A Magic Bullet
Choosing and Using Games for the Classroom
Who Am I?
What am I playing Now?

2014-06-03

Gamification Workshop

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Magic Bullet
My Background

- B.Sc., M.Sc. In Computer Science
- Taught CS 1982 - present
- Ph.D. in Ed. Tech (Instructional Design) 2008
- Have taught in Science, Education, Art, Engineering
- Have taught: Programming, Data Architecture, CAL, DGBL, Game Design, Technical Writing, General Science & Math
- Using games since 1998
- Maintain extensive websites & course sites
- **Hatching Program** 1989 - 2011
Overview

1. The Challenge
2. Magic Bullet Model
3. Q & A
4. Guided Exercises
5. Debriefing
Introductions

• Who are you?
• Why are you here?
• What you hope to get out of it?
• What is your experience with gamification?
Games for Learning

THE CHALLENGE
The Challenge

• Games are complex.
• Assessments designed for commercial games miss the mark.
• Assessments designed for ‘traditional’ instruction also miss the mark.
• Summative assessment not always an option.
• Critical reviews are hard to do (and even harder to find).
The Challenge

Digital Games cannot be assessed in the same way as traditional games or for that matter, any other modern media form.

1. What do we need from digital games for learning?
2. What criteria are important when assess games?
## What Makes Digital Different?

<table>
<thead>
<tr>
<th></th>
<th>Digital (Digital Games (and Simulations) (ALL))</th>
<th>Analog (Board &amp; Card Games)</th>
<th>Analog Simulation Games</th>
<th>Analog Role-Playing Games</th>
<th>Live Action Role-Play (including cosplay)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model of Original System</strong></td>
<td>Painstakingly and precisely defined.</td>
<td>Many details taken for granted and never made explicit.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rule Enforcement</strong></td>
<td>Hard-coded.</td>
<td>Uses 'honor system'.</td>
<td>On the fly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rule Structures</strong></td>
<td>Pre-determined.</td>
<td>Negotiable.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Game Objects</strong></td>
<td>Can be autonomous.</td>
<td>Either inert or mechanical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Game Interaction (what people can do with / to the game)</strong></td>
<td>Consistent across all instantiations of the game.</td>
<td>Consistent only if the rules are followed.</td>
<td></td>
<td>Each instantiation can be different.</td>
<td></td>
</tr>
<tr>
<td><strong>Participants</strong></td>
<td>There need only be one human participant.</td>
<td>All participants are human.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What Do We Need?

- Structured Approach
  - for comparability
- Concise
  - not too long
- Complete
  - as a game AND
  - as a learning object
What Criteria Are Important?

• How is it as a game?
• Does it have teacher support?
• Is it well-designed as an educational object?
• Are the various elements appropriately balanced?
What Makes A Game Good?
What Makes a Good Game for Learning?
A Solution

4PEG: THE FOUR PILLARS OF EDUCATIONAL GAMES, A MAGIC BULLET FOR EDUCATIONAL GAMES
Overview

• Model for evaluating and assessing games
• Subjective tool
• Learning NEED NOT = education
• Currently developed for single-player games
  – Relative Proportions
Four Pillars

The Four Pillars of Analysis

- Magic Bullet Rating 20%
- Game Overview 30%
- Educational Content 30%
- Teacher Support 20%

4PEG
The Four Pillars of Educational Games

- Gameplay & Aesthetics
- Educational Content
- Teacher Support
- Magic Bullet Rating

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Ratings

- Common Likert scale.
- Includes missing & N/A

### Game Review V5

<table>
<thead>
<tr>
<th>Component</th>
<th>Rating</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Rating</td>
<td>2.5</td>
<td>49 /100</td>
</tr>
</tbody>
</table>

