Game On! Adding Elements of Game Theory to PA Courses

Melissa Murfin, PA-C, PharmD, BCACP
OBJECTIVES

- Understand the term gamification and application of game techniques to topics in PA education.
- Review techniques for the adaptation of common games to didactic topics in the first-year PA curriculum.
- Discuss research on the application of game techniques in the PA classroom.
- Experiment with game techniques utilized in a PA education setting.
NEW DRUG APPROVALS THRU AUG 2015

• Jan: secukinumab, parathyroid hormone, edoxaban
• Feb: panobinostat, avibactam/ceftazidime, lenvatinib, palbociclib
• Mar: dinutuximab, nivolumab, isavuconazonium, ivacaftor
• Apr: ivabradine, deoxycholic
• May: oladaterol
• Jun: cangrelor, albendazole
• July: alirocumab, sonidegib, brexpiprazole, daclatasvir, sacubitril/valsartan
• Aug: flibanserin, evolocumab
We teach it, 
but do they learn it?
IN THIS HOUSE
We believe in Magic
and that the truth is out there
Once upon a time and in
GALAXIES FAR FAR AWAY
WE DO WORLDS WOBBLY TIMEY WIMEY STUFF while
SOUNDING WHERE NO MAN HAS DONE BEFORE
We know the answer to everything is 42 and that
The odds are ever in our favor
We do cosplay and passion
And we aim to misbehave
And we don’t care what others think
Because in this house
We do GEEK
You are a team of CDC scientists. The world as we know it is in chaos. Zombies have taken over the planet. The cause of zombieism is unknown…there currently is no treatment and no cure. You and your team are locked inside the CDC building in Atlanta, desperately racing to find a cure and solve this crisis before there are no humans left.
GAMIFICATION

What is it
How it applies to education
GAMIFICATION DEFINED

adding game elements to non-game activities
WHERE YOU’VE SEEN IT

• Frequent flier programs
• Company loyalty rewards programs
• Social apps
  • FourSquare
GAME-BASED LEARNING

- Using game attributes in education
  - Goal or outcome to achieve
  - Rules
  - Levels
  - Feedback
GAME ATTRIBUTES

- Unknown outcomes
- Multiple paths to one goal
- Problem context construction
- Multiplayer collaboration
- Immersion with limited real-life consequences

http://www.gc-solutions.net/blog/making-learning-games-effective-5-ways-of-ensuring-that-players-learn/
GAMES ARE THE MOST ELEVATED FORM OF INVESTIGATION

-- EINSTEIN
GAME-BASED LEARNING

• Does it work?
  • What does that mean?
    • Better test scores
    • Better retention
  • How do I define whether it works or not?
RESEARCH ON GAMES

• Pharmacy games
  • Price is Right
  • Family Feud
  • $100K Pyramid

• Used as review tools or paired with didactic lecture
• Games well-received
• Enjoyable interactions
• Collaborative efforts
RESEARCH ON GAMES

• Game-based learning similar to problem-based learning
• Intrinsic motivation
• Makes learning activities enjoyable
  • Incorporates challenge and curiosity
RESEARCH ON GAMES

• Study on civil engineering educational game software
• Undergrad students in Austria, Germany, Switzerland (N=47)
• Compared online participants, lecture only and lecture-volunteer game players
• Equivalent learning results with game learners
• ‘fun factor’ and motivation higher with game (p=0.033)
LET THE GAMES BEGIN!
Jeopardy

Antiretroviral Therapy
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Classy Drugs</th>
<th>MOA</th>
<th>ADRs</th>
<th>Mystery</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
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</tr>
</tbody>
</table>
What treatment should be started on a healthcare provider who experiences a needle-stick?
Drug associated with life-threatening hypersensitivity
Two drugs associated with kidney stones
GAMES ARE THE MOST ELEVATED FORM OF INVESTIGATION

-- EINSTEIN
RESEARCH ON GAMES

- Pharmacy games
  - Price is Right
  - Family Feud
  - $100K Pyramid
- Used as review tools or paired with didactic lecture
- Games well-received
- Enjoyable interactions
- Collaborative efforts
RESEARCH ON GAMES

