

Research Methods in Computing

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Research Proposal

*Can Games
become
Teachers?*

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1. Introduction

1.1 Abstract

This report goes over the misconception of video games, how education became integrated video games and what areas the games can teach. Psychology is also covered in this report as the differences to how boys and girls learn, and how teaching styles can affect developmental growth.

There is a bit of generalisation in how children learn in the Western Culture but knowing about them allows other people to judge situations quickly and take appropriate action in understanding about how people learn and their differences. Going over how games are designed to be fun and dynamic and blending the two together is how a serious game can become popular and hopefully defining a genre.

The aim of the research is to provide non-biased data in seeing how much people learn compared to the traditional methods of teaching and draw conclusions whether games can become part of the future teaching standard.

1.2 Aims & Goals

The aim of this report is show that games can be regarded on a similar level to teachers, if not even more. The goals are below:

- Look into why games are fun.
- Research the different methods of teaching.
- Learn if there is any different in learning between males and females.
- See how games can become educational and examples.

1.3 Justification

Video games in general are under the notion that “they are bad for you”, especially games with violence whom people can think that playing violent video games make the players more prone to violence.

The misconception comes from mainly the older generation growing up in a different time period of where their childhood was running and playing outside, exploring nature and hanging out with their friends. Generation Z’s childhood is ever increasing to staying inside and playing video games with their friends. The older generation see that as being stuck to a screen the whole time and not interacting with the world in their immediate environment. Also, since technology is developing at such a fast rate, the older generation who do not or wish to not learn about the current technology automatically assume that anything done on a screen is “playing games”. As serious games become more popular, the older generation can take part in the trend and see how beneficial serious games are to everyone; and when Generation Z passes knowledge down to the younger generation, using games as a medium will not be frowned upon.

A process called gamification is already being applied to real-world problems like Foldit (2011) and while the process is still young, there has already been profound effects. If serious games were applied like that, especially in education, then there would a massive compound effect. If teachers make or break the subject, then having a “teacher” that will keep the student actively learning, engaged, and always being rewarded for however much progress was made, then having masses of students eager to learn more about a particular subject in university because

their first introduction was such a fun experience, the frontiers of education will be pushed to new heights.

1.4 Ethical Considerations

There is no ethical concerns in reviewing this subject matter but gender and culture may play a big part in if people would want to play a serious game or not – like how some genres appeal to a person more than other genres do.

2. Literature Review

2.1 Evidence of Education in Games

The first game that ever got released was called “Tennis for Two (1958)”, and that was only 60 years ago. During this period, the focus for games have been for fun, engagement and entertainment.

As computer graphics and technology grew exponentially, games grew more fulfilling and rewarding to play, questions and mentalities of “video games are bad for you” popped up especially between the different generations of Generation Z verses the older generations. The misunderstanding is justifiable and hopefully as Generation Z becomes the older generation, any notion of video games – positive or negative, as long as it is not biased – will fade away when bringing up the new generation. To help such occurrence a genre called “serious games” will be focused on.

Two definitions need to be properly defined – serious games and gamification. A serious game is an electronic game whose main purpose is “serious” and not to simply entertain. The primary “serious” purposes can be to teach or train in areas such as education, health care, advertising, politics, etc. (What is Serious Games, n.d.). Gamification is the basic idea of taking game mechanics and applying to other web properties to increase engagement (Bret Terrill, 2008).

Serious games can cover a large number of areas such as social, physical, emotional, educational and mental learning. An example of such a game teaching an emotion aspect is Brothers – A Tale of Two Sons (2013); in this game, the player controls two characters – an older brother and younger brother – in a unique way of a half of the controller for each brother. The controls are strange but as the player progresses through the game through a series of puzzles and adventures, the controls feel more and more natural.

The older brother can do things the younger brother cannot, and vice versa. A sad twist is as the journey is reaching its climax, the older brother dies in the final combat and the younger brother has to make the journey back home alone. Suddenly, the player is unable to use half of the controller – and the teaching here is to understand the loss of losing someone. The teaching can be useful for anyone and help develop empathy and as humans are quite social creatures, the ability to connect with people is very important to thrive in their environment.

Playing a typical first-person shooter game like Counter Strike or Call of Duty develops, decision making, reaction and reflexive responses, and even reading and language skills (mainly for English) because since English is the current global language, young people who play such games online will need to understand the game and then communicate in a common language.

2.2 Psychology of Fun

In positive psychology there is a concept called flow. (Csikszentmihalyi, 2014) describes that being “in flow” is the way that some interviewees described the subjective experience of engaging just-manageable challenges by tackling a series of goals, continuously processing feedback about progress, and adjusting action based on this feedback. Under these conditions, experience seamlessly unfolds from moment to moment, and one enters a subjective state with the following characteristics:

- Intense and focused concentration on what one is doing in the present moment
- Merging of action and awareness
- Loss of reflective self-consciousness (i.e., loss of awareness of oneself as a social actor)
- A sense that one can control one’s actions; that is, a sense that one can in principle deal with the situation because one knows how to respond to whatever happens next
- Distortion of temporal experience (typically, a sense that time has passed faster than normal)
- Experience of the activity as intrinsically rewarding, such that often the end goal is just an excuse for the process.

