# SUBJECT GROUP COMPUTER SCIENCE AND INFORMATION SYSTEMS

## Research Proposal for Honours project

## 1. Student initials, surname and student number

| Initials | J | Surname | Esterhuizen | Student number | 30285976 |
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## 2. Degree for which student is registered

| BSc Hons. Computer Science and Information Systems |
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## 3. Name of supervisor

| Initials and surname | Prof Günther Drevin |
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## 4. Proposed title

| Title (preferably not more than 12 words) | The Qualities of Games for Use in Education |
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## 5. Problem statement and substantiation

Provide the theme and link with gaps in the literature and recent research in the area. Indicate the research question, its actuality and how the research will endeavour to answer the question.

Education as it stands is still built on a system that is no longer needed in modern society. Ackoff and Greenberg (2008) explain that the current traditional methods of teaching are no longer as relevant as they once were as it is aimed to produce members of society that were likely to not question any fundamental aspects of how things operated. It is largely a system that focuses on teaching while disregarding learning as the last major stride in development in education was to industrialise it – having them operate efficiently like factories (Ackoff & Greenberg, 2008). One major flaw with this system currently is that it stifles the creativity and drive of some students as each level of education is largely the same and as such monotonous. As such, education is in need of some form of system to create an interest in learning for the students.

Virvou, Katsionis and Manos (2005) mention that computer games are popular among those in schools and as such provide a means to deliver content in an interesting and engaging manner. Providing learners in all levels of education with content or methods of delivery that they will enjoy will cause them to be more motivated to learn and look further into that specific topic (Ackoff & Greenberg, 2008). Annetta (2008) states that the movement to include video games in teaching and training began in 2003, two years after the field of ludology began to gain traction. These types of games are called "serious games". These types of games have already had an impact on the military, medical

and higher business education fields early in their conception and this trend continues to day with most serious games being used within the medical fields specifically (Annetta, 2008). However, there were attempts to use serious games, as simulations, within physics and engineering (Deshpande & Huang, 2011). It is at this point that the study of serious games became more theoretical at lower levels and more applied at higher levels, with a great impact to medical fields and training. As such, there is a fair amount of theoretical research on specific aspects that relate to serious games as simulations and within ludology as a whole, but only a few mention the qualities a game needs to better present information to a user.

The main aim of this study is to answer the question: Can a digital serious game be effectively applied within a learning environment as a means to provide better engagement with content whilst still being enjoyable to learners? Thus, this study is conducted to collect information on what principles and qualities can be applied to a game in order to make it viable for learning as well as developing a level to demonstrate these principles.

## 6. Research aims and objectives

Provide the different general as well as the specific aspects which will form part of the research.

This study's primary aim is to determine if games as a whole can effectively be applied within a learning environment as a means to provide better engagement with content whilst still being enjoyable to learners. To reach this goal, an artefact in the form of a digital game will be developed that will involve specific sections which focus on other study's research in addition to this one. With regards to this study, the artefact will employ various audio-visual stimuli while adhering to the principles found to demonstrate how a game may be used in a learning environment.

To effectively reach the aforementioned aim, the following secondary objectives will have to be met:
1. A literature study will need to be performed with a focus on:
    i. Ludology, narratology and simulation;
    ii. The effects of games, both digital and analogue, in early development;
    iii. The effects of games in other stages of life;
    iv. Best games for learning
    v. Previous attempts to integrate game use in learning;
2. Collect examples of games that employ some form of teaching or learning
3. Create an artefact similar to a digital game that can be played
4. Create a specific scene/level within the aforementioned artefact that specialises on delivering information through various audio-visual stimuli that incorporates the principles and qualities

found.

## 7. Basic hypothesis (where applicable)

N/A

## 8. Method of investigation

8.1 Literature study

Provide an indication only of which literature will be used in the study with a few key references. A summary of the literature is not required here.

The following areas of study and literature will be researched for this study:

**Impact of Games in Early Development**

- The Effect of Adventure Video Games on The Development of Student's Character and Behavior (Kristiadi, Hasanudin, Sutrisno and Suwarto, 2019)
- The best game in the world: Exploring young children's digital game -related meaning-making via design activity (Mertala & Meriläinen, 2019)

**Effects of Games in General**

- A Meta-Analysis of the Cognitive and Motivational Effects of Serious Games (Wouters , Van Nimwegen, Van Oostendorp and Van der Spek, 2012)
- Extensive childhood experience with Pokémon suggests eccentricity drives organization of visual cortex (Gomez, Barnett, Grill-Spector, 2019)

**Games Best Suited for Education**

- Ludology from Representation to Simulation (Frasca, 2002)
- Simulation versus narrative: Introduction to Ludology (Frasca, 2013)

**The Use of Games in Learning**

- Computer Games in Education (Mayer, 2019)
- Learning by Teaching versus Learning by Doing: Knowledge Exchange in Organic Agent Systems (Fisch, Janicke, Kalkowski and Sick, 2009)
- Serious Games for education and training (De Gloria, Bellotti, Berta, Lavagnino, 2014)

8.2 Methods of investigation

The proposed design, data acquisition, procedures, data processing, funding sources (but not a budget), mathematical methods, computer methods, etc.

This study will be conducted using the interpretivist paradigm and design science research and will include:

- A literature study on the impact of games during early development, the general effects of games, an overview of game types using ludology determine the best type of game suited for education and the uses of games in education and learning.
- Finding and discussing examples of "serious" games.
- Designing and developing an artefact to aid in determining the viability of games in education.
- Determination on whether the research was appropriately applied to the artefact.

## 9. Provisional chapter division

Here it should be clear that there was proper reflection on the appearance of the final product (mini dissertation). Provide provisional titles of the various chapters, with a brief outline of the planned content of each.

The provisional chapter division is as follows:

**Chapter 1: Introduction**

The problem that is being researched, the viability of games in education and its affects during early development, is discussed in Chapter 1. Information on the background of this problem, similar research and the research contribution will be discussed. Furthermore, the aim of the study in addition to the planned method of conduct will be discussed.

**Chapter 2: Literature Study**

Chapter 2 will discuss the impact of games both in early development and in general in more detail, the accessibility of games as well as a focus on games being used in learning.

**Chapter 3: Development of Accompanying Artefact**

The accompanying artefact that will be developed as a part of the study will be discussed along with the development process of the artefact.

**Chapter 4: Review of Collected Information**

The means of data collection, processing and analysis will be discussed in this chapter along with the results of this data. This chapter will mostly deal with a review on what qualities and principles that could be applied to the artefact.

**Chapter 5: Discussion on Results**

A discussion on the results obtained will be presented in this chapter. As such, it will discuss how well the artefact demonstrates the qualities previously identified.

**Chapter 6: Conclusion**

The contents and results of the study will be briefly discussed and reiterated in an overview.

## 10. Literature references

Provide complete references to the literature referenced to in this proposal only.

Annetta, L. A. (2008). Video games in education: Why they should be used and how they are being used. *Theory into practice*, *47*(3):229-239.

Deshpande, A. A., & Huang, S. H. (2011). Simulation games in engineering education: A state-of-the-art review. *Computer applications in engineering education*, *19*(3):399-410.

Ackoff, R. L., & Greenberg, D. (2008). *Turning learning right side up: Putting education back on track*. Pearson Prentice Hall.

Virvou, M., Katsionis, G., & Manos, K. (2005). Combining software games with education: Evaluation of its educational effectiveness. *Journal of Educational Technology & Society*, *8*(2):54-65.

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Student             Supervisor          Date