PRESENT OR PLAY

A 'REAL LIFE' EXPERIMENT TO EXPLORE WHETHER PEOPLE'S SHOWN BEHAVIOUR AFTER PLAYING A SERIOUS GAME, HIGHLIGHTING THE NEED FOR A SPECIFIC SET OF BEHAVIOURS, DIFFERS FROM PEOPLE'S SHOWN BEHAVIOUR AFTER ATTENDING A PRESENTATION WITH THE SAME CONTENT, AND WHY.

A THESIS BY TOM VAN DIJK

UNIVERSITEIT TWENTE

DATE:

4 april 2014

SUPERVISORS

Sanne van der Burg	*Accenture*
Ivo Wenzler	*Accenture*
Ton Spil	*1e begeleider Universiteit Twente*
Simon Dalmolen	*2e begeleider Universiteit Twente*

STUDENT NUMBER: *S1382462*

UNIVERSITEIT TWENTE.

accenture

High performance. Delivered.

Table of Content

Preface

The document you are about the read is the final result of my Master Thesis project, conducted to obtain my Master's Degree Business Administration from the University of Twente. The research was carried out within the Talent & Organization department of Accenture, in Amsterdam the Netherlands.

The completion of this project would not have been possible without the support of others. First of all I would like to thank my supervisors from the University of Twente, Ton Spil and Simon Dalmolen, for their constructive criticism and support. Moreover, I would like to thank my supervisors from Accenture, Sanne van der Burg and Ivo Wenzler. Thanks to their guidance and support I really enjoyed the whole graduation process and never experienced any setbacks. For this I like to show my greatest gratitude. I will especially miss the Friday morning coffee sessions

Furthermore, I would like to thank the people from the Talent & Organization gaming community who helped me constructing and conducting my research, and the employees from Human Resources who made it possible that I could conduct my experiment. I would also like to thank the six experts I interviewed for my thesis; they provided me with interesting insights on serious gaming. Last but not least I would like to thank my ex-roommate Kimon Tousmanof for his help in the last stages of my thesis.

Tom van Dijk

Amsterdam, April 2014

Summary

Many people claim that serious gaming has more influence on the behavior of the trainees than a normal presentation, but very little evidence is available in literature. Therefore in this report the following research question will be answered: *"Does people's shown behaviour after playing a serious game, highlighting the need for a specific set of behaviours, differ from people's shown behaviour after attending a presentation with the same content, and why".*

To answer this research question, an experiment was conducted within a consulting company (Accenture). The experiment took place during the 'new hire days'; an introduction program for all new employees, taking place during the first two days of these new employees at the company. During these 'new hire days' people are expected to understand the Core Values of Accenture; statements describing how employees of Accenture are supposed to act. These Core Values are related to: collaboration, the validation of client needs, helping behaviour, respectful behaviour, the use of people's potential and integrity. For the purpose of this experiment these core values were presented using a serious game and a presentation. Consequently, three hours after the learning methods, participants' behaviour was measured in a simulated environment. The outcomes of these measures were used to compare the behaviours of the people that played a serious game, with those that attended the presentation. Both the serious game and presentation included similar learning elements and similar content; only the format of the learning method differed.

The experiment was conducted for four consecutive months. During this experiment, a presentation was given twice, and a serious game was played twice; Yin (2009) claimed that when "two or more cases are shown to support the same theory, replication may be claimed"(Yin, 2009). In total 154 people took part in the experiment, 82 played a serious game and 72 attended a presentation. Observation of participant behaviour took place on a sub-group level. One week prior to the experiment a survey was sent to 'the new hires'; including questions regarding participants' social demographics, social styles and personality traits. Based on the outcomes of this survey, comparable sub-groups were created during all four months. Furthermore, to create extra validation and context for the conducted experiment, six interviews were conducted with serious gaming and/or learning & behaviour experts.

The results of this research show that people's shown behaviour after playing a serious game, highlighting the need for a specific set of behaviours, differs from people's shown behaviour after attending a presentation with the same content. Furthermore, the experts were in general really optimistic about the potential of serious gaming.

