Games as Teachers

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ABSTRACT

This paper seeks to outline a set of fundamental observations about the instructive nature of video games. It stands as a resource when considering the content of games, the design intentions, and the games' relationship to general society. It is, as asserted in this paper, true that games introduce fundamental approaches to problem solving and conflict resolution. These introductions serve as a kind of prescription which may be translated into philosophical approach. This paper outlines three instruction-related characteristics of video games. These are the games tendency to require learning for efficacy, understanding over recitation, and diagnosis the system. These three observations are then related to two solutions, the use of appropriate win conditions and the use of direct agency through computer-vision technologies.

Keywords

Educational Video Games, Computer Vision, Extra-game Worlds

1. INTRODUCTION

While it is a common approach to ask whether or not games instruct specific behaviors, it is perhaps more accurate to assess the behaviors reinforced by games in an effort to later identify how those reinforced behaviors are enacted in extra-game worlds. The mere fact that much research has been completed on the effects of video game technologies indicates an overwhelming suspicion that games are instructive, if not prescriptive technologies. Much of the preceding literature evaluates the relationship of video game portrayal of violence and the behaviors of their players.

This paper actively endeavors to avoid arguments about the relationship of game violence to extra-game violence because violence is a mechanic in games, not an instructional ideology. It is more accurate to state that firing a gun is a direct action solution, where side-stepping an advisory would be an indirect solution. The difference is in the element of diagnosis. Instead of evaluating the relationship between certain animated behaviors in a video game, it is more beneficial to look at the philosophical under pinning of that address. This is a fairly literary view, where the content of the work is subsequently analyzed for its subtext and suggestions.

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1.1 Background and Terminology

To understand the instructive quality of games, it is first important to understand how the video game integrates into educational theory. This paper assumes a fundamental understanding of fairly contemporary educational theory and practice. This paper does not purport to be an educational theorist's resource, but as is necessary in the evaluation of instructional content, the contemporary theories of education must be co-opted. Essential to this understanding is the assumption that demonstrative learning, and in particular, lab based exercises are effective means for education. The experience of video game play is presented here, as a kind of laboratory environment guided by the game's design. The lessons in such an environment are directed by the objective set forth by the game's designers.

It is also useful to understand the basic notion of Dr. Howard Gardner's multiple intelligence theory. Dr Gardner's work emphasizes eight intelligences, of which three are essential to the understanding of the claims in this paper. These three are the bodily-kinesthetic, or physical intelligence, the logical-mathematical, or reasoning intelligence, and the spatial, or picture-based intelligence [1].

This writing assumes a basic understanding of the terminology used in popular culture to describe game types and elements of specifics games. This includes the notion of gameplay, the flow and experience of a game, and game mechanics, which describe the means through which game goals are accomplished.

There are several texts on the basics of game design that apply to all games and to the subspecialty of video games. These include the oft cited Homo Ludens[2], Adams and Rollings' Fundamentals of Game Design [3], and Salen and Zimmerman and Rules of Play[4]. Such texts describe the benefit of play, the opportunity in play and the techniques for designing effective play situations. In particular, Homo Ludens, emphasizes play as a basic and purposeful cultural need.

Atypical of some writing on games design, this writing does not differentiate from console games and computer games. For the purpose of this writing the differentiation is not necessary. It is likewise simpler to ignore the mode of delivery and the interface. The focus of this writing is on the design decisions related to the specific software experiences of game play and transcend the implementation details of basic technological difference.

To emphasize a specific contrast between game worlds and non games worlds, this writing applies the term extra-game to mean the world outside of the game. This is more accurate than the

contrast of game world and real-world, as the focus of this text is the confluence of intra-game experiences with the extra-game world. Such terminology also avoids the post-modern quandary of distinguishing the simulation from the real. This is particularly important when considering the universe of games, which includes alternate reality games, a kind of game that extends itself into the extra-game to assert its own reality. It is simpler then to distinguish what exists in game and what exists outside of it.

2. The Three Pedagogic Tendencies

There are three tendencies in modern computer game design that result in educational experiences. Each of this is explored in the following three sections.

