Game and Learn:
An Introduction to Educational Gaming
9. Games and Assessment

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Assessment and the Game Selection Process
Target Maximum Use of Game Features

• Match goals to:
  
  • Genre
  
  • Critical Gaming Analysis
  
  • Narrative Structure
  
  • Player Types

• Wherever possible, consider whether game events can be used for assessment purposes.

The Assessment Tools
Are Your Existing Assessment Tools a Good Match for the Task?

- Yes, they are.
  - What are the features of the tools that fully justify this answer?
- No, they are not.
  - Were the existing tools ever adequate?
  - Will you make new tools that you intend to apply to non-game courses?
  - Will they perform adequately there?

Bloom’s Taxonomy – Cognitive Processes

<table>
<thead>
<tr>
<th>Anderson &amp; Krathwohl Revision (2001)</th>
<th>Characteristic Processes</th>
</tr>
</thead>
</table>
| Create                               | • Generating multiple hypotheses based on given criteria  
                                         • Designing a procedure to accomplish an untyped task  
                                         • Inventing a product to accomplish an untyped task |
| Evaluate                             | • Testing for consistency, appropriateness, and effectiveness in principles and procedures  
                                         • Critiquing the consistency, appropriateness, and effectiveness of principles and procedures, basing the critique upon appropriate tests |
| Analyze                              | • Distinguishing relevant/irrelevant or important/unimportant portions of material  
                                         • Integrating heterogeneous elements into a structure  
                                         • Attributing intent in materials |
| Apply                                | • Applying a procedure to a familiar task  
                                         • Using a procedure to solve an unfamiliar, but typed task |
| Understand                           | • Paraphrasing materials  
                                         • Exemplifying concepts, principles  
                                         • Classifying items  
                                         • Summarizing materials  
                                         • Extrapolating principles  
                                         • Comparing items |
| Remember                             | • Recalling memorized knowledge  
                                         • Recognizing correspondences between memorized knowledge and new material |
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Matching Existing Tools to New Assessment Requirements

Optimal Game Assessment

Optimal Non-game Assessment
Correcting for Expectation Effects

The Four Major Forms of Expectation Effects

- **The Placebo and Halo Effects**
  - Placebo Effect: a technology has an effect, because the person interacting with that technology believes it will.
  - Halo Effect: one aspect of a technology colors how other aspects of that technology are perceived, and consequently its effect.

- **The Hawthorne Effect**
  - The fact that someone is exposed to a technological shift by itself can affect how they perform, regardless of the specifics of that technological shift.

- **The John Henry Effect**
  - A group that is not exposed to a technological shift, and knows that another one is, may view itself as in competition with the latter group and change its performance accordingly.

- **The Pygmalion Effect**
  - Teachers' expectations of the performance of their students will tend to determine their actual performance.
Controlling for Expectation Effects

• Try to have multiple instructors use the technology
• Try to have multiple classes use the technology
• Have a third party observe instructors and classes
• Look for trends in class performance throughout the term
• Use end-of-term attitudinal surveys

Experimental Design

<table>
<thead>
<tr>
<th>Groups</th>
<th>Teacher Expectation</th>
<th>Benefit</th>
<th>No Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No-Treatment</td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. Hawthorne</td>
<td></td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3. Experimental</td>
<td></td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>Procedure</td>
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</tbody>
</table>

Essential
Important
Desirable
Checking for Effect Size

Comparing Results
Cohen’s Effect Size Index $d$

$$d = \frac{|m_A - m_B|}{\sqrt{\frac{(n_A - 1)\sigma_A^2 + (n_B - 1)\sigma_B^2}{n_A + n_B - 2}}}$$

$m_A, m_B$: mean scores for the two groups being compared
$n_A, n_B$: sample sizes for the two groups being compared
$\sigma_A, \sigma_B$: standard deviation of the scores for the two groups being compared

$d=0.2$
Resources Cited

• **The Assessment Tools:**

• **Correcting for Expectation Effects:**
  - Draper, S.W. *The Hawthorne Effect*. Online at: http://www.psy.gla.ac.uk/~steve/hawth.html

• **Checking for Effect Size:**