education? Edu-tainment? (cont'd)**

- Learning and play in World of Warcraft
- **Readings Due**
  - Chapters 4 & 5, What Video Games Have to Teach Us About Learning and Literacy <sup>[19]</sup> - Gee
  - Peruse [WoWWiki \(www.wowwiki.com\)](http://www.wowwiki.com) <sup>[22]</sup>
  - <sup>[22]</sup>Read your class column at [Wow.com](http://Wow.com) <sup>[23]</sup>
- **Assignments**
  - Paper - Designing Curricula for Games <sup>[21]</sup> (**Due Mar 2**)
  - Continue leveling your character in World of Warcraft

#### **Feb 18th - How to we combine games and education? Edu-tainment? (cont'd)**

- Learning and play in World of Warcraft
- Forums
  - [Official Forums \(class forums, near the bottom\)](#) <sup>[24]</sup>
  - [Elitist Jerks](#) <sup>[25]</sup>
- **Readings Due**
  - Take a look at the forums above
  - Chapters 6, 7 & 8, What Video Games Have to Teach Us About Learning and Literacy <sup>[19]</sup> - Gee
- **Assignments**
  - Paper - Designing Curricula for Games <sup>[21]</sup> (**Due Mar 2**)
  - Continue leveling your character in World of Warcraft

#### **Feb 23rd - Research on Games and Learning**

- What have we learned through Play?
  - Discussion of Readings - Gee, Steinkuehler, Ducheneaut
- Can educational games embody these principles?
  - Designing Games in TEA - Labyrinth, AR, Ubiq
- **Readings Due**
  - Massively Multiplayer Online Games as an Educational Technology (Steinkuehler) (STELLAR)
  - Building an MMO with Mass Appeal (Ducheneaut et al.) <sup>[26]</sup>
- **Assignments**
  - Paper - Designing Curricula for Games <sup>[21]</sup> (**Due Mar 2**)
  - Continue leveling your character in World of Warcraft

#### **Feb 25th - Research on Games and Learning (cont'd)**

- World of Warcraft PvP day!
- **Readings Due**
  - PvP Columns TBD
- **Assignments**
  - Paper - Designing Curricula for Games <sup>[21]</sup> (**Due Mar 2**)

- Your World of Warcraft character must be in level range

## **March 2nd – Video Games -> Board Games**

- The state of educational games
  - Educational Games Online <sup>[27]</sup>
- Activity - Designing a board game
  - What are the issues in designing an educational game?
  - How do we solve these issues?
- **Readings Due**
  - Introduction <sup>[28]</sup> and first steps <sup>[29]</sup> to Board Game Design (Link to SDSU EDTEC 670)
  - Lord of the Rings Boardgame Essay - Reiner Knizia (STELLAR)
- **Assignments**
  - **Paper Due-** Designing Curricula for Games <sup>[21]</sup>
  - Draft Design Document (technical and educational) for educational board game <sup>[30]</sup> (**DUE in Class March 11**)
  - Case Study of Learning Through Gaming <sup>[31]</sup> (**DUE March 16**)

## **March 4th – Video Games -> Board Games (cont'd)**

- Activity - Designing a board game (cont'd)
  - What are the issues in designing an educational game?
  - How do we solve these issues?
- **Readings Due**
  - Types of Constructivism <sup>[32]</sup>
  - Constructivist Learning Design <sup>[33]</sup>
  - Wikipedia Entry <sup>[34]</sup>
  - Why it doesn't work <sup>[35]</sup>
- **Assignments**
  - Draft Design Document (technical and educational) for educational board game <sup>[30]</sup> (**DUE in Class March 11**)
  - Case Study of Learning Through Gaming <sup>[31]</sup> (**DUE in Class March 16**)

## **March 9th – Video Games -> Board Games (cont'd)**

- Intro to Board Games Activity
  - Brainstorming Educational Board Game
- **Assignments**
  - Draft Design Document (technical and educational) for educational board game <sup>[30]</sup> (**DUE in Class March 11**)
  - Case Study of Learning Through Gaming <sup>[31]</sup> (**DUE in Class March 16**)

## **March 11th - Learning from Games**

- The Ecology of Games Jigsaw (individuals or pairs responsible for chapter)
  - Learning & Games - Josh
  - In Game, In Room - Alex & Fernando
  - E is for Everyone - Claire & Stacey

- **Readings Due**
  - The Ecology of Games <sup>[36]</sup> (student led discussions <sup>[37]</sup>)
- **Assignment**
  - Draft Design Document (technical and educational) for educational board game <sup>[30]</sup> (**DUE in Class March 11**)
  - Case Study of Learning Through Gaming <sup>[31]</sup> (**DUE in Class March 16**)
  - Documentation and Presentation of an Educational Board Game <sup>[38]</sup> (**DUE in Class April 6**)