Based on the results of this research, several conclusions can be drawn. Firstly, a serious game is more effective than a presentation when it comes to making people show a specific set of behaviours. Secondly, a serious game is more engaging than a presentation. Thirdly, failure is an important learning element of a serious game. Fourthly, also learning elements like goals setting, feedback and challenge are important during a serious game, since these are the learning elements that drive failure. Fifthly, the debriefing is an essential aspect of a serious game. And lastly, a serious game is more fun than a presentation. Furthermore, it is difficult to make generalizations about all serious games and presentations, since the effectiveness of each learning method depends upon the learning elements that are included. However, since a serious game and presentation were compared which both include similar learning elements; this research is a good indication of the extent to which the impact of both learning methods differs.

1 Introduction

1.1 General problem exploration

"While most games appear to be effective in terms of creating an environment where students stay on task longer while engaged in the process of playing, little empirical evidence exists that demonstrates games providing any more positive, systematic outcomes for content learning than traditional teaching methods" (Gunter, Kenny, & Vick, 2007). Serious gaming is one of the new developments in the business environment that gained increasing awareness recently. In the last couple of years, several serious gaming projects were initiated in the educational and healthcare sector, newspapers have started publishing about serious gaming, and also an increasing number of consulting companies have started using serious games in their change projects. There is however still relatively little known about serious gaming. The number of publication is increasing, but a significant number of 'serious gaming relating' publications in the top journals is lacking. In literature some evidence is found about the effect of serious gaming on e.g. behaviour, knowledge acquisition, and motivational change; however the evidence is still weak.

As far as the origin of 'serious gaming' is concerned; the notion was first mentioned in a book by Abt (1970). The discussion about the exact definition of serious games is however still in progress. In general serious games could be defined as "games with as purpose learning or changing behaviour" (Crookall, 2011) . The topic serious games gained, as mentioned, an increasing amount of attention the last years by both the academic and business community. This increase in attention can be explained by two developments. Firstly there are large developments in IT. This stimulates the thought of practitioners that "new form of training, as close as possible to business situations (…), needs to be organised in order to keep up with the speed of changes"(Pannese & Carlesi, 2007). Secondly new views arise on how education should be constructed. Pannese and Carlesi (2007) noticed that there is an increasing believe that learners need to be engaged more, and that learners must be put more in the centre of the learning experience.

In general, serious games are developed for training and teaching purposes. A training method can enhance different learning outcomes. According to Noe (1986), the learning effect of a learning method can be best identified by Kirkpatrick's (1967) hierarchical model of training outcomes. This hierarchy is composed of four levels of training outcomes: (a) trainees' reactions to the program content and training process (reaction); (b) knowledge or skill acquisition (learning); (c) behaviour change; and (d) improvements in tangible individual or organizational outcomes such as turn-over, accidents, or productivity (results). Each outcome affects the next level in the hierarchy (Noe, 1986). Thus when looking at outcomes on individual level; change in behaviour is often the ultimate goal of training sessions. However when looking at the overall serious gaming literature however, the impact of serious gaming on behaviour is one of the most unexplored topics.

A company that recognises the value of serious gaming is Accenture; a global consulting company, operating in 54 counties. Within Accenture, a gaming community of around 15 people works on the development, promotion and facilitation of serious games. Over the years, this gaming community built a large database with clients from all over the world, hiring Accenture to provide, build or facilitate serious games. Accenture's activities vary from the development of large budget software games, to the facilitation of non-software driven 'off the shelf games'. The ambition of the serious gaming community is to grow; by selling an increasing number of games to their clients. A problem faced by Accenture consultants when selling their serious gaming services, is some sceptics about

their effectiveness. This scepticism mainly originates from lacking evidence in literature about the effectiveness of serious games. Moreover, when consultants sell their serious gaming product to customers nowadays, they mainly base their story on their own experience and on experiences from former clients. More academic evidence would reduce the scepticism of potential clients, and would strengthen the story of the consultants selling the serious games.

1.2   Problem statement

When looking at serious gaming in a training context; several practical and theoretical problems can be identified. The following problems are experienced in practice:

1. Potential clients are sceptical about the effectiveness of serious games
2. Serious Gaming practitioners have difficulties to tell a convincing story about the effectiveness of serious games, based on academic evidence

The problems faced by practitioners are therefore mainly related to theoretical problems. In literature the following theoretical problems are identified:

1. Little academic evidence is available regarding serious gaming and behaviour.
2. Little academic evidence is available on the effectiveness of serious games compared to 'traditional teaching methods'

1.3   Goal of this research

The main goal of this research is aimed at providing evidence that will contribute to overcome the problems as identified in the problem statements. Therefore this research will focus on people's shown behaviour after playing a serious game, compared to people's shown behaviour after attending a presentation highlighting this same set of behaviours. The current most used traditional training method is a presentation; therefore the main research question of this research is:

Does people's shown behaviour after playing a serious game, highlighting the need for a specific set of behaviours, differ from people's shown behaviour after attending a presentation with the same content, and why?

