E19.2176
Simulations and Games for Education
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Overview
Designing Animations and Simulations:
Cognitive Factors

Cognitive Design Factors

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Design recommendation based on information processing and knowledge construction aspects of learning

Information Design | Interaction Design | Pedagogical Design
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Contiguity | Segmentation | Guidance & Feedback
Split Attention | Pacing | Reflection
Cuing | Content Manipulation | Coherence
Representation/Icons | Task Appropriateness | Worked-Out Example
Multiple Representations | | |

Presentation

Presentation of a game related to today’s topic (2 groups - 5min. each)

Cognitive Design Factors
Class Discussion

Discuss cognitive factors for the design of educational simulations and games (groups of 2–3, 20 min.)

- For one design factor:
  - State recommendation
  - Summarize theoretical foundation
  - Use existing game to exemplify its application (applied v. not applied)
  - How can this factor inform the design of your educational game?
  - Discuss implications and limitations for educational game design
  - Present results to class

Presentation

- Play a game developed by your peers (10 min.)
  - Establishment Game (Jeannie and Laura)

Cognitive Design Factors

**Specify Cognitive Design Factor**

- Recommendation...
- Theoretical Background...
- Examples: When applied vs. When not applied in existing materials
- Application to your own educational game design
- Implications for Educational Game Design
- Limitations of Applicability

Cognitive Design Factors

- Design of Effective Animations and Simulations
  - Information Design
  - Interaction Design
  - Pedagogical Design

Cognitive Design Factors

- 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)
**Interaction Design: Exploration**

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

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**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

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**What makes an educational game a game?**

Plass & Perlin

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**Out of Class Activity**

Design an educational game!

- Select project for development an educational game