

Beyond Entertainment: Games as Learning Technologies

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ABSTRACT

Computer and videogames are increasingly becoming recognized as providing a powerful means for learning. This paper explores what is it about today's digital games that provide such deep learning experiences, together with how educational designers can harness the potential of games.

Keywords

Games, learning, education, technology, theory.

INTRODUCTION

Recently games, particularly digital games such as console-based videogames and computer games, have become recognized as providing rich learning contexts for players (Norman 2001b; Norman 2001a; Prensky 2001; Papert 1998; Stapleton 2003; Gee 2003a; Gee 2003b; Stapleton and Taylor 2002). So the question comes to mind. Exactly, what is it about games that make them so good for learning? And, how can these features be implemented those designing materials for educational purposes? In this paper I explore these questions with the aim of providing educational designers a conceptual toolkit to draw upon to harness the potential of game-based learning.

Games as Educational Technology

Today's digital games are typically long, challenging and complex. Players need to develop appropriate skills in order to play the game, together with strategies in order to beat it. The amount of time players invest in learning, has had some call playing a computer game "a demarcated learning project" (Papert 1998, p. 87). Others have directly compared the informal learning accomplished by game players, with that achieved within the formal context of school:

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Think of what it takes to learn a game compared to what has to be done in school. To play a game well requires the same kinds of learning, study, understanding, and practice as are required of any educational activity. (Norman 1993, p. 32)

Now, while academics have just been beginning to recognize the learning potential of digital games, game designers themselves have been aware of it for some time. For example, ex-Atari game designer, Chris Crawford, explains:

Games are...the most ancient and time-honored vehicle for education. They are the original educational technology, the natural one, having received the approval of natural selection. In light of this, the question, "Can games have educational value?" becomes absurd. It is not games but schools that are the newfangled notion, the untested fad, the violator of tradition. Game-playing is a vital educational function for any creature capable of learning... I claim that the fundamental motivation for all game-playing is to learn. (Crawford 1982, pp. 16-17)

Games, therefore, can be understood as a *natural educational technology*. All kinds of animals play games as a means of learning the knowledge and skills necessary to live in their environment. And the same form of natural selection evident in the wild occurs within the contexts of digital games. Game studios are involved in a business that depends on the success of players being able to learn in order to master the game. Quite simply "[i]f their public failed to learn, they [the game studios] would go out of business" (Papert 1998, p. 87). This is why today's digital games have become so successful at promoting meaningful learning. And like other educators today, I am interested in moving beyond entertainment, and exploring the true learning potential of games.

Games versus Traditional Education

So what is it that's different about games compared to the approaches of traditional education?

The view of traditional education is one which focuses on the teacher delivering a certain amount of sequenced content - the *curriculum* - typically through "chalk-and-talk" sessions to students. It's the *teacher* who holds the

appropriate knowledge and then actively disseminates it to the students. And it's expected that the students will faithfully receive and understand the information provided, or at least remember it. This view of education principally focuses on *teachers* and the *practice of teaching*. It is the teachers who enact an active role, and the students who enact a passive one. Academics term this approach "*instructionist* education, [where] a learner is asked to learn what the instructor thinks [s]he should learn" (italics added) (Gargarian 1996, p. 149), and this viewpoint is "exemplified by the traditional lecture where the lecturer talks and the students listen" (Birkbeck College Central Computing Services 2003).

This approach is not confined simply to 'human teachers', but is also applicable to computer programs which adopt a "question and answer" approach. The answer is there as a means to assess if the student has learned the *content* and scores are often regarded as a measure of understanding. With the primary emphasis on producing answers as a means for assessing learning, little attention is afforded to the *learning process*. And when this happens "kids aren't learning how to think anymore – they're learning how to memorize" (Gee 2003a, p. 1).

Now, compare the traditional *instructionist* view of education with the approach that games employ. Game designers recognize that "[p]layer activity is arguably at the heart of the video game experience" (Wolf and Perron 2003, p. 15). Accordingly, videogames *empower players* by giving them control within the game world. So game designers, aim to ensure there is a "[a] constant focus on the player experience" (Falstein in Prensky (2001, p. 134)). Their approach is a *player centered* approach, and since game playing can be regarded as a learning activity, games provide a *learner centered* approach to learning.

Game designers are aware that the key to successful games is to "[e]ntertain the player by engaging the[ir] mind" (Shelley 2001) by providing "a series of interesting choices" (Meier in Rollings and Morris (2000, p. 38)). In short, good games provide players with a challenging experience in which they must make interesting decisions.

Now, the game designer's focus on the player experience is a non-trivial one as it shifts control to the player as the active agent in learning, as opposed to the teacher being the active agent in traditional education. Games aren't designed to *teach* players; rather they are designed for players to *learn*. Attempting to create a game that *teaches* players, from a traditional perspective, would mean delivering *content*, or *knowledge*, in a sequential fashion in which the primary focus is on achieving 'correct answers', or key goals. It would be the *game* that would have control, and the players would need to passively receive the knowledge, and then correctly demonstrate their reception of it in order to receive a reward through some form of assessment, such as a score. This, for me at least, is a

misunderstanding of the true potential of games as learning technologies.

