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Simulations and Games for Learning
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Overview

- Designing Simulations and Games: Affect
  - Emotional Design
  - Affective Outcomes

Games and Affect

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Overview

Designing Simulations and Games: Affect

- Emotional Design
  - The emotional brain
  - Conceptual Approach
  - Design Model
  - Affective Outcomes

Affective Design Factors

The emotional brain

Affective Design Factors

Limbic System
- Seat of emotions, memory, attention
- Comprised of:
  - Hypothalamus
  - Hippocampus (temporal lobe)
  - Amygdala
- Deeply connected to neocortex–cortical functions

Affective Design Factors

Response to Emotions (limbic-cortical triangle)
- Thalamic Pathway
- Cortical Pathway

Affective Design Factors

Response to Emotions
- Thalamic Pathway
- Cortical Pathway
Affective Design Factors

**Physical Aspects of Emotions**
- Facial Expression
- Body Language
- Gaze
- Pupil size
- Heart rate
- Skin conductance
- Body temperature
- Gastrointestinal tract activity
- Subcortical autonomic nervous system

**Primary vs. Secondary Emotions**
- **Primary**
  - Happiness, sadness, fear, anger, surprise, disgust
- **Secondary**
  - Embarrassment, jealousy, guilt, pride, envy

Affective Design Factors

**Emotions and Learning**
- Emotions are essential for decision making (Damasio, 1994)
- Positive mood as effective retrieval cue (Loewenstein, 1979)
- Positive mood increases creativity (Loewenstein, 1979)
- Positive mood leads to more positive judgments and more favorable feedback (Loewenstein, 1979)
- Positive emotions facilitate intrinsic motivation (Joo & Lee, 2012)
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**Conceptual Approach for Emotional Game Design**
- Emotion and Engagement, Motivation, Interest
- Emotion and Cognition
- Affective Communication

**Educational Games**

- Plass & Perlin
Educational Games

Emotional Design for Math Game

Overview

Class Activity

Affective Design Factors

• Designing Simulations and Games: Affect
  • Emotional Design
  • Affective Outcomes
    • Attitudes (Persuasion)
    • Interest, Motivation
    • Identity

Gamasutra (Bures)

• How can learners' emotions be manipulated in games?
  • Game Mechanics
    • Audio
      • Sound Effects
    • Visual
      • Lighting (Color)
    • Tactile
      • Force feedback controllers

Educational Games

Gamasutra (Bures)

• What approaches can be used to enhance the games using emotional design?
  • cognition
  • motivation
  • communication

Educational Games

Plass & Perlin

Action
  • System
  • Self
  • Social

Freedom
  • Mastery
  • Data

Mastery
  • Measuring skills, their acquisitions and their uses.

Data
  • Measuring content, information, rules and real-life objects.

Self
  • Reflexive thoughts, goals, private experiences and inner changes.

Social
  • Shared experiences, rituals, culture and relationships.

Freedom
  • Measuring choices and opportunities for choices.

System
  • The level of the mind, cognitive, logic, plans.

System
  • Strategy, Creativity
  • Designing storyboards, game mechanics, rules.

Self
  • Action
  • The level of the body, visceral, immediacy.

Class Activity

Educational Games

Gamasutra (Bures)

Emotional Design
  • Affective Outcomes
  • Attitudes (Persuasion)
  • Interest, Motivation
  • Identity

Gamasutra (Bures)

Conceptualization, Tasks and Aesthetics

Visual
  • Lighting (Color)
  • Shapes

Educational Games
**Affective Design Factors**

**Effect of Emotion on Interest, Motivation, Engagement**

- Affect as a signal to act or assess (e.g., Carver, 2001, 2003; Carver & Scheier, 1998; Fredrickson, 2001)
- Negative affect: signals that goal is not met
- Positive affect: signals that primary goal is met
- Lower-order goals can be addressed

**Affect Design for your educational game!**

- Design your educational game from an affective perspective
  - Select Conceptual Approach
  - Determine Higher-level Objectives
  - Desired Outcomes (cognitive, attitudes, identity)
  - Activities/Game Mechanics
  - Use Game Design Variable Categories from Bures

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**Research Findings**

**Rapunzel**

- Goal: Teach Girls How to Program
- Participants: 56 middle school students (29 female)
- Design: Pre/Post test design
- Duration: 4 weeks, 50min per week

- No increases in programming-related knowledge
- Significant pre/post increases in girls’ general self-efficacy ($d = .65$) and boys
- Significant pre/post increase in programming self-efficacy for girls ($d = 1.06$), marginally significant for boys ($d = .48$)
- Significant pre/post increase in self-esteem for girls ($d = .66$) and boys ($d = .48$)

**Out of Class Activity**

- Affect Design for your educational game! (project teams, 30min)
- Design your educational game from an affective perspective
  - Select Conceptual Approach
  - Determine Higher-level Objectives
  - Desired Outcomes (cognitive, attitudes, identity)
  - Activities/Game Mechanics
  - Use Game Design Variable Categories from Bures

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**Affective Design Factors**

**Effect of Emotion on Identity**

- Attitudes
- Self-esteem
- Self-efficacy

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**Affective Design Factors**

**Effect of Emotion on Identity**

- Attitudes
- Self-esteem
- Self-efficacy