- Game-based learning similar to problem-based learning
- Intrinsic motivation
- Makes learning activities enjoyable
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http://ac.els-cdn.com/S0360131505001910/1-s2.0-S0360131505001910-main.pdf?_tid=9da4adb8-0ea4-11e4-8108-00000aacb35d&acdnat=1405706271_fe95f3239c7bab15f635b396b3100a4f
GAME RESEARCH

• Study on civil engineering educational game software
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LET THE GAMES BEGIN!
Jeopardy

Antiretroviral Therapy

Created by Educational Technology Network. www.edtechnetwork.com 2009
### POWERPOINT JEOPARDY

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<td>50</td>
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<td>50</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>
JEOPARDY

lipodystrophy
Pharmacology MadLibs
Faculty member is a fabulous 50 yo female who appears much adjective ending in er than her stated age. She presents to the office with a one-month history of htn symptom. Her PMH is consistent with history of comorbid condition for which she takes medication. FH is positive for CV disease, endocrine disease, rheum disease. Upon PE, you note Stage 1 B/P and B/P eye finding. This is the second time her B/P has been elevated. You prescribe diuretic with dose. During patient education, you explain the medication works by diuretic MOA and has possible side effects of side effect, side effect, side effect. Pt verbalizes understanding and the appropriate f/u time is later.

Pt is seen in the ER one week later by your partner, classmate, for a medical adj arrhythmia caused by diuretic electrolyte imbalance. She is treated and released to f/u with you the next day.
ANTIHYPERTENSIVE PICTIONARY
CATCH PHRASE
APPLES TO APPLES
Antibiotic Trivial Pursuit

- Pink: Drug Names and Classes
- Orange: Indications/Uses/Contraindications
- Yellow: Adverse Effects
- Green: Mechanisms/Spectra
- Blue: Interactions/Toxicities
- Brown: Potpourri
PSYCHOTROPIC
IT WAS A DARK AND STORMY DAY AT THE FRANCIS CENTER.......
YOU ALL ARRIVE TO FIND THE BUILDING....

Quiet
and
creepy
YOU BEGIN CHECKING THE ROOMS....

• To see what’s going on
Something is terribly wrong
THE ROOMS
WITHIN EACH ROOM...

You find one faculty member who appears comatose
NEXT TO EACH FACULTY MEMBER...

Is an empty pill bottle
YOUR JOB...

- Determine which drug was in each bottle based on a series of clues
- Determine which faculty member is in each room
CLUES

• You will form teams of 6 – 7 members.
• Your team will ‘enter’ a room by spinning a spinner and may ask for a clue regarding the drug or faculty member.
• Inquiries will be related to the following categories:
  • Neurotransmitter affected by the drug
  • Indications/uses
  • Adverse effects
  • Drug interactions
  • Class of drug
  • Brand name
• You may NOT use notes or technology
STUDENT FEEDBACK
CLASS OF 2015
GBL SURVEY RESULTS

• N=18 of 37 students responded
• 17 age 21 – 30
• One 31 – 40
• 16 women, 2 men (class distribution: 33 women, 4 men)
Please choose the answer which best fits:

- I enjoy playing games for fun.
- I consider myself a serious gamer.
- I was familiar with the format of many of the games played in class.
- I prefer online games to board games.
- I prefer multiplayer or team games to individual player games.
- I enjoyed playing pharmacology games for review of material.
- I prefer a traditional lecture type review.
- I feel playing pharmacology games helped me in reviewing the course material.
- Playing pharmacology games helped improve my test score.
## Class of 2015 Responses