In order to answer this research question, several sub-questions are defined which will help work toward the goal of this research:

− *What is known in literature regarding the definition, learning elements and learning outcomes of serious gaming*
− *What are the learning elements that can be included in a presentation?*
− *What are the elements in a learning method that create a learning effect?*
− *What are the determinants of people's behaviour?*
− *How do people behave after playing a serious game or attending a presentation with the same content?*
− *How can a (possible) difference in peoples observed behaviour, after participating in a serious game or presentation with same content, be explained?*
− *How does knowledge on the difference in people's shown behaviour after playing a serious game or attending a presentation, contribute to Accenture?*

1.4   Outline of this research

To work towards the goal of this research, this report consists of the following chapters: theory, method, results experiment, results interviews, analysis, conclusions and recommendations.

In the 'theory section' the academic foundation will be established regarding this research, using serious gaming, learning and behaviour theory. The theory will be used to gain an understanding of what is known in serious gaming literature, which elements of both a serious game and presentation enhance learning, and how a learning method can have an impact on behaviour.

In the 'methodology section', the methods will be discussed hat were used to answer the main research question validly and reliable. In order to assess whether there is a difference in people's shown behaviour after attending a presentation or serious game an experiment is constructed. Furthermore interviews were conducted with serious gaming and/ or learning and behaviour expert to create extra context and enhance the validity of this research.

In the 'results experiment section' the outcomes of the conducted experiment will be presented. The results are presented per variable, comparing the behaviours of the participants that played a serious game, with the behaviours from the participants that attended a presentation. Per measurement construct a statistical test will be conducted, descriptive analysis will be conducted and a general description will be given of what was observed.

In the 'results expert interview section' an overview will be given of the outcomes of the interviews with six serious gaming and/or learning and behaviour experts. The outcomes of the interviews will be discussed descriptively.

In the analysis section the results of this experiment are discussed using information from literature and interviews with experts. Based on this paragraph conclusions can be made whether and why people's shown behaviour after playing a serious game, highlighting the need for a specific set of behaviours, differs from people's shown behaviour after attending a presentation with the same content.

In the' conclusions and recommendations section' the main research question will be answered and there will be elaborated on the implications and limitations of this research.

2 Theory

The purpose of the theoretical section is to establish an academic foundation for this research, which will be used to answer the main research question.

In this chapter there will be first focussed on the topic of serious gaming, since this is the main topic of this research. A comprehensive literature review was conducted, used as a starting point to elaborate on what is known in literature regarding the definition, the learning process, the learning elements that can be included in a serious game and the known learning outcomes of serious gaming. However, in order to look beyond the known learning outcomes and to get a structural idea of how a serious game and a presentation might be different in their impact on people's shown behaviour, more general learning and behaviour literature should not be excluded.

Therefore, in the second paragraph the classical learning theories from literature are discussed; this is to gain an understanding of which learning elements in a learning method enhance a positive learning effect. Consequently, the general format of a serious game and a presentation are mapped to these learning elements, to gain an understanding of how and which elements of the learning methods enhance an effective learning effect. Furthermore, in this chapter the focus is set on which learning paradigms support the use of (learning methods similar to) serious gaming, and which learning paradigms support the use of (learning methods similar to) a presentation. This paragraph will be used to explain the theoretical differences in the learning impact of a serious game and a presentation.

In the third paragraph the behavioural theory will be discussed; this to gain an idea of the determinants of people's behaviour. Getting an understanding of how behaviour can be influenced by a learning method. These determinants will consequently be used as a starting point to ensure the validly and reliability of the constructed experiment. In the last paragraph the theories will be summarized and a link will be made to the method section.

2.1   Serious gaming theory

This chapter will elaborate on the definition, the learning process, the included learning elements and the known learning outcomes of serious gaming; this to gain a full understanding of what is known in serious gaming literature, and which learning elements can be included in a serious game. A systematic literature review was conducted to identify all relevant serious gaming theory.