One part of game flow is immersion – a psychological state of when a player is so engrossed in the game, they do not notice the time passing. Another example is when the player hears a noise in the outside world and think it is part of the game. Games being able to achieve this type of immersion is important since it means the player is enjoying the game so much that they will spend more time playing the game. If the player enjoys the game, the player can support the developer by buying past or upcoming releases, or buying in-game micro transactions.

There are several factors in achieving game flow – how the game level is built so any mundane processes like walking from one location to another does not disrupt it, if the challenges are too easy or difficult, if the rewards are appropriate, and a number of other factors. Achieving a balance in those factors are to create endorphins like dopamine, serotonin, and partly oxytocin.

Dopamine is a neurotransmitter that helps control the brain’s reward and pleasure centres. Dopamine also helps regulate movement and emotional responses, and it enables us not only to see rewards, but to take action to move towards them (Psychology Today, n.d.). Serotonin is used to transmit messages between nerve cells, it is thought to be active in constricting smooth muscles, and it contributes to wellbeing and happiness, among other things (Medical News Today, 2018). Oxytocin is also mentioned because even though it is known as “the love hormone”, it plays an important part in social bonding and playing a largely popular game, people can connect with each other through the experiences they had when playing the same game.

Many educational games designed to teach subject areas at schools do not achieve game flow and releasing endorphins. By playing those games, the player still feels the main focus is teaching, and many serious games do not teach educational areas but more social, emotional and environmental areas and whilst they are still listed as “serious games”, there are not many games which achieve the fun aspect while still teaching.

2.3 Teaching Methods

There are seven learning styles in which a person can learn, and while one person can be more dominant in one learning style, it is usually a blend of them together. The seven styles are visual, aural, verbal, physical, logical, social, and solitary.

Overview of Learning Styles (n.d.) states that:

- Visual (spatial) prefers using pictures, images, and spatial understanding.
- Aural (auditory-musical) prefers sound and music.
- Verbal (linguistic) prefers words, both in speech and writing.
- Physical (kinaesthetic) prefers using body, hands, and sense of touch.
- Logical (mathematical) prefers using logic, reasoning and systems.
- Social (interpersonal) prefers learning in groups or with other people.
- Solitary (interpersonal) prefers working alone and using self-study.

There are several teaching styles and Portland Education (2017) gives five examples:

- The Authority, or lecture style

The authority model is teacher-centred and frequently entails lengthy lecture sessions or one-way presentations. Students are expected to take notes or absorb information.

- The Demonstrator, or coach style

The demonstrator retains the formal authority role by showing students what they need to know. The demonstrator is a lot like the lecturer, but their lessons include multimedia presentations, activities, and demonstrations. (Think: Math. Science. Music.)

- The Facilitator, or activity style

Facilitators promote self-learning and help students develop critical thinking skills and retain knowledge that leads to self-actualization.

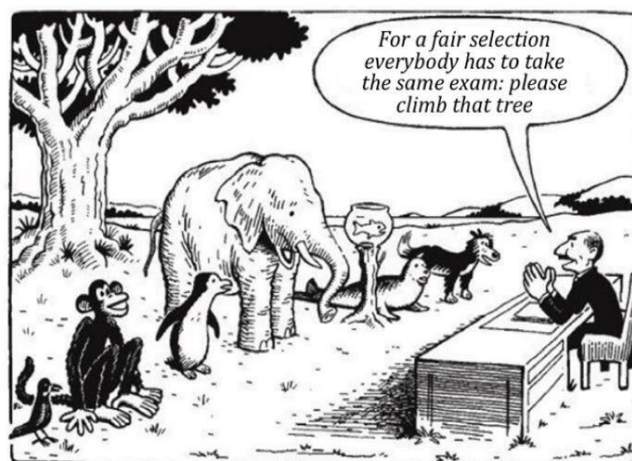
- The Delegator, or group style

The delegator style is best suited for curriculum that requires lab activities, such as chemistry and biology, or subjects that warrant peer feedback, like debate and creative writing.

- The Hybrid, or blended style

Hybrid, or blended style, follows an integrated approach to teaching that blends the teacher's personality and interests with students' needs and curriculum-appropriate methods.

Currently most educational institutions follow The Authority, or lecture style because there are too many students and a shortage of students, so there is simply not enough time to give each student their personalised structure, which then therefore, leads to a problem described in the image.



Our Education System

"Everybody is a genius. But if you judge a fish by its ability to climb a tree, it will live its whole life believing that it is stupid."