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Responses</th>
<th>Weighted Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>I enjoy playing games for fun.</td>
<td>0 (0.00%)</td>
<td>0 (0.00%)</td>
<td>1 (5.56%)</td>
<td>5 (27.78%)</td>
<td>12 (66.67%)</td>
<td>18</td>
<td>4.61/5</td>
</tr>
<tr>
<td>I consider myself a serious gamer.</td>
<td>2 (11.11%)</td>
<td>6 (33.33%)</td>
<td>4 (22.22%)</td>
<td>5 (27.78%)</td>
<td>1 (5.56%)</td>
<td>18</td>
<td>2.83/5</td>
</tr>
<tr>
<td>I was familiar with the format of many of the games played in class.</td>
<td>0 (0.00%)</td>
<td>0 (0.00%)</td>
<td>0 (0.00%)</td>
<td>11 (61.11%)</td>
<td>7 (38.89%)</td>
<td>18</td>
<td>4.39/5</td>
</tr>
<tr>
<td>I prefer online games to board games.</td>
<td>1 (5.56%)</td>
<td>9 (50.00%)</td>
<td>6 (33.33%)</td>
<td>2 (11.11%)</td>
<td>0 (0.00%)</td>
<td>18</td>
<td>2.50/5</td>
</tr>
<tr>
<td>I prefer multiplayer or team games to individual player games.</td>
<td>0 (0.00%)</td>
<td>1 (5.56%)</td>
<td>5 (27.78%)</td>
<td>8 (44.44%)</td>
<td>4 (22.22%)</td>
<td>18</td>
<td>3.83/5</td>
</tr>
<tr>
<td>I enjoyed playing pharmacology games for review of material.</td>
<td>0 (0.00%)</td>
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<td>0 (0.00%)</td>
<td>7 (38.89%)</td>
<td>11 (61.11%)</td>
<td>18</td>
<td>4.61/5</td>
</tr>
<tr>
<td>I prefer a traditional lecture type review.</td>
<td>0 (0.00%)</td>
<td>8 (44.44%)</td>
<td>9 (50.00%)</td>
<td>1 (5.56%)</td>
<td>0 (0.00%)</td>
<td>18</td>
<td>2.61/5</td>
</tr>
<tr>
<td>I feel playing pharmacology games helped me in reviewing the course material.</td>
<td>0 (0.00%)</td>
<td>0 (0.00%)</td>
<td>3 (16.67%)</td>
<td>11 (61.11%)</td>
<td>4 (22.22%)</td>
<td>18</td>
<td>4.06/5</td>
</tr>
<tr>
<td>Playing pharmacology games helped improve my test score.</td>
<td>0 (0.00%)</td>
<td>1 (5.56%)</td>
<td>8 (44.44%)</td>
<td>7 (38.89%)</td>
<td>2 (11.11%)</td>
<td>18</td>
<td>3.56/5</td>
</tr>
</tbody>
</table>
Class of 2015 Responses

My favorite game played in class was:

- Jeopardy: 10
- Pictionary (Win, Lose or Draw): 5
- Catch Phrase: 5
- Apples to Apples: 5
- Clue: 10
- None of the above: 0
- I did not enjoy any of the games: 0

Options

My favorite game played in class was:
CLASS OF 2016
GBL SURVEY RESULTS

- N=22 (of 38 students)
- 19 age 21-30; 3 age 31-40
- 18 women; 4 men (class 27 women, 11 men)
Please choose the answer which best fits:

