The Games Show

Gaming Theory As a Teaching Tool at All Levels

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Overview

- We'll focus on theory and rational
  - 30 minutes allows no more
- This presentation & additional information contained in our game integration packet can be found on the web:
  - http://idt.memphis.edu/~rvaneck/Tech2004.html
- Additional Resources & Readings

- Aldrich, C. (2004). Simulations and the future of learning: An innovative (and perhaps revolutionary) approach to e-learning. San Francisco: Pfeiffer.
- Gee, J. P. (2003). What Video Games Have to Teach Us About Learning and Literacy. New York: Palgrave MacMillan.
- Prensky, M. (2000). Digital Game-Based Learning. New York: McGraw-Hill.
- Cassell, J., & Jenkins, H., eds. (1998). From Barbie to Mortal Kombat: Gender and computer games. Massachusettes Institute of Technology.
- Kafai, Y. B. (1995) Minds in Play: Computer game design as a context for children's learning. Hillsdale, NJ: Lawrence Erlbaum Associates.

Top 10 Reasons Why Games Will NEVER Be Effective for Learning

- No learning takes place when we play (play=play, learning=work)
- I've nothing against fun, but why must we entertain our students?
- Motivation is not a learning objective
- Not everyone wants to play computer games
- Games don't teach anything
- Games are expensive to develop
- If I play games in my class, I'll never have time to cover the material
- There are no games that teach Physics/Biology/Civil Engineering/...
- If the game content can't be modified, I can't use it in my class
- Games are resource-intensive & won't work for all topics & learners

No learning takes place when we play

- Not True
- Play IS Learning
  - "We learn more in the first years of life [through play] than we do in any other corresponding time in our lives (Lepper & Chabay, 1985).
  - Research in "anthropology, psychology, and education indicates that play is an important mediator for learning and socialization throughout life" (Reiber, 1996, p. 44)
  - Flow & Gaming
    - Games can promote optimal flow experiences (Csikszentmihalyi, M., 1990; The psychology of optimum experience)
    - Flow may be optimal learning state
- Play is self-regulated problem-solving activity
  - "playing a game successfully can require extensive critical thinking and problem-solving skills" (Reiber, 1996, p. 52).
  - Ideas we recognize as important in learning
- Play is Piaget & Bandura
  - Assimilation, Accommodation, Cognitive Disequilibrium
  - Modeling
- BUT: play is not the primary benefit of instructional games

...why should we have to entertain our students?

(The "No Pain, No Gain," theory of learning)

- We shouldn't
  - Learning should always be our focus, whether it is fun or not BUT:
- Why should learning be painful?
  - We've made school irrelevant and boring for most
  - Where and when we can make learning fun WITHOUT sacrificing learning, why not do it?
- BUT: Fun is not the primary benefit of instructional games

Motivation is not a learning objective

- Maybe
- Lepper and Chabay (1985): "Motivational factors may often exert as great an influence on children's achievement as do cognitive factors" (p. 217)
- Motivation increases likelihood of engagement in the activity (practice) and attitude toward the content
  - "practice that is motivational" promotes practice (Klein, Freitag, & Wolf, 1990, p. 330)
  - Attitude toward the content is correlated with performance (Gal & Ginsburg, 1994; Schoenfeld, 1983, 1985; Lehman, 1987).
- Motivation ≠ Fun; Motivation = Willingness to Engage
  - When is the last time you heard a twelfth-grader exclaim "Man, am I ever going to miss school when I graduate next year"?
  - Learning should be relevant and meaningful to student lives now, and in future
- BUT: motivation is not the primary benefit of instructional games

Not everyone wants to play computer games

- True
- Not everyone wants to learn from books, videos, multiple choice tests, web...
- In fact, most people don't REALLY want to go to school...
- And yet:
  - Statistics show trend
    - 41% of of all Americans and 63% of all parents will buy at least one computer game this year
    - More than 200 million games are sold each year
    - 65% percent of parents believe games are a positive part of children's lives
    - 30% of game players are under 18; 29% are 18-35 (Interactive Digital Software Association, 2003)
- Game play leads to computer literacy and is correlated with interest in science & mathematics
- Unequal access promotes a digital divide