Our Education System

2.4 Difference between Genders

Taking a subject area taught in high school and turning it into a game would be a blend of the Facilitator and the Delegator teaching style with a lot of visual, aural, and physical feedback. If the game becomes popular, it would also be an interesting mix of solitary and social learning style because students can play alone or together, and work out problems alone or together. Each student would also have a “personalised teacher” as each student progresses through the game differently.

As Edward Dixon (2015) stated that “boys’ engagement in school is dropping off”, and this is becoming a problem when the turn of the 21st century saw a rise of feminism as the world became more progressive and equal. The population growth and the teaching style of The Authority became more favoured and students were told to sit down, not fidget, listen, take notes, and only participate when spoken upon. This type of teaching style favoured girls as their brains are more mature at a younger age and more socially connected, while for boys, they start releasing testosterone at a young age whenever they set a goal and achieve it. This means boys can start becoming quite competitive and liking games – where the goals are clearly defined and achievable.

Achieving engagement for boys in schools can be broken down into six topics.

1. Movement – being able to move about a lot is important as they have a lot of energy and moving while doing something can help their learning. A quick example is if a boy needs to learn ten words, use a ball and play catch. If the boy gets the word correct, the ball can be passed back and forth.
2. Competition – testosterone makes the boy quite competitive and to add a hint of competition to the catch game, there can be a time limit in-between each throw.
3. Humour – humour is a great way to build lasting memories. People engaged in conversation usually don’t remember the topic of conversation later but instead remember the way the other person made them feel during the conversation; this also helps the focus of the boy’s learning.
4. Challenge – the more difficult the challenge is, the rewarding the feeling is when the challenge is overcome.
5. Mastery
6. Meaning – Mastery and meaning go hand-in-hand. If the boy feels like he is learning a subject well and also enjoying it, a reason to further the education in that subject is to find out why he likes it so much and thus, wants to become the best out of his peer group.

All of the six topics overlap and interweave with each other and if a game was built covering the entire curriculum of a high school subject, then the game would cover all six topics (apart from movement metaphorically) naturally, but the main hurdle to overcome is whether the game is “fun” and the subject is learnt passively, or knowing that subject matter is being learnt while having fun.

3. Research Methodology & Development Approach

3.1 Proposed Research Methodology

There are three main approaches towards research, and that is the Qualitative, Quantitative, and Mixed Methods.

Qualitative Approach

Using this approach looks at general research questions, and looks at relevant sites and sources to back up the data researched. Then to source data to validate the questions produced, the researcher interacts with participants with methods like a case study. After collecting sufficient data, findings can be summarised and written up.

The problem with this type of research is that the number of participants studied are quite small, varied due to different upbringing, culture, status, etc., and the research period itself takes a long time.

Quantitative Approach

Using this approach looks at questions originated from social trends, and sources the data from a large number of participants in a much generalised format like a questionnaire. After gathering sufficient amount of data, the findings can be analysed if such trends are occurring and why, then compared with other sources and finally, written up.

The problem with this type of research is that the participants answering the questions give a broad answer – usually thought up by the researcher themselves – and the background of each is not looked into to see why the participant might answer that way.

Mixed Methods

As the name suggests, there is a mixture of qualitative and quantitative approaches in this method. While the data collected offers more insight to how the social trends are occurring and why, the problem with this is a huge amount of time and resources invested into this type of research.

A mixed method approach would be taken to this research. Firstly, interest for this type of research should be generated via signs/posters across the university, and a blanket email stating what the research is about and if participants are interested, they should sign up.

Secondly, a questionnaire will be given out to the signed-up participants to figure out their background, how open-minded they are and the level of knowledge in the proposed subject area.

Then the participants are split into three groups: a group learning from the video game, a group learning from a text-book, and a group learning from a video lecture. After a certain amount of time, all participants are given the same short test to see how much knowledge is learnt.

There are many flaws in the type of approach due to the amount of variables that cannot be controlled – like how long the person takes to play the game or study, if the person enjoys learning from the chosen group, and if the person actually does the voluntary work given to them. Also gender and culture differences may affect as a generalisation, the male population would enjoy playing video games more.

3.2 Proposed Development Approach and Proposed Platform

Research into a subject area related to the high school curriculum will be undertaken as the subject area must be interesting enough to be turned into a video game, not be too small or large with the content volume for the video game to be created, and also not too common as participants may still remember what they learnt in school.

After the subject area is proposed, the time allocated for the project will be taken into consideration as to not underwhelm or overwhelm myself with the amount of work required. Then the question of which dimensions should the game be developed in to best communicate the game.

Side-scrolling, isometric, top down, fully flat. 3D first person, or 3D third person shooter-like can all affect the game different in how the participant will experience the game. Even the platform can affect how the game is experienced, as controls for mobile games are completely different for Xbox/PlayStation, and the same is especially true for pc gaming and virtual reality.

Thereafter creating the game, sufficient textbook / video lectures which cover the subject topic to a similar degree must be sourced to be given out, and a short test that covers the subject range not too easily or difficult must be written up.

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