- I enjoy playing games for fun.
- I consider myself a serious gamer.
- I was familiar with the format of many of the games played in class.
- I prefer online games to board games.
- I prefer multiplayer or team games to individual player games.
- I enjoyed playing pharmacology games for review of material.
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<th>Agree</th>
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</tr>
</thead>
<tbody>
<tr>
<td>I enjoy playing games for fun.</td>
<td>0 (0.00%)</td>
<td>1 (5.26%)</td>
<td>0 (0.00%)</td>
<td>9 (47.37%)</td>
<td>9 (47.37%)</td>
<td>19</td>
<td>4.37 / 5</td>
</tr>
<tr>
<td>I consider myself a serious gamer.</td>
<td>6 (31.58%)</td>
<td>7 (36.84%)</td>
<td>2 (10.53%)</td>
<td>1 (5.26%)</td>
<td>3 (15.79%)</td>
<td>19</td>
<td>2.37 / 5</td>
</tr>
<tr>
<td>I was familiar with the format of many of the games played in class.</td>
<td>0 (0.00%)</td>
<td>0 (0.00%)</td>
<td>4 (22.22%)</td>
<td>9 (50.00%)</td>
<td>5 (27.78%)</td>
<td>18</td>
<td>4.06 / 5</td>
</tr>
<tr>
<td>I prefer online games to board games.</td>
<td>1 (5.26%)</td>
<td>9 (47.37%)</td>
<td>8 (42.11%)</td>
<td>0 (0.00%)</td>
<td>1 (5.26%)</td>
<td>19</td>
<td>2.53 / 5</td>
</tr>
<tr>
<td>I prefer multiplayer or team games to individual player games.</td>
<td>0 (0.00%)</td>
<td>1 (5.26%)</td>
<td>6 (31.58%)</td>
<td>6 (31.58%)</td>
<td>6 (31.58%)</td>
<td>19</td>
<td>3.89 / 5</td>
</tr>
<tr>
<td>I enjoyed playing pharmacology games for review of material.</td>
<td>0 (0.00%)</td>
<td>3 (15.79%)</td>
<td>4 (21.05%)</td>
<td>7 (36.84%)</td>
<td>5 (26.32%)</td>
<td>19</td>
<td>3.74 / 5</td>
</tr>
<tr>
<td>I prefer a traditional lecture type review.</td>
<td>1 (5.26%)</td>
<td>2 (10.53%)</td>
<td>7 (36.84%)</td>
<td>8 (42.11%)</td>
<td>1 (5.26%)</td>
<td>19</td>
<td>3.32 / 5</td>
</tr>
<tr>
<td>I feel playing pharmacology games helped me in reviewing the course material.</td>
<td>0 (0.00%)</td>
<td>5 (26.32%)</td>
<td>3 (15.79%)</td>
<td>7 (36.84%)</td>
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<td>19</td>
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<td>Playing pharmacology games helped improve my test score.</td>
<td>0 (0.00%)</td>
<td>5 (26.32%)</td>
<td>8 (42.11%)</td>
<td>5 (26.32%)</td>
<td>1 (5.26%)</td>
<td>19</td>
<td>3.11 / 5</td>
</tr>
</tbody>
</table>

3.43 / 5
My favorite game played in class was:

- Clue

Other options:
- Jeopardy
- Pictionary (Win, Lose or Draw)
- Catch Phrase
- HeadBandz
- Apples to Apples
- None of the above
- I did not enjoy any of the games

# of times chosen
CLASS OF 2017
GBL SURVEY RESULTS

- N=23 (of 38 students)
- 22 age 21-30; 1 age 31-40
- 22 women; 1 men (class 33 women, 5 men)
Please choose the answer which best fits:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Standard Deviation</th>
<th>Responses</th>
<th>Weighted Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>I enjoy playing games for fun.</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1 (4.35%)</td>
<td>5 (21.74%)</td>
<td>17 (73.91%)</td>
<td>6.47</td>
<td>23</td>
<td>4.7 / 5</td>
</tr>
<tr>
<td>I consider myself a serious gamer.</td>
<td>2 (8.7%)</td>
<td>8 (34.78%)</td>
<td>6 (26.09%)</td>
<td>6 (26.09%)</td>
<td>1 (4.35%)</td>
<td>2.65</td>
<td>23</td>
<td>2.83 / 5</td>
</tr>
<tr>
<td>I was familiar with the format of many of the games played in class.</td>
<td>0 (0%)</td>
<td>1 (4.35%)</td>
<td>0 (0%)</td>
<td>13 (56.52%)</td>
<td>9 (39.13%)</td>
<td>5.39</td>
<td>23</td>
<td>4.3 / 5</td>
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<td>I prefer online games to board games.</td>
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<td>11 (47.83%)</td>
<td>5 (21.74%)</td>
<td>1 (4.35%)</td>
<td>0 (0%)</td>
<td>3.93</td>
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<td>2.04 / 5</td>
</tr>
<tr>
<td>I prefer multiplayer or team games to individual player games.</td>
<td>0 (0%)</td>
<td>4 (17.39%)</td>
<td>3 (13.04%)</td>
<td>8 (34.78%)</td>
<td>8 (34.78%)</td>
<td>3.07</td>
<td>23</td>
<td>3.87 / 5</td>
</tr>
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<td>I enjoyed playing pharmacology games for review of material.</td>
<td>0 (0%)</td>
<td>1 (4.35%)</td>
<td>2 (8.7%)</td>
<td>7 (30.43%)</td>
<td>13 (56.52%)</td>
<td>4.84</td>
<td>23</td>
<td>4.39 / 5</td>
</tr>
<tr>
<td>I prefer a traditional lecture type review.</td>
<td>2 (8.7%)</td>
<td>10 (43.48%)</td>
<td>11 (47.83%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>4.88</td>
<td>23</td>
<td>2.39 / 5</td>
</tr>
<tr>
<td>I feel playing pharmacology games helped me in reviewing the course material.</td>
<td>1 (4.35%)</td>
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<td>5 (21.74%)</td>
<td>9 (39.13%)</td>
<td>7 (30.43%)</td>
<td>3.2</td>
<td>23</td>
<td>3.87 / 5</td>
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<tr>
<td>Playing pharmacology games helped improve my test score.</td>
<td>1 (4.35%)</td>
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<td>10 (43.48%)</td>
<td>7 (30.43%)</td>
<td>3 (13.04%)</td>
<td>3.38</td>
<td>23</td>
<td>3.39 / 5</td>
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</table>
### Class of 2017 Responses

