

# Minecraft or Mindcraft? The Value of Online Games in Education

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## ABSTRACT

In this poster, we explore four examples of the value of PC gaming to education in the context of a design science research project. This project hopes to develop a suitable set of game experiences to teach some fundamental networking concepts to tertiary students enrolled in a Level 4 Certificate. The research suggests that this endeavour is likely to be successful in terms of promoting learning.

## Categories and Subject Descriptors

K.3.1 [Computers and Education]: Computer Uses in Education

## Keywords

Games, education

## 1. INTRODUCTION

Education through gaming, what does it mean and what are its implications? There are many thoughts that cross our mind both positive and negative when the words 'gaming' and 'education' are used together. While there appears to be a widely held belief that playing computer games is time-wasting, anti-social behaviour, research is suggesting that used appropriately, gaming can provide learning opportunities and enhance learning particularly for those students who are less successful in the academic classroom. Indeed, it could be considered that gaming exercises the mind as physical activity exercises the body.

It can be argued that playing games help to develop interpersonal skills, persistence, communication ability and other non-cognitive skills which are just as essentially necessary as cognitive skills in how we learn and if we are to be successful. Even the process of failing (or dying) in a game can provide the motivation to learn from the mistakes and develop new strategies.

This poster explores four studies on learning through gaming. From the knowledge gained through this review, the intention is to implement an initiative to provide similar 'learning through gaming' experiences for students enrolled in a level 4 Certificate in IT programme.

## 2. BACKGROUND AND METHOD

The research is an on-going Design Science Research seeking to create an effective 'gaming through learning' teaching resource for the students identified above. The project is divided into four stages; a) identify the problem, b) design a solution, c) implement the solution and d) evaluate the solution. The work reported here is a consideration of four examples that are informing the work of the first two stages.

## 3. RESULT

The first study [1] concludes that playing a hard version of a strategy game over a period of time increased cognitive abilities. In their study a group of non-gamers were put in three separate groups in which they either played the Sims, Starcraft on easy difficulty or Starcraft on hard difficulty. Each student played the allocated game for roughly an hour a day for six to eight weeks.

Their results indicated that in subsequent psychological tests, volunteers who played the most complex version of StarCraft were the quickest and most accurate in their responses and had increased cognitive abilities, primarily in the decision making and speed of reaction areas. From these results they concluded that playing the advanced game promoted cognitive flexibility, particularly under conditions in which players had to rapidly switch between contexts while maintaining memory for both contexts and that it was valuable for enhancing 'grace under pressure' thinking which involved making quick educated decisions.

The second example comes from the use of the game Skyrim to teach aspects of Norse culture [2]. In this case the game was addressing a specific body of content knowledge rather than generic skills. The course description, from Rice University, Department of English stated "This course has two goals. First, it introduces students to fantasy as both psychological concept and driving force in gamer culture; and second, using these paradigms, it considers how and why medieval Scandinavia serves as a locus of modern Anglo-American fantasy." In addition, "Students are involved in 'quests' within the Skyrim game in which they read Old Norse and Old Icelandic sagas (in translation), discuss the ideals of empire vs. rebellion political stances in the world, and identify where the saga world and the Skyrim world entwine." This is an example of an existing game being used to provide a rich insight into a specific example of an historical culture and its lore. It also allows for an in depth study of perspectives within rebellious or empire controlled areas and an analysis of where lore and the game overlap.

The third example is the use of Minecraft [3]. Minecraft is a free, easy to use, modifiable game which allows for a customisable world. Teachers have used its capabilities to do a number of complex and sophisticated things: from re-creating simple circuit

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boards using the games 'redstone wire' system to showcasing old architecture. Many YouTube videos exist demonstrating how to build a fully functional calculator or exploit the characteristics of water to farm resources. Minecraft has both an easy, intuitive interface and the ability to 'turn off' the monsters to enable uninterrupted complex building in 'creative' mode. It enables learners to engage at a simple level with the inner workings of complex ideas that might otherwise be inaccessible.

The final study [4] examines a number of games and highlights some of the learning that can be derived from them. Their study categorises the learning as follows:-

- **Cognitively Stimulating:** Use of these games stimulate the cognitive processes of the brain and seem to affect those even while sleeping.
- **Motivating:** Whether it be victory over the game's battles, solving a puzzle or the prospect of a better looking character to control, the player is constantly motivated with goal orientation via a "carefully calibrated balance of rewards, challenges, and chance"
- **Constantly Providing Feedback:** Commercial off the shelf games are all about "delayed gratification" which is granted only when the player's skill and consistency has been assessed and deemed sufficient to proceed to the next, inevitably harder stage of assessment."
- **Ensuring Failure is used as a Learning Device:** Probably the most common source of failure for students is failing to engage with a task in the first place. Video games bypass this personal barrier by adhering to the principle of "low cost of failure and high reward for success"
- **Encouraging Systems Thinking:** Games such as Wright's "SimCity" might not teach players what single-handedly running a bustling metropolis is like in real life but what it does teach is how different variables within a system interact in emergent and complex ways. As a result, the player learns to instinctively view the situation in front of them, be it real or virtual, as a whole and as such can micromanage accordingly. They see each immediate task as part of a much larger system with numerous different, interacting variables at play, developing their own mental model in order to introduce order to something that is otherwise chaotic."

#### 4. DISCUSSION

The focus of this poster is around the feasibility of education in a tertiary environment by verifying that games aren't just for entertainment but can actually reinvigorate, train and even enhance brain functionality through problem solving. Why might games be good for our mind? Is it the improvement of hand and eye coordination through shooting simulated guns and other weapons with your friends? Not all the games on the best sellers

list contain violence. Indeed, the most popular PC game of all time is The Sims, which involves very little hand and eye coordination but a significant amount of challenging strategic thinking. The player manages an entire household or town of characters, each endowed with individual personality traits, each cycling through an endless series of short-term needs. These needs such as food and friendship are in a network of relationships with other characters who have their very own individual personality traits. When playing this game, the player is required to multitask and balance the needs of a virtual reality, from kids going to school, going to work or tidying up the house.

Games entice us and teach us patience, the value of learning from failure, advanced problem solving and so much more. It approaches problems and teaches in a way that is often intriguing and attention-getting, stepping away from the traditional 'sage on a stage' approach and even going as far as helping tune the brain for specific problems and tasks.

#### 5. CONCLUSION

Games can certainly be entertaining but we need to move away from the misconception that they are only for amusement or that success in them is a sign of misspent time. Just because there is enjoyment and a virtual environment doesn't mean that we are not learning. In fact research suggests that the opposite is true. The question we need to ask ourselves is: why can't learning be fun and something to look forward to? When applied correctly the benefits and opportunities are huge. We believe that our investigation of recent research into the value of gaming provides evidence that it could be worthwhile developing our own ideas for utilizing a game for teaching various concepts to our students.

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