Overview

- Learning from Animations and Simulations
  - Definitions
  - Specific Affordances of Animations and Simulations
  - Student Presentation
  - Design of Animations and Simulations
  - Game Play (Lisa’s game)

Presentation

- Presentation of a game related to today’s topic
  - (1 groups - 5min.)
  - Learning from Animations and Simulations

Animations & Simulations

- Definitions

- Animation
  - Dynamic visualization

- Simulation
  - Interactive dynamic visualization where user can manipulate parameters that affect the simulation behavior
  - Operational representation of central features of reality
  (Handbook of Game Design)
Animations & Simulations

Learning
Active process of knowledge construction
Build or expand mental models
Goal: apply knowledge
Socio-cultural process
Needs to be situated in meaningful context
Constraints: working memory capacity

Affordances
Motion
Visualization
Learner action
Engage users in meaningful exploration
Allow manipulation of parameters
Highlight important content through motion, color
Provide feedback
Complex tasks require self-regulation of learning

Obstacles to effectiveness
Learner
Need for prior knowledge
Limited WM capacity: overload when material is complex
Design
Simulations are abstract systems
Requires effective information design
Requires effective interaction design
Requires meaningful pedagogical design

Presentation
Presentation of a game related to today’s topic
(1 group – 5 min.)
Learning from Animations and Simulations

Class Discussion
What makes animations and simulations effective learning environments?
What are affordances of animations and simulations that can facilitate learning?
What are possible obstacles for animations and simulations to be effective?
Games as the Play of Simulations

Simulation of an imaginary world
Elements are simulated signs but may not have real-world referent

Do you agree with Salen & Zimmerman that all games are simulations?
- Tic-tac-toe?
- Chess?
- Tetris?
- Dungeons & Dragons?

Micro-level procedural representations
Macro-level procedural representations

Play of a game developed by your peers (10 min.)
Learning from Animations and Simulations

Design of Effective Animations and Simulations
Animations & Simulations

Design of Effective Animations and Simulations

- Information Design
- Interaction Design
- Pedagogical Design

Animations & Simulations

Information Design: Representation
- Spatial, Temporal Contiguity
- Cueing, Color coding
- Iconic representations more effective, especially for learners with low prior knowledge (Plass et al., in press)

Animations & Simulations

Interaction Design: Exploration
- Content Manipulation: Exploratory environments more effective than worked-out examples, especially for learners with high levels of executive functions (Plass et al., in press)

Animations & Simulations

Pedagogical Design
- Guidance is needed in exploratory environments (Mayer, 05)
- Reflection increases comprehension
- Explanatory Feedback better than corrective feedback (Moreno & Mayer)
- Design needs to be task-appropriate

Out of Class Activity

Play a game!
- Play a computer/console game in CREATE - tonight!

Design an educational game!
- Select project for development of an educational game

Out of Class Activity

Educational game topics to choose from:
- K12 Inc.: Misconceptions in Science Education
- G4L Institute: Game to elicit and display user responses
- M&M: Turn simulation into game
- ECT promotion game for ECT website