2.1.1 Learning from Necessity for Efficacy

Despite reports, the video game industry is full of educational titles with enormous success and incredible numbers of committed players. This is because most video game titles are educational. The learning curve experienced by those who have not played video games for years demonstrate the fundamental knowledge required to play them. This knowledge extends beyond the motor skills needed to succeed at an action game. It includes technical knowledge, historical knowledge and scientific knowledge. The one drawback, from an educational perspective is that much of this knowledge is based on fiction. It is the kind of knowledge common to literature for example, but not necessarily applicable to extra-game worlds.

The knowledge gained from playing video games is not limited to fictions. Players of simulations games learn a significant amount about the effects of specific game elements. Consider the example of Gran Turismo, a franchise which has gone through several iterations and spawned a collection of other racing simulations. The game employs a competency based system of matriculation that allows players to graduate through race car ranks by proving that they can master skills in acceleration, breaking, holding a racing line, and other fundamentals.

In Gran Turismo[5], objective matriculation through the system is augmented by the creative problem solving skill set employed by purchasing the appropriate car for the track and modifying the race car through true-to life principles of physics. The game goes so far as to allow players to modify camber, drag coefficient, and others. This is not merely an exercise in turning when appropriate; it is a world that requires engineering knowledge and skill to navigate.

What is most important here is that necessity is directly tied to the success. Educators often discuss the challenges of making course content relevant. Yet relevance is, in such games as this, immediate. Students of Gran Turismo will be left behind if they do not succeed. Yet, like a good instructor, evaluation in the game world is consistent, perpetual, and objective.

A quick glance at the game mechanics and game objectives of Gran Turismo indicate some clear learning outcomes:

□Understanding the mechanical use of specific items on the car

□Understanding the physical properties of drag, weight, and raw materials as they relate to high speed vehicle performance

□An overview of the international models and makes of a leading car manufacturers

□An introduction to racing classes, licensure, and track locations

□Increased understanding of driving control and strategy

□Introduction to the components used to modify vehicles, including acceleration, stopping distance, ride control, and top speed

These objectives read as though they were ripped from a course syllabus. Each is an independent concept that would require hours of disciplined study to master. Yet, even if studied in a traditional classroom, the instruction would lack the practical application that many students require. Yet, these objectives are met, demonstrated, and reinforced during gameplay which is paced for the students' specific needs.

Through the entire experience necessity drives the educational experience. The player cannot play well until they understand, and the more they understand the more they get to play.

2.1.2 Understanding versus Reporting

This is also a fundamental difference between education in many school environments and education in the game world. In the game world, there is a need for understanding, not just simple recitation. You cannot succeed in most major games by memorizing vocabulary or having the ability to report back what you just heard. If you are to best someone in a first-person shooter, you must understand how the weapons work, where the weapons are most effective, the geography of the space, objectives, and others.

This character of games distinguishes it from a variety of other forms of entertainment. While it is common for a sports fan to earn the respect of their peers from the ability to recall specific statistics or to report scores, it is rarely the place for earned respect among the game community. This recitation of statistics is instead often eclipsed by evaluation of a player's performance in the game world. It is for example, rare to hear of a video game fan that does not play games. Yet, in traditional sports, the fan is often a non-player.

This lack of dichotomy between fan and player creates an important social structure. It is virtually impossible within the society of gamers to be a fan without participation. Even the critique must play, not just watch a game, to understand it. This is an important distinction, in that there is an intrinsic relationship to doing. Game players are defined by what they do. The logic typically follows, that the player spends many hours playing real-time strategy games; therefore they are a fan of real time strategies. Rarely does the logic read, the player reads about a lot of real-time strategy games, they are a fan of real time strategies. This reliance on action implies a reliance on understanding since few well designed games allow a player to succeed in-game without knowing what they are doing. These observations emphasize the notion that recitation of fact is eclipsed through at least social structures, by an understanding of the experience.

It may alternatively be argued that games which follow the Simon Says game template of listen and repeat are exercises in recitation. These games include the well established Dance-Dance-Revolution[6] game type and the musical Rock Band[7] franchises. It is fairly true that these games employ a mechanic that simply requires the player to follow directions, but these games are perhaps better diagnoses as exercises in following direction, anticipation and timing. To succeed in these games it is not enough to repeat the material provided. The player must be able to respond at the appropriate time and under the appropriate context. In this way, the games are more akin to exams in geography which require great memorization, but also contextualization. It can also be argued that the exergame Dance – Dance Revolution is in itself a physical education, practicing specific muscle groups similar to techniques in an aerobics class.