I believe that the true potential of games lies in their player focus whereby players actively learn about the game world – the entire system of interaction - through play. Games are not about the *transmission of knowledge* from the game, or the game designer for that matter, to the player. Rather, games are about players *actively constructing knowledge* through their experiences of play. Players come to a game with their own *prior knowledge and experience* about the real and game world, about games they have played before and so on. They then attempt to apply this knowledge to the new situation, or context, provided by the game. Now, while some of this knowledge may be applicable within the game, some of it may not, so players will need to learn about the game, as a system of interaction, through play. Players construct mental pictures, or models, in their head based on the patterns they discover during play. These *mental models* allow players to run internal "what if?" scenarios, or scripts, inside their heads. For example, what happens "if I jump on that?", or "what if I walk over there?" and so on. Through play, players build up a mental model, or image, of the game system and how it plays; in essence how it works. They can then use these models to *predict* what would happen, *experiment* to find out what actually did happen, and *reflect* on the outcome. Though this process players develop strategies, "simpler solutions to harder questions" (Durkin and Aisbett 1999, p. 71) and also come to understand that "[t]here's more than one way to solve problems" (p. 72). So whereas games promote players, as learners, to experiment, play with ideas and solve problems in innovative ways, traditional approaches expect students to stay on task and provide 'correct answers' in order to achieve grades.

Now, the idea of players, as learners, actively constructing knowledge through interaction, and founded on their prior knowledge and experience, is one which exists within education circles as *constructivism* (Our Purpose Associates 2001; Driver 1995; Hewson 1982; Kozel 1998; Tobin and Tippins 1990). Constructivism, is an educational theory, in which learners *actively construct knowledge* through interaction based on their prior knowledge and experience. Knowledge, therefore, isn't some objective 'message' that can be sent from a teacher to a learner, but rather it is highly *subjective* and *must be constructed by learners* themselves. The metaphor of construction emphasizes that it is the *learner* who is the active agent in the process, which stands in stark contrast to the *teacher-centered* approach of instructionism.

In providing a context in which players learn, rather than one in which they are taught, game designers are approaching learning similar to that of Albert Einstein who remarked "I never try to teach my students anything. I only try to create an environment in which they can learn." (Einstein in Prensky (2001, p. 71)).

But for me, I believe games extend constructivism into a more powerful form of learning. While constructivism genuinely offers a view of learning as knowledge construction, it neglects a *specific context* for that knowledge construction. However, I regard games as providing a specific context for this learning; namely that of *design*. Game designer, Bruce Shelley, makes the following comment as to what makes a good game:

Players invest in the game by building something or shaping a character. They put a personal stamp on the game by building, possessing, moulding, defending and operating their creations. Players get a chance to be designers. (Shelley 2001)

When playing games, players are provided with opportunities for building or shaping elements within the game. They are *both constructing knowledge* in their heads, *and building or shaping external objects* that exist within the game. Consequently, today's digital games provide players with opportunities to *design* in some form. And in education, value-adding constructivism with the context of design is an educational theory known as *constructionism*.

Constructionism - the N word as opposed to the V word - shares constructivism's connotation of learning as "building knowledge structures" irrespective of the circumstances of learning. It then adds the idea that this happen especially felicitously in a context where the learner is creating a public entity, whether it's a sand castle on the beach or a theory of the universe. (Papert in Harel and Papert (1991, p. 1))

Constructionism connects building knowledge structures with building objects or models. In short, constructivism takes the view that players, as learners, "don't get ideas; they make ideas" (Kafai and Resnick 1996, p. 1), and constructionism adds that they are "more likely to make new ideas when they are engaged in making some type of external artifact [or object]"(p. 1) that is personally meaningful to them.

Implications for Educational Designers

Now while I have only touched the surface of the potential of games for learning in this paper, I do believe that educational designers can take some points away that will help them harness the potential of games as a means for learning. So here are a few points I think are worth keeping in mind.

Approach design from the *learner's* perspective. You are trying to create an environment in which people can learn, rather than one that is meant to teach. Further, in creating this environment, the focus is on the *activity* of the player. Accordingly, as a designer, your focus should be on the *verbs* of your design rather than the *nouns*. It's more about what the player can *do*, than what they can *remember*.

And this raises the point about the *content* within the interactive design you create. For the most part the content

is *in the process of play*. While a key component of games is having a definite outcome, the enjoyment and engagement of playing a game is in the *process* of achieving, or maybe simply trying to achieve, that goal. The content is about understanding the system of interaction within the game. It's about the player understanding *relationships* between different elements within the game, the results of their actions, and what variables affect those results.

Also be aware of engaging the mind of the player, as learner, with interesting challenges and choices, rather than random or trivial ones. It is the nature of this challenge that will help motivate and engage the player - remember its fun *because* its hard, not in spite of being hard.

Finally, consider that players need to *personally invest* in the game somehow. They need to shape a character, or build something during play. In essence, players have the ability to design something within your game. And this leads to another point. The idea of learners as designers can extend beyond the context of the game into other areas. For example, some games give players the opportunity to modify, or *mod*, existing games. Here they move beyond the context of the game itself into other applications which they can change various elements of the game. Providing players tools for modding gives them a new level of freedom in their ability to design, something consistent with the learning approach of constructionism.

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