### **March 16th - *Learning from Games***

- The Ecology of Games Jigsaw (individuals or pairs responsible for chapters)
  - Edutainment - Genevieve & Julia
  - Rhetoric - Aaron & Mark
- Case Study of Learning Through Gaming - Presentations
  - Nick
  - Julia
  - Stacey
  - Matt
- **Readings Due**
  - The Ecology of Games <sup>[36]</sup> (student led discussions <sup>[37]</sup>)
- **Assignment**
  - Case Study of Learning Through Gaming <sup>[31]</sup> (**DUE in Class March 16**)
  - Documentation and Presentation of an Educational Board Game <sup>[38]</sup> (**DUE in Class April 6**)

### **March 18th - *Learning from Games***

- The Ecology of Games Jigsaw (individuals or pairs responsible for chapters)
  - Race - Jesse & Matt
  - Open-ended - Seth & Calvin
  - I Love Bees - Annie & Jayson
- Case Study of Learning Through Gaming - Presentations
  - Aaron
  - Alex
  - Fernando
  - Forrest
- **Readings Due**
  - The Ecology of Games <sup>[36]</sup> (student led discussions <sup>[37]</sup>)
- **Assignment**
  - Case Study of Learning Through Gaming <sup>[31]</sup> (**DUE in Class March 16**)
  - Documentation and Presentation of an Educational Board Game <sup>[38]</sup> (**DUE in Class April 6**)

### **March 30th and April 1st - *Learning from Games***

- The Ecology of Games Jigsaw (individuals or pairs responsible for chapters)
  - 3/30 - Second Life (Nick & Forrest)
  - 4/1 - Johnny Can't Fly (Amy & Naomi)

- Case Study of Learning Through Gaming - Presentations
  - Everyone else should be ready to go on 3/30.
- **Readings Due**
  - **The Ecology of Games** <sup>[36]</sup> (**student led discussions** <sup>[37]</sup>)
- **Assignment**
  - **Case Study of Learning Through Gaming** <sup>[31]</sup> (**DUE in Class March 16**)
  - **Documentation and Presentation of an Educational Board Game** <sup>[38]</sup> (**DUE in Class April 6**)

#### **April 6th and 8th – Board Games**

- Board game presentations - 20 minutes of playable game
  - Critique and Feedback on Board Games
- **Readings Due**
  - Harnessing the Power of Video Games for Learning <sup>[39]</sup>
  - Does Easy Do It <sup>[40]</sup> (Papert)
- **Assignment**
  - Documentation and Presentation of an Educational Board Game <sup>[38]</sup> (**DUE in Class April 6**)

#### **April 13th – Game Design and Production**

- Scratch <sup>[41]</sup>
- Game Exercise <sup>[42]</sup> (Link to SDSU EDTEC 670)
  - Responses
 Apps for Health Kids - <http://www.appsforhealthykids.com/>
- **Readings Due**
  - The Seductions of Sim <sup>[43]</sup>
  - Constructivism and Constructionism <sup>[44]</sup>
- **Assignment**
  - Design Document (technical and educational) on Simulation/Game Design <sup>[45]</sup> (**DUE by April 22**)

#### **April 15th – Game Design and Production (cont'd)**

- Designing Good Games with Ed Arcade Creative Director Scot Osterweil
- **Readings Due**
  - Hewlett White Paper <sup>[46]</sup>
- **Assignment**
  - Design Document (technical and educational) on Simulation/Game Design <sup>[45]</sup> (**DUE by April 22**)

#### **April 20th – No class for Patriot's Day**

#### **April 22nd – Game Design and Production (cont'd)**

- Links to Simple Game Development Tools <sup>[47]</sup>
- Love2D, Python, Flex, App Inventor
- **Assignment**

- **Design Document (technical and educational) on Simulation/Game Design** <sup>[45]</sup> (**DUE IN CLASS April 22**)
- Final Simulation/Game and Supporting Documentation/Information <sup>[48]</sup> (**Written Final Due with Presentations May 11-13**)

#### **April 27th - *Thinking about Users***

- In class work and feedback
- Grad Reports
- **Readings Due**
  - Learning Theory in Practice - Learner Centered Design <sup>[49]</sup>
- **Assignment**
  - Final Simulation/Game and Supporting Documentation/Information <sup>[48]</sup> (**Written Final Due with Presentations May 11-13**)

#### **April 29th - *Guest***

- Alex Chisholm of the **Learning Games Network** <sup>[50]</sup>
- **Readings Due**
  - None
- **Assignment**
  - Final Simulation/Game and Supporting Documentation/Information <sup>[48]</sup> (**Written Final Due with Presentations May 11-13**)

#### **May 4th– *Thinking About Users***

- Louisa Rosenheck - *Ubiq Bio*
- **Readings Due**
  - Try It! - Formative Eval. Article [STELLAR]
- **Assignment**
  - **Final Simulation/Game and Supporting Documentation/Information** <sup>[48]</sup> (**Written Final Due with Presentations May 11-13**)

#### **May 6th – *Design and Guest***

- Bert Snow of Muzzylane <sup>[51]</sup>
- **Assignment**
  - Final Simulation/Game and Supporting Documentation/Information <sup>[48]</sup> (**Written Final Due with Presentations May 11-13**)

#### **May 11th and 13th – *Final Project Presentations***

- **Assignment**
  - Final User Testing Project -Design and conduct an focused feedback session on how people use your game - include with final paper/presentation.