2.1.3 Understanding the Design of a System

Regardless of the game type, for the more accomplished game player, the game becomes a fiction to be analyzed in much the way a literature student examines a text. The player tries to understand intention referencing the cannon of previous experiences to inform their ongoing success and analysis of the game. In these cases there is a general canon which includes the long history of platform scrollers, first person shooters, simulations, and sports titles, et al. Players of Role playing games must draw on traditions from Dungeons and Dragons or Legend of Zelda, platform scrollers, might play on the traditions of the Mario Brothers franchise. The player's efficacy might even be dependent on an experience between genres, as George Orwell's Animal Farm requires an understanding of the political and ideological history of the industrial world. Notions of manna, leveling up, spell-casting are remnants of the ancient history, in video game development terms, of table-top Dungeons and Dragons. While some of this historical experience does not assure success in a game, it often facilitates efficacy in the game world.

One of the better examples of reliance on this cannon exists in a small game that acquired web notoriety for its various challenges. The game, entitled I Wanna be the Guy[8], constructs large set of familiar 2D scenarios and mechanics. Yet, the games core challenge is inspired by frustrating each of these expectations. Fruit on trees become threats, navigating from top to bottom screen is the wrong way to go. In each case, a trap is set merely by flipping the expectations that are held by game players. The expectations frustrated here are not neccerily held by all, they are held by people who have experience with games. As one reviewer writes:

"I Wanna Be The Guy: The Movie: The Game is a sardonic loveletter to the halcyon days of early American video gaming, packaged as a nail-rippingly difficult platform adventure. Players fill the role of The Kid, a youthful, vaguely Megaman-esque protagonist on a quest to become The Guy. This inscrutable plot, however, is just a vehicle for a wide variety of inventive, well-designed and frustrating jump-and-shoot challenges that pay homage to many of the games you loved as a child. "[8]

The game, although a small success in the larger world of games, is a clear product of a substantial cannon of video game reference and knowledge.

In a fundamental way, the design of the system helps the player to understand how the system works. The game of American Football was once taught by watching others play or being involved in some non-professional team. Watching a game played is rarely as an engaging experience as playing the game. The drawback in playing non-professionally is that the experience varies from the professionals (e.g. rules, abilities of other team mates, etc) . Playing football in non-game worlds also involves teaching yourself motor skills, losing time to injuries, working against any inherent disadvantages (e.g. height, weight, etc), and being subject to the realities of fatigue and weather. Yet, video games solve balance the advantages of disadvantage to being spectator and participant.

Video games allow the player to experience almost all positions by themselves. They can be player, coach, and spectator. Yet, in holding all of these positions there are some specific teaching experiences that are being ignored. The learning experiences of working through physical fatigue, full-body motor skill development, relaying on others, and taking direction from a coach are sharply decreases in the experience of playing the video-game version of the sport. This is where the first point of critique begins. In their search for an immediately satisfying experience, games often shortcut through some important moments in education.

In the incredible efficiency of educational experience in games, they sometimes remove the subtle substances of an experience. These include, to further the analogy, the anticipation while waiting on the bench, the satisfaction of matriculating from fourth string to first string, discovering new talents, choosing to be very good at one position. The list could extend for pages, but focuses to extensively on these misses would be similar for berating the painting teacher for not describing the atomic structure of the paint medium in a studio art course.

3. Employing Games as Teachers

As many educators have written before, it is not enough to simply tack on education and it is not enough to allow a hope that the merit of being merely educational will allow the game to be a success. As stated previously, most educational game are not intended to be educational games, they are intended to be entertaining.

The solution to the educational game problem then exists in total in the educational games win condition. The win condition must be both extrinsic and intrinsic. Like successful entertainment titles, it must be something that helps students feel good, immerses them in a fiction to which they are interested and provides some extra-game reward such as comradery, peer respect, or membership in an elite class defined perhaps by their own social structures. These are the habits of highly effective games in the entertainment domain, and should be the character of games in the education domain.

