Hard Fun: Cognition & Emotion at Play

Clark N. Quinn
Quinnovation
Digital Game and Intelligent Toy Enhanced Learning
Digital Game and Intelligent Toy Enhanced Learning
HOW?
It’s the *process*, silly!
(Selected) Background

DesignWare

UCSD

UNSW

Quinnovation

Independent Consultancy

Helping organizations take learning to the ‘next level’
Why?
Respecting Our Learners

- Meaningful Goals
- Most Effective Learning
- All Dimensions: Cognitive, Affective & Conative
  - Personality/Learning Styles
  - Motivation/Anxiety
Engaged eLearning

- Compelling Introduction
- Modeled Application
- Conceptual (Re)Presentation
- Scaffolded Practice
- Cognitive Skill
- Guided Reflection
- Graceful Exit
What is…

• A Simulation?

• A Scenario?

• A Game?
Terminology

• Simulation
  – A model
• Scenario
  – Initial conditions
  – Goal
  – Story
• Game
  – Tuned
“Play is the beginning of knowledge”
- Anonymous
What makes an effective practice experience?
E3: Elements of Effective Experiences

- Clear Goals: Cognitive Research
- Appropriate Challenge: Vygotsky’s ZOPD
- Contextualized: Situated Learning
- Anchored: Bransford ‘Studios’
- Relevant: ARCS Model
- Active: Constructivism
- Manipulation: Microworlds
- Rapid/Appropriate Feedback: Behavioral Research
- Attention: ARCS model
What makes an experience engaging?
E3(2): Elements of Engaging Experiences

- Clear or Emergent Goals
- Thematic coherence
- Balanced challenge
- Meaningfulness: action to domain
- Meaningfulness: problem to learner
- Choices of action
- Direct manipulation
- Coupling: I/O Inter-referentiality
- Novel information and events

Games
‘Flow’
Film
Magic
UI
Direct Manipulation
Theatre
FICTION
<table>
<thead>
<tr>
<th>Education</th>
<th>Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear Goals</td>
<td>Clear or Emergent Goals</td>
</tr>
<tr>
<td>Appropriate Challenge</td>
<td>Balanced Challenge</td>
</tr>
<tr>
<td>Contextualized</td>
<td>Thematic Coherence</td>
</tr>
<tr>
<td>Anchored</td>
<td>Relevance: action to domain</td>
</tr>
<tr>
<td>Relevant</td>
<td>Relevance: problem to learner</td>
</tr>
<tr>
<td>Exploratory</td>
<td>Choices of Action</td>
</tr>
<tr>
<td>Active Manipulation</td>
<td>Direct Manipulation</td>
</tr>
<tr>
<td>Appropriate Feedback</td>
<td>Coupling</td>
</tr>
<tr>
<td>Attention-getting</td>
<td>Novel information/events</td>
</tr>
</tbody>
</table>
Synergy

• Learning is difficult
• Engagement is difficult
• Doing both together is even harder

• Whole greater than the sum of the parts
Learning *should* be ‘hard fun’
How?
"The proper study of mankind is the science of design"
- Herb Simon
Design

- Systematic Creativity
Design: Analysis
Engaged Analysis

• Determine Target Performance
  – Cognitive Skills
• Reliable Misconceptions
• Determine Learner Knowledge
• Determine Learner Interests
What’s the *key* difference in eLearning games?
“A good game is a series of interesting decisions”
- Sid Meier
Built games
I’m **not** interested in better fact remembering!
Decisions

- *Habit* of moving up is critical…
- Where would learner actually *use* this knowledge
- Challenge
  - don’t insult your learner
  - optimize learning
“No matter what I do…”
Misconceptions

• Learner’s mistakes (generally) are *not* random!
• Learners have
  – logical, sensible reason
  – just wrong
  – hard to extinguish.
Constrained Consequences
Consequences

• Where does that choice lead?
  – What decision?
• Always?
• What factors influence?
• Can you try again?
What’s the story?
Settings

• Where do these decisions occur?
  – Reliably
  – Repeatedly

• Get all
How do we find out what interests the learner?
Learner Interests

- Who is the audience?
- What makes them take *this* job?
- What makes them get up in the morning?
- What characterizes them *outside* this job?

- e.g. Personality (Big 5)
- Learning Styles
- Motivation
- Anxiety
- Etc...
Design: Specification
Engaged Specification

• Determine Pedagogical Approach
• Set Metrics
  – Including Engagement
• Situate the Task(s) in (a) Model World(s)
• Elaborate the Details
  – (err on the side of graphics)
  – (or, err on the side of media, e.g. audio)
• Incorporate Underlying Pedagogical Support
• Map Learning Activities to Interface
“Choose a role that the player would want to be in”
- Henry Jenkins
What about the details?
‘Sweating’ the details

• Media
  – Use appropriate expertise

• Point of View

• Feedback
  – IN context
  – NOT (necessarily) immediate

• Don’t forget **fun**
  – Novelty
  – Random and probabilistic
  – Drama
  – Humor

• **Exaggeration!**
Maximizing Impact
Design: Implementation & Evaluation
Engaged Implementation & Evaluation

- Prototype
- Test for Usability
- Test for Educational Effectiveness
- **Test for Engagement**
- Cycle (read: tune)
  - Until Metrics met
“If you don’t get the design right, it doesn’t matter how you implement it; If you get the design right, there are lots of ways to implement it”
- (Me)
“Tuning is nine-tenths of the effort”
Will Wright
Metrics & Tuning

• Usability Metrics
  – Time
  – Errors
  – Learning
  – Retention

• Educational Metrics
  – Mager’s Objectives

• Engagement Metrics
  – Subjective Experience

• NB: You can’t decide it’s a game
Learning *can* be ‘hard fun’
Ways to ‘think outside the box’

- Problem-driven
- Principle
  - No Limits Design
  - Models
- Empirical
  - Examples
  - Reflection
  - Research
Wise Curriculum

- Problem-Solving
  - Research
  - Design
- Systems Thinking
  - Model-based Reasoning
  - Modeling
- Working With Others
  - Leadership
  - Communication
- Learning
  - Critical Thinking
  - Meta-Learning
- Values
  - Ethics
  - Stewardship
“Any truly advanced technology is indistinguishable from magic”
- Arthur C. Clarke
...extended

- Motivating Examples
  - Compelling Introduction
  - Reference Frameworks
    - Conceptual (Re)Presentation
      - Modeled Application
        - Cognitive Skill
          - Scaffolded Practice
            - Spaced Practice
            - Job Aids
          - Guided Reflection
            - Communication
              - Reactivation
            - Graceful Exit

Quinnovation
Smart
Dimensions

- # of programmables
- Uniformity
- Quantity
- Context specificity
- Extensibility
- Etc!
Study: ‘smart toy’ you’d like to have, better than anything you’ve seen

- (2nd) A robot that does your command without a controller…it can do chores without wanting to play and never gets tired or bored.
- (4th) …a robot that does what you say……it does what you want it to.
- (5th) …a robot that has a keyboard …when you type something, it will …give you what you typed…Type it and you’ll get it!

- Subjects & instrument →
Action!

• Respect Your Learners
  – Whole learning

• Engage Learning
  – Meaningful practice
  – Focus on decisions, not facts
  – Maximize Impact

• Don’t get trapped
• Have fun!
Learning can, and should, be ‘hard fun’!

Thanks!
clark@quinnovation.com
+1-925-200-0881
http://www.quinnovation.com
http://www.engaginglearning.com