**Links:**

- [1] <mailto:klopper@mit.edu>
- [2] <mailto:jhaas@mit.edu>
- [3] <http://education.mit.edu/drupal/11127/assignments>
- [4] <http://education.mit.edu/drupal/11127/extrareadings>
- [5] <http://www.youtube.com/watch?v=rN0qRKjfX3s>
- [6] <http://2dboy.com/games.php>
- [7] <http://www.crazy-machines.com/>
- [8] <http://www.kongregate.com/games/tapir/color-infection-2>
- [9] [http://colorinfection.appspot.com/htmls/editor\\_page1.html](http://colorinfection.appspot.com/htmls/editor_page1.html)
- [10] <http://portal.wecreatestuff.com/>
- [11] <http://armorgames.com/play/751/shift>
- [12] <http://incredibots.com>
- [13] <http://fantasticcontraption.com/>
- [14] <http://www.sciencemuseum.org.uk/launchpad/launchball/>
- [15] [http://gambit.mit.edu/loadgame/summer2009/waker/waker\\_playgame.php](http://gambit.mit.edu/loadgame/summer2009/waker/waker_playgame.php)
- [16] <http://crayonphysics.com>
- [17] <http://www.npr.org/templates/story/story.php?storyId=99080116>
- [18] <http://www.futurelab.org.uk/resources/publications-reports-articles/literature-reviews/Literature-Review378>
- [19] [http://www.amazon.com/Video-Games-Learning-Literacy-Second/dp/1403984530/ref=ed\\_oe\\_p](http://www.amazon.com/Video-Games-Learning-Literacy-Second/dp/1403984530/ref=ed_oe_p)
- [20] [http://www.futurelab.org.uk/resources/documents/project\\_reports/teaching\\_with\\_games/TWG\\_report.pdf](http://www.futurelab.org.uk/resources/documents/project_reports/teaching_with_games/TWG_report.pdf)
- [21] <http://education.mit.edu/11127/designcurric.htm>
- [22] <http://www.wowwiki.com>
- [23] <http://wow.com>
- [24] <http://forums.worldofwarcraft.com/index.html?sid=1>
- [25] <http://elitistjerks.com/forums.php>
- [26] <http://gac.sagepub.com/cgi/reprint/1/4/281>
- [27] <http://education.mit.edu/drupal/11127/edugames>
- [28] <http://edweb.sdsu.edu/courses/edtec670/slides/Board.htm>
- [29] <http://edweb.sdsu.edu/courses/edtec670/boardgame/BoardGameDesign1.html>
- [30] <http://education.mit.edu/11127/whiteboard.htm>
- [31] <http://education.mit.edu/drupal/11127/casestudy>
- [32] <http://dougiamas.com/writing/constructivism.html>
- [33] <http://www.prainbow.com/cld/cldp.html>
- [34] [http://en.wikipedia.org/wiki/Constructivism\\_\(learning\\_theory\)](http://en.wikipedia.org/wiki/Constructivism_(learning_theory))
- [35] [http://www.cogtech.usc.edu/publications/kirschner\\_Sweller\\_Clark.pdf](http://www.cogtech.usc.edu/publications/kirschner_Sweller_Clark.pdf)
- [36] <http://www.mitpressjournals.org/toc/dmal/-/3>
- [37] [http://education.mit.edu/drupal/11127/ecology\\_assign](http://education.mit.edu/drupal/11127/ecology_assign)
- [38] <http://education.mit.edu/11127/boardgame.htm>
- [39] <http://www.fas.org/gamesummit/Resources/Summit on Educational Games.pdf>
- [40] <http://www.papert.org/articles/Doeseasydoit.html>
- [41] <http://scratch.mit.edu/>
- [42] <http://edweb.sdsu.edu/courses/edtec670/exercises/1.htm>
- [43] <http://www.princeton.edu/~starr/17star.html>
- [44] <http://www.imedia.mie.utoronto.ca/publications/mie2002-readingcourse.pdf>
- [45] <http://education.mit.edu/drupal/11127/whitepaper>
- [46] [http://education.mit.edu/papers/MovingLearningGamesForward\\_EdArcade.pdf](http://education.mit.edu/papers/MovingLearningGamesForward_EdArcade.pdf)
- [47] <http://share.xmarks.com/folder/bookmarks/941YRISJhf>
- [48] <http://education.mit.edu/11127/finalsim.htm>
- [49] [http://www.acm.org/sigchi/chi96/proceedings/papers/Soloway/es\\_txt.htm](http://www.acm.org/sigchi/chi96/proceedings/papers/Soloway/es_txt.htm)
- [50] <http://www.learninggamesnetwork.org/>
- [51] <http://www.muzzylane.com/>