Chapter 3
Theories Behind Gamification of Learning and Instruction
Overview

• What learning theories support the use of games within the instructional process?
• What elements of motivational theory apply to the gamification of learning and instruction?
Introduction

• How learning theory support the use of games?

• Operant conditioning and the reinforcement schedules

• Are the distributed practice, social learning theory, achieving the flow state, scaffolding and game levels, and the power of episodic memory?
Motivation

• Intrinsic Motivation
  • Is the motivation primarily driven from within the learner?

• Extrinsic Motivation
  • Is the motivation from some external factor? This is known as extrinsic motivation
Intrinsic Motivation

• When a person undertakes an activity for its own sake
  • Open a book and read for self-fulfillment, not because of some external reward

• May lead to a greater depth of learning and more creative output

• Rewards come from the carrying out an activity rather than from the result of the activity.
Extrinsic Motivation

• Behavior undertaken in order to obtain rewards or avoid punishment

• Grade, praise, certificate, badge, reward, prize or admiration from others

• We will have six motivation models that describe elements of both intrinsic and extrinsic motivations.
1. ARCS Model

- Well known model in the field of instructional design
- Used as a framework in creating e-learning and courseware

- Attention – Perceptual, inquiry, variability
- Relevance – Goal orientation, match motives, familiarity, modeling
- Confidence – Clearly state the learning requirements and expectations in the beginning; Small opportunities for success; Different and challenging experiences that build upon one another
- Satisfaction – Opportunity to apply new knowledge and skills; Positive encouragement and reinforcement.
2. Malone’s Theory of Intrinsically Motivating Instruction

• Why games are so much fun and motivational?

• Challenge
  • Goals with uncertain outcomes.
  • Personally meaningful to the learner

• Fantasy
  • An environment that “evokes mental images of things not present to the senses or within the actual experience of the person involved”
  • Can make instructional environments more interesting and more educational
  • Extrinsic and Intrinsic fantasies

• Curiosity
  • An optimal level of informational complexity and a novel and exciting environment
  • Sensory and Cognitive curiosity
  • Random surprising feedback for engagement.
3. Lepper’s Instructional Design Principles for Intrinsic Motivation

• Promoting intrinsic motivation in instructional activities to avoid having to rely on extrinsic motivational techniques

• Control
  • Decrease or minimize any extrinsic constraints

• Challenge
  • Goals of uncertain. Timely feedback. Multiple goals and levels.

• Curiosity
  • Areas of inconsistency, incompleteness

• Contextualization
  • Present the activity in a functional simulation or fantasy context
4. The Taxonomy of Intrinsic Motivation

• Internal Motivational:
  • Challenge
  • Curiosity
  • Control terms of the contingency, choice, and power
  • Fantasy

• Interpersonal Motivational:
  • Cooperation
  • Competition
  • Recognition
5. Operant Conditioning

- Create operant conditioning
- Choose a proper reward schedules

<table>
<thead>
<tr>
<th>Type of Reward Schedule</th>
<th>Definition</th>
<th>Example</th>
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</thead>
<tbody>
<tr>
<td>Variable Ratio</td>
<td>Reinforcement for a behavior is provided in unpredictable intervals.</td>
<td>Sometimes receiving a gold coin when hitting a mushroom and sometimes not. Sometimes receiving a reward when stealing a hat from ten elves and sometimes receiving the reward when stealing it from three or fifteen.</td>
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<tr>
<td>Fixed Ratio</td>
<td>Reinforcement is provided after a pre-selected number of times a behavior is exhibited.</td>
<td>Receiving a power-up or reward after collecting one hundred coins or fifty badges.</td>
</tr>
<tr>
<td>Fixed Interval</td>
<td>Reinforcement for a behavior is provided after a fixed amount of time has elapsed.</td>
<td>A magic shield always appears fifteen minutes after the last magic shield is destroyed.</td>
</tr>
<tr>
<td>Variable Interval</td>
<td>Reinforcement for a behavior is provided after a variable amount of time has elapsed.</td>
<td>The magic carpet appears every so many minutes; sometimes it is every two minutes, sometimes every three minutes, and sometimes up to ten minutes.</td>
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</tbody>
</table>
6. Self-Determination Theory (SDT)

• Autonomy
  • A person has the feeling that they are in control and can determine the outcome of their actions.

• Competence
  • A need for challenge and a feeling of mastery.

• Relatedness
  • Experienced when a person feels connected to others. Online multiplier game or friends or families are playing together.
Distributed Practice

• What is distributed practice?
• Also called spaced practice, or spaced rehearsal
• Opposite: Mass Practice
• Robust and powerful phenomenon in learning
• Long-term retention and recall of content
• Avoid fatigue and less efficient
• Not better in immediate learning, only for a period of time.
• Varying storylines, different areas open, content; no same experience twice
Scaffolding

• Different levels
  • Easy → Intermediate → Hard
  • Demonstration → Practice → Test

• Progressive disclosure
Social Learning

• Human social models can be effective in influencing another person to change behaviors, beliefs, or attitudes.

• Virtual Human
Flow

- Achievable Task
- Concentration
- Clear Goals
- Feedback
- Effortless Involvement
- Control Over Action
- Concern for Self Disappears
- Loss of Sense of Time