Games don't teach anything

- Not True
  - Games exist at the highest level of the learning taxonomy
  - For Example: A meta-analysis of 58 experiments from 33 studies found a .33 effect size in favor of instructional simulation games over conventional instruction for cognitive learning across all grade levels (Szczurek (1982)
    - Games have only gotten better since then
  - Games allow for self-regulated learning, individualized instruction, scaffolding
- Scientific Revolution + Industrial Revolution=abstraction of knowledge from human activity: "Learning is not doing"
  - Situated Cognition & Learning
  - Anchored Instruction
  - Context & Transfer
- They just don't teach in the WAY we think of teaching
  - Trick is to harness what they are good at
- BUT: games are not the only way to achieve this, and these strengths are not the primary benefit of instructional games

Games are expensive to develop

- Maybe
- What's possible vs. what's been done
  - Open source
  - Participatory design as learning strategy
  - Templates and Knowledge Authoring Tools
    - Microsoft's new XNA Game Development Toolkit (PDA, phones, Windows, Xbox)
  - Partnerships like MIT's Games-To-Teach project funded by $1 million grant from Microsoft
  - Textbook companies
- BUT: developing games is not the primary way to use games to teach
  - need to find ways to integrate existing games into learning

I'll never have time to cover the material if I play games in class

- Not True
- Movies and overheads take time to implement too, but they ARE the material
- Games, like any instructional medium, must be matched to the content and outcomes
- Games CAN take a long time to implement
  - Must maximize the content/material to game time ratio
  - Can also occur outside of normal class time (just as reading textbooks)

There are no (Physics/Biology/Civil Engineering/etc.) games

- Partially True
- MOST commercial games do not focus directly on a domain
  - Physicus
  - Chemicus
  - Bioscopia
- But many have integrated content from different domains, or require strategies that are compatible with other domains
  - Rollercoaster Tycoon--Physics
  - Sim City--Civil Engineering

If can't modify game content, can't use it

- Partially True
- If modifying the game were the only way to modify the content, you wouldn't be able to use the game
- But teachers re-purpose learning content all the time
  - show part of a film or ask learners to focus on one aspect/theme of the film
  - Combine learning elements from a variety of sources to create new content
  - Evaluate media and resources (fact-checking, bias)
- The key is to supplement materials with activities and additional material according to your instructional purpose
  - Address inaccuracies, implications, etc.

Using games is too resource-intensive & won't work for all topics & learners

- Partially True
  - Using games without careful planning and attention to learning outcomes is resource intensive
  - Games will never work for all topics and all learners
    - Nor will any other instructional medium, although we've tried with the lecture
- The primary benefits of instructional games lie in all of the above:
  - Implement discovery-based learning and constructivist approaches
  - Create engaging learning experiences that matter to students
  - Promote transfer by creating authentic learning environments
  - Increase instructional time in and out of class
  - Promote self-regulated learning and autonomy
- BUT: Games are effective ONLY if:
  - Careful planning and attention are paid to Medium and Instruction
  - Instruction is matched to the medium (e.g., Kozma, 1985)
  - Content is integrated with the game (e.g., not just for motivation)

Final thoughts & considerations

- Not All Games Alike
  - Card games, video "arcade" style games, & interactive adventure games: different strategies, different learning supported
  - Analyze individually for underlying strengths and strategies
- Matching Game and Learning Taxonomies
  - Learning taxonomies can be matched to game taxonomy
  - A beginning (Gagne, Bloom, & Bates' Taxonomies--website)
- Intrinsic Motivation (Malone & Lepper, 1987)
  - Endogenous vs. exogenous fantasy (in relation to content)
  - Endogenous fantasy will promote flow
  - When not IN game, keep activities & roles endogenous TO game
- Instructional/Learning Factors
  - What type/level of learning is supported by game or puzzle (taxonomy)?
  - What is the relation of puzzles to story, plot, and/or goal (flow)?
  - What types of strategies are promoted by game/puzzles? (trial & error vs. scientific method)
  - Game as Frame for New Learning (top-down)
  - Game as Chance to Synthesize and Apply Pre-learned Skills (bottom-up)