Developing a win condition that depends on achieved efficacy in the world is one of the most direct approaches to improving the

educational content of a game. Instead of augmenting specific goals with educational content, successful games require educational content as an essential element. Real Time strategy games like Civilization franchise are quality examples of direct application of educational content. Players of these games cannot achieve anything in the game world without understanding how specific historical developments effect6 society. Although the game simplifies the results of these historical developments, it does at least hint at one or two perspectives on the historical implications of developments like the Sistine Chapel or the Gutenberg Press.

The Sims franchise could also be described as a kind of life skills educational experience. The lesson for Sims players is one of balance. The lesson is a simple one. It expounds the idea that happiness is achieved through responding to individual needs by purchasing, socializing and working. This is interestingly not far from the happiness prescribed by magazines Glamour and GQ.

3.1 Teaching and Interface Efficacy

Games teach people tool based efficacy brilliantly. Most games are designed around the fundamental assumption that the players or player avatar needs a specific tool to accomplish their goal. This may be a faster car, a bigger gun, or even the help of a non-player character. It is only a relatively new generation of games that starts to emphasize the other that the player has all the tools they need. These are of course the games that employ computer vision to achieve game goals. Commercially introduced with Sony's Eye toy, these games represent a substantial shift from one of the key ideologies of game design. The game ceases to be about augmenting oneself, with controllers and virtual weapons. Instead the player augments the experience of the game with their own bodies.

These computer vision games are perhaps a departure from the overarching philosophy of extending the players abilities in game, to extending the player into the game. Even the aesthetic of the early versions of these games broke with tradition choosing to insert images of the player, where player avatars would have sufficed. This moves from the notion of a projected self in avatar, to real self embedded in a fiction. The player no longer needs to convert their sex, their behaviors, or their image of self to what has been rendered on screen. Instead they are the element on screen. Because these games often portray the player in the game world, they are a sharp contrast to more traditional sit-in or body movement games which continue to rely on augmentation of player or player avatar.

Returning to the fundamental of game design, the model of computer vision games provides a useful technique for employing better educational game design. Based on the observation set forth in this paper it seems clear that games which employ a non-augmented solution may effect a player's philosophy on efficacy. If, for example, a game seeks to inspire in the player a sense of inherent efficacy, they could eliminate as many augmenting elements as possible. Instead of providing the player character a gun, perhaps you supply the player character nothing but standard physical abilities – push, pull, move, et al. This is a mechanic somewhat provided by puzzle games and adventure games. Where many puzzle games have succeeding in providing non-augmented efficacy, they have often failed at providing the analogy to familiar, extra-game worlds. Adventure games on the other hand have historically provided good fidelity to extra-game worlds, but may lack non-augmented solutions.

A well known example of a game that includes quality, low-augmentation puzzles is the Tomb Raider franchise. These games provide a good set of puzzles with often physics based solutions. While the educational content is largely based on fictions, the educational potential is substantial. A computer-vision based game that projects the player into the game world to solve specific physical problems would address two of the proposed challenges of educational game design. Such a game could eliminate the players implied reliance on augmentation and require a game to solve problems that have extra-game applications.

Although significantly newer, and less often involving projection of the player in the game, the plethora of Nintendo WII games also transfer efficacy from the player avatar to the player. These games employ a level of interaction that extends what most players have been lacking on other games, direct agency. The success of these titles may perhaps indicate a movement toward implied player efficacy.

Employing games that require substantial physical movement, as is common with Nintendo Wii and Microsoft's Project Natal[9], also provides a learning dimension to games that has previously been mission. As references previously, traditional avatar based sports games ignore the educational value in the physical aspects of learning an athletic game. Yet, electronic games that require physical movements succeed in creating more educational content because they teach to physical intelligence as well.

4. Conclusion

This position paper is a collection of observations about how students have learned substantial information about the game worlds, sometimes exceeding what they have learned about the extra-game worlds. This may be in part because there is a clear relationship between what needs to be learned and the world in which they play, a kind of immediate relevance that may be lacking in their traditional education. What is more relevant than the standard game verb – stay alive? The win condition determines the need to learn and understand the game world, its rules, potentials for exploits and the decisions made by its authors. This is at the heart of an educational approach in games that needs to be exploited. Games should immediately intertwine the games extrinsic knowledge with the intrinsic needs of game-playing students. In its most basic form, the game must necessitate understanding of the material to earn facility in the game. The less augmentation the player or player avatar require, the more immediately transferable that knowledge may be perceived.

5. REFERENCES

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