#### Summaries

<table>
<thead>
<tr>
<th>Component</th>
<th>Rating</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Game Overview</strong></td>
<td>2.8</td>
<td>14 /30</td>
</tr>
<tr>
<td>Gameplay</td>
<td>2.0</td>
<td>6 /15</td>
</tr>
<tr>
<td>Art &amp; Audio</td>
<td>4.0</td>
<td>8 /15</td>
</tr>
<tr>
<td><strong>Educational Overview</strong></td>
<td>2.5</td>
<td>35 /70</td>
</tr>
<tr>
<td>Teacher Support</td>
<td>2.5</td>
<td>10 /20</td>
</tr>
<tr>
<td>Educational Content</td>
<td>2.5</td>
<td>15 /25</td>
</tr>
<tr>
<td>Magic Bullet Rating</td>
<td>2.5</td>
<td>10 /25</td>
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<td>2.8</td>
<td>14 /30</td>
</tr>
<tr>
<td>Content &amp; Originality</td>
<td>2.0</td>
<td>1 /5</td>
</tr>
<tr>
<td>Game Mechanics</td>
<td>2.0</td>
<td>3 /5</td>
</tr>
<tr>
<td>Game Progression</td>
<td>3.0</td>
<td>3 /5</td>
</tr>
<tr>
<td>Artistic Design</td>
<td>4.0</td>
<td>5 /5</td>
</tr>
<tr>
<td>Setting &amp; Characters</td>
<td>5.0</td>
<td>5 /5</td>
</tr>
<tr>
<td>Audio</td>
<td>-1.0</td>
<td>5 /5</td>
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<tr>
<td><strong>Educational Content</strong></td>
<td>2.5</td>
<td>15 /30</td>
</tr>
<tr>
<td>Instructional Strategies</td>
<td>0.0</td>
<td>0 /5</td>
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<tr>
<td>Instructional Design</td>
<td>1.0</td>
<td>1 /5</td>
</tr>
<tr>
<td>Objectives</td>
<td>2.0</td>
<td>1 /5</td>
</tr>
<tr>
<td>Integration</td>
<td>3.0</td>
<td>1 /5</td>
</tr>
<tr>
<td>Accuracy</td>
<td>4.0</td>
<td>5 /5</td>
</tr>
<tr>
<td>Assessment</td>
<td>5.0</td>
<td>5 /5</td>
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</tbody>
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<tbody>
<tr>
<td><strong>Teacher Support</strong></td>
<td>3.0</td>
<td>10 /20</td>
</tr>
<tr>
<td>Guides</td>
<td>1.0</td>
<td>1 /5</td>
</tr>
<tr>
<td>Plug N' Play</td>
<td>2.0</td>
<td>2 /5</td>
</tr>
<tr>
<td>Resources</td>
<td>3.0</td>
<td>3 /5</td>
</tr>
<tr>
<td>Community</td>
<td>4.0</td>
<td>4 /5</td>
</tr>
<tr>
<td><strong>Magic Bullet Rating</strong></td>
<td>2.5</td>
<td>10 /20</td>
</tr>
<tr>
<td>Overall Balance</td>
<td>1.0</td>
<td>1 /5</td>
</tr>
<tr>
<td>Can Learn vs Must Learn</td>
<td>2.0</td>
<td>2 /5</td>
</tr>
<tr>
<td>Operational vs Educational Learning</td>
<td>3.0</td>
<td>3 /5</td>
</tr>
<tr>
<td>Educational vs Discretionary Learning</td>
<td>4.0</td>
<td>4 /5</td>
</tr>
</tbody>
</table>

**NOTE:** Items marked -1 (na) are not counted.

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Magic Bullet
Game Overview 30%

- Content & Originality
- Game Mechanics
- Game Progression
- Artistic Design
- Setting & Characters
- Audio
Educational Overview 70%

3 of 4 Pillars

- Teacher Support 20%
- Educational Content 30%
- Magic Bullet Rating 20%
Teacher Support

- Guides
- Plug N' Play
- Resources
- Community

See Template Here
Educational Content

- Instructional Strategies
- Instructional Design
- Integration
- Objectives
- Accuracy
- Assessment
Magic Bullet Rating

- Overall Balance
- Can Learn vs Must Learn
- Operational vs Educational Learning
- Educational vs Discretionary Learning

See Template Here
The Bullet

- All learning in a game can be classified in one (or more) categories.

- Four criteria for assessment in digital games:
  - Things We Can Learn
  - Things We Must Learn
  - Collateral Learning
  - External Learning
Things I Can Learn

- Deliberately designed by those who created the game.
- Includes things designers *hope* people will take up.
- Includes game-specific objectives as well as general ones.
Things I MUST Learn

• Should be a subset of the first category.
• Required in order to achieve a specific goal or to win.
• Includes strategy.
Collateral Learning

• Other things we can learn
  – these are not necessarily designed into the game, although sometimes designers may hope that players choose to take these up

• Have NO impact on success in the game.
External Learning

- Not *technically* considered part of the normal gameplay.
- CAN impact success in the game.
- Includes social learning and outside communities.
- Also includes Cheats
  - typically designed into the game for testing purposes
  - often left in the game once it ships
  - deliberate design elements on the part of the designers
The Ed Piece

- When specifically intended for education / learning, we need more.

- Sub-divide into 3 additional classifications......

Defn: Serious Games
Games design for purposes other than pure entertainment.
Includes *but is not limited to* games for learning.
The Ed Piece

- **Operational**
  - Game controls & some mechanics
  - Necessary overhead

- **Educational**
  - *This is the critical piece*

- **Elective**
  - Anything that doesn’t fit into the other 2 categories ("fluff")
The Ed Piece

• Operational
  – How much is reasonable?

