

How Are Games Educational?

Learning Theories Embodied in Games

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Theme: Learning to Play:Playing to Learn: How we learn in and through game play, what we do/don't learn in playful environments, and extant and projected designs for learning. Serious Games: (How) are games serious?

Abstract

Although the climate is changing, there remains considerable resistance to the use of games in the classroom, especially to commercial, off-the-shelf (COTS) games. The potential value of computer and video games for learning seems high (Mitchell & Savill-Smith, 2004), but the body of in-class research on the use of games is still small – partly because studying learning through games in the classroom still meets with considerable resistance. One way of changing this is by connecting games with accepted pedagogy. This paper proposes to explain how existing game design coincides with two of the most prominent learning theories to come out of the last generation: Gagné's Conditions for Learning (Gagné, 1985); and Gardner's Theory of Multiple Intelligences (Gardner, 1983). Game pedagogy is sound but often unrecognized: good games *already* possess the major components necessary to meet the needs for sound instruction as outlined by both Gagné and Gardner.

Gagné's theory stipulates that there are several different types or levels of learning, implying that each type also requires a different approach to instruction. While there is a fair degree of overlap between Gagné's approach and Gardner's, there are still sufficient distinctions to warrant separate treatment. Gardner provides a somewhat more accessible classification based on social interactions and culture, while Gagné focuses on cognitive constructs. Gagné's categories of learning are: verbal information, intellectual skills, cognitive strategies, motor skills and attitudes, which are embodied in his well-known "Nine

Events of Instruction” (Gagné, 1985; Gagné, Briggs, & Wager, 1992). These events are purported to provide the necessary conditions for learning, and also for the appropriate selection of media. As will be explained, (good) games meet virtually all the criteria listed. Thus, a case can be made for the potential applicability of games for learning. It is not the intent of this paper to make a case for the replacement of all instruction by games.

Gagné’s nine events applied to games (examples of specific games to be provided in full paper):

- (1) **Gaining attention (reception)** - in games this is referred to as “attract mode”; it is what one sees when a game appears to be playing by itself – it shows elements of the game play and is intended to entice players to play.
- (2) **Informing learners of the objective (expectancy)** – part of the back-story and description of the victory condition;
- (3) **Stimulating recall of prior learning (retrieval)** – typically accomplished in the form of a back-story associated with the introduction to a game; sometimes sequels and new levels will refer back to things learned in previous levels/versions.
- (4) **Presenting the stimulus (selective perception)** – controlled with-in the game; designed to provide encouragement as well as challenge
- (5) **Providing learning guidance (semantic encoding)** - games must be self-contained; players do not use manuals; games tutor – often employing sophisticated “just-in-time” approaches to providing help
- (6) **Eliciting performance (responding)** –an essential element of the interactivity – without this, there really *is* no game
- (7) **Providing feedback (reinforcement)** – accomplished in many ways, including scores; displays; queries; verbal feedback
- (8) **Assessing performance (retrieval)** – an integral part of the game – game designers already know that when players receive insufficient feedback on progress they tend to loose interest in the game

(9) **Enhancing retention and transfer (generalization)** – skills and strategies learned in one game are often usable in other games and entire genres

Gardner's theory of multiple intelligences is one of the most significant recent developments in learning theories. Gardner proposes seven primary forms: linguistic, musical, logical-mathematical, spatial, body-kinesthetic, intrapersonal (e.g., insight, metacognition) and interpersonal (e.g., social skills). The implication of this theory is that learning can become more effective if we focus on and develop instruction for these intelligences. Assessment should include more than one 'intelligence', as each is more than simply a content domain; it is also a learning modality. Cultural differences play a key role, as each culture tends to value and emphasize particular intelligences in favour of others.

Connecting Gardner's ideas with the design of games is particularly effortless, as almost every one is evident in almost every successful game – one of the features of games that make them so engaging is that they address each one of these forms, providing game players with a particularly rich experience, where each player has an opportunity to take advantage of her own particular strengths:

- **Linguistic:** games often include written and spoken elements – for game play, as well as for direction and help
- **Spatial:** games are of course highly visual, providing a rich 3 dimensional environment, but always at least partially under the player's control in terms of what is visible. It is quite common, for example, to be shown multiple simultaneous first- and third-person views – which not only tap into one's spatial intelligence, but at the same time actively helping players learn to use these views in their gameplay.
- **Musical:** all include sound to enhance play – there are sound-effects, both diegetic and non-diegetic, and in some cases musical scores for games are

as sophisticated as they are for film. Sounds are used as feedback and reinforcement as well as for effect and enjoyment.

- **Kinaesthetic:** Although games can not yet place their players physically in the game, most games do require players to 'place themselves' virtually in the game in one way or another and all involve movement and action which, at the very least, is realized through physical movements of the players hands (watching players quickly confirms that there is more going on than simple hand motions).
- **Logical-mathematical:** strategy is one of the key elements in play – the extent to which this intelligence is exercised depends heavily on the genre and specific game played
- **Intrapersonal:** strategy is one of the key elements in play – once again this is a key element in games: they force players to discover and practice what one can do, what one wants to do, how one reacts to things, which things to avoid, and which things to gravitate toward.
- **Interpersonal:** many of the most popular games are now multi-player games, some massively so. Even single player games typically include multiple NPC's (non-playable characters) and often require varying degrees of competition or cooperation in order to win.

Concluding with Gardner, who describes seven levers of change in a recent book (Gardner, 2004), this paper argues that all seven must be fully utilized in order to effect real change in the attitudes of educational institutions towards the use of games for learning. The establishment of a clear connection between best practices in game design and current learning theories is one more strategy to support the use of games as valuable tools for learning.

- **Rational reasoning:** Logically outline the pros and cons of the use of games for learning.
- **Research:** Present data and relevant cases to support the argument.
- **Resonance:** Create connections between desirable facets of education and those elements already embodied in games.

- **Representational redescription:** Make your point in many different ways.
- **Resources and rewards:** Use rewards as incentives to convince someone to adopt your view; make it easy to agree.
- **Real world events:** Use events from society at large to make your point.
- **Resistances:** Understand the factors that cause people to reject your view. Such insights can make it easier for you to change their minds.

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