**My favorite game played in class was:**

<table>
<thead>
<tr>
<th>Game</th>
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</tr>
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<tbody>
<tr>
<td>Jeopardy</td>
<td>1 (4.35%)</td>
</tr>
<tr>
<td>Pictionary (Win, Lose or Draw)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Catch Phrase</td>
<td>9 (39.13%)</td>
</tr>
<tr>
<td>HeadBandz</td>
<td>3 (13.04%)</td>
</tr>
<tr>
<td>Pharmacology Trivial Pursuit</td>
<td>1 (4.35%)</td>
</tr>
<tr>
<td>Clue</td>
<td>9 (39.13%)</td>
</tr>
<tr>
<td>None of the above</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>I did not enjoy any of the games</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>
I enjoy playing games for fun.

I consider myself a serious gamer.

I was familiar with the format of many of the games played in class.

I prefer online games to board games.
I prefer multiplayer or team games to individual player games.

Playing pharmacology games helped improve my test score.
I enjoyed playing pharmacology games for review of material.

I feel playing pharmacology games helped me in reviewing the course material.
My favorite game played in class:

- Jeopardy
- Pictionary (Win, Lose or Draw)
- Catch Phrase
- HeadBandz
- Apples to Apples
- Pharmacology Trivial Pursuit
- Clue
- None of the above
- I did not enjoy any of the games
LEVELING UP

• What if the whole class was a game?
### Scoring:

<table>
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<tr>
<th>Points</th>
<th>Levels</th>
<th>Grade points</th>
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</thead>
<tbody>
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<td>8950-10000</td>
<td>A</td>
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<tr>
<td>8550-8949</td>
<td>B+</td>
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<td>7450-7949</td>
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<td>6950-7449</td>
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</tr>
<tr>
<td>Below 6950</td>
<td>U</td>
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</tbody>
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Note: For further information regarding academic standing in the Department of Physician Assistant Studies, please see the DPAS Student Handbook.

### Assessment Activities:
Student progress will be assessed in a variety of ways, including written exams, assignments and quizzes.

<table>
<thead>
<tr>
<th>Point Opportunities</th>
<th>Number per course</th>
<th>Maximum point value per assessment</th>
<th>Total possible points</th>
</tr>
</thead>
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Game Mechanics in Pharm I

- I preferred assessing pharmacology grades by earning points rather than the traditional percentage system.
- I felt less pressure to perform using the points system for grades instead of a traditional percentage system.
- I had more control over my grade when using the point system as compared to the traditional percentage system.
- I approached assignments differently when using points for grades rather than a traditional percentage grading system.
UPCOMING AREAS

• Online games
• Immersive experiences
• Augmented reality
• Wearable devices
REFERENCES