• Educational
  – How do you plan to use the game?

• Elective
  – Can add value.
  – BUT watch out for the Decorative Media Trap.
It's All About Balance
A Good Game:

- Good balance.
- Nothing I **MUST** learn that is outside of what I **CAN** learn.
- Allows for learning outside of game and from cheats and community.
- Things I **MUST** learn < ½ of what I **CAN** learn.
- External learning not necessary.
- Collateral learning possible.
Good Game Variations

External Learning
Things I CAN learn.

Collateral Learning
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External Learning
Things I CAN learn.

Collateral Learning
© K.Becker 2014

External Learning
Things I CAN learn.

Collateral Learning
© K.Becker 2014

External Learning
Things I CAN learn.

Collateral Learning
© K.Becker 2014

External Learning
Things I CAN learn.

Collateral Learning
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A Good Game:

Magic Bullet Color Code

- Things I CAN learn. (Field)
- Things I MUST learn. (Core Learning)
- External Learning (Scaffolding)
- Collateral Learning (Incidental Learning)
MUST Learn > CAN Learn

• Tends to worry traditional educators.
• Need outside help / resources to get into the game or progress.
• CAN still be good, but this has serious implications for audience and support requirements.
• Very risky but also useful in serious games.
• Games do not always need to be self-contained.
MUST Learn > CAN Learn

- Things I MUST learn.
- Things I CAN learn.
- External Learning
- Collateral Learning

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MUST Learn > CAN Learn

Things I MUST learn.

Things I CAN learn.

Collateral Learning

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Magic Bullet

Color Code

Things I CAN learn. (Field)

Things I MUST learn. (Core Learning)

External Learning (Scaffolding)

Collateral Learning (Incidental Learning)

Beat the clock and your school day will rock!
MUST learn ≈ CAN learn

- MUST learn is considerable component of CAN learn.
- Can be good game.
- Edgames can fit in here.
- Challenging for some, frustrating for others.
- Often requires players to repeat plays and levels many times.
- Design does not really allow for or include external learning.
- Collateral learning possible, but not necessary.
- The more one MUST learn of the total set, the fewer choices players may ultimately have.
MUST Learn $\approx$ CAN Learn
MUST Learn ≈ CAN Learn

Mom's left you in charge of the house... can you handle it? Prove yourself on Level 1 and you'll get to tackle Level 2!

External Learning
Things I CAN learn.

Things I MUST learn.

Collateral Learning

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Magic Bullet
Color Code

Things I CAN learn. (Field)

Things I MUST learn. (Core Learning)

External Learning (Scaffolding)

Collateral Learning (Incidental Learning)

You're In Charge

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Math Blaster
Master The Basics

Play

Manual

Exit

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MUST Learn << CAN Learn

- Lacks direction.
- Aimless.
- Toy, not game ~OR~ straight SIM.
- If there is not enough we MUST learn in order to win, there may be insufficient challenge.
MUST Learn << CAN Learn

Things I MUST learn.

Things I CAN learn.

External Learning

Collateral Learning

External Learning

Collateral Learning

External Learning

Collateral Learning

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Magic Bullet
MUST Learn << CAN Learn

Magic Bullet Color Code

- Things I CAN learn. (Field)
- Things I MUST learn. (Core Learning)
- External Learning (Scaffolding)
- Collateral Learning (Incidental Learning)
A Thin Game

- Often CAN needn't be much bigger than MUST in a short form game.
- Can be great if carefully designed.
- Must be designed as $\leq 5$ minute game.
- Many puzzle games are in this category.
- Likely to be bad if a round is too long.
- Could be OK for a drill game.
A Thin Game

1. Things I CAN learn.
2. Things I MUST learn.
3. Collateral Learning

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A Thin Game

Things I CAN learn.

Things I MUST learn.

External Learning

Magic Bullet
Color Code

Things I CAN learn. (Field)

Things I MUST learn. (Core Learning)

External Learning (Scaffolding)

Collateral Learning (Incidental Learning)

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Your Turn

GUIDED EXERCISES
Activities

1. On-the-spot assessments of games suggested by the audience
   – assuming the game can be accessed and demo’d

2. The Game Lesson Plan
Games to Assess

- Angry Birds
- Osy Osmossis
- Animal Crossing
- Steel Driver
- Under the Knife
- New Super Mario
Game Lesson Plan

• Pick a game you know.
  – Angry Birds
  – Scribblenauts
  – Unblock Me

• Develop a draft lesson plan.
Where does that leave us?

DEBRIEFING
• Questions?
• Issues?
• Feedback?