Due to the fact that the main focus of this research is on serious gaming; the relevant available serious gaming literature was identified. First a Systematic literature review was conducted according to the method of Wolfswinkel, Furtmueller, and Wilderom (2011), Defining criteria, searching on these criteria, refining the sample, analysing the content and lastly presenting the content (a complete overview can be found in appendix A) . This analysis was conducted using the 'Social Sciences & Humanities' database of Scopus. The used search criteria are stated in table 1.

Table 1: Criteria for inclusion, requirements and search terms of serious gaming literature review

Document type	Articles; reviews
Subject areas	Computer science, Social sciences, Psychology, Business management and accounting, Economics Econometrics and Accounting, Decision sciences.
Language	English; Dutch
Source type	Journals
Citations	Ten citations or more since publication of the article
Search terms	Obligatory; Games OR Gaming OR Serious Games OR Serious Gaming OR Business Games

In total 433 articles were found. After filtering out doubles, reading the abstract, reading the full text and applying forward and backward citation, 12 found papers remained in total. These 12 articles will be used as the core of this chapter.

Furthermore, in order to really get a complete picture of the field of serious gaming, also three other techniques were used to gather literature. First a more explorative research was conducted using the Google scholar database, searching for high-cited articles. Secondly all gaming journals were identified and rated on their impact (see appendix B for a complete list), and searched for relevant papers. Thirdly Igor Mayer was approached, a respected author in the serious gaming industry, which provided also an overview of the literature on serious gaming. In total 18 additional papers were found. Although these papers will not be extensively discussed in this paragraph; they did contribute to a better understanding of what is known about serious gaming literature. A complete list of all papers can be found in appendix C.

2.1.1 Definition of serious gaming

When looking at the gaming literature in general, there are two main concepts that are often entangled; games and simulations. In literature, a debate has taken place for more than 40 years on how games and simulations are to be defined and distinguished (Crookall, 2011). In order to simply distinguish between games and simulations, the definition of an article of Randel, Morris, Wetzel, and Whitehill (1993) is used. In this article games are defined as "competitive interactions bound by rules to achieve specified goals that depend on skills and often involve chance and an imaginary setting", and stating that "simulations model a process or mechanism relating input changes to outcomes in a simplified reality that may not have a definite end point". Thus, games are more focused on interaction and achieving certain goals, while simulations are often more linear models, focussing on the consequences when one changes certain input. However, in literature many definitions exist; therefore the most important criteria is whether the terminology is understood for the context in which it is used, not solving this 40 year old debate (Crookall, 2011).

Within the gaming literature, differences also exist between the definition of a normal game and a serious game. In an overview on gaming, Connolly, Boyle, MacArthur, Hainey, and Boyle (2012) pointed out that games can be distinguished according to the primary function of the game. Whether the game was developed for fun, entertainment and recreation, or whether the game was developed for learning and behavioural change (Connolly et al., 2012). This last category of games is better known as "serious games"; a terminology first used in the book of Abt (1970). The used definition of serious gaming is derived from the article of Crookall (2011), generally stating that serious games, are games that are used for the purposes of learning and training. Furthermore, as indicated by Gunter et al. (2007), serious game often try to bridge the gap from game-world to reality, by simulating a real-world situation.

2.1.2 Learning process and learning elements of serious gaming

When looking at the core process of serious games, a basic framework was developed by Garris, Ahlers, and Driskell (2002), claiming that Serious Games basically consist of two key elements: Instructional content and game characteristics (see figure 1) . According to Garris et al. (2002) the learning effect takes place while participants are actively playing, and during the debriefing when there is reflected on the playing process.
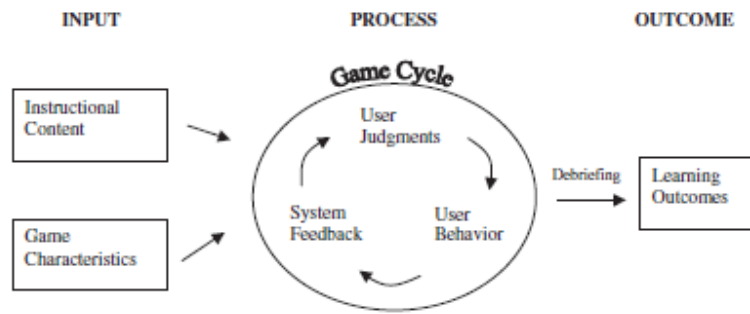
Figure 1: Gaming Model Garris (2002)

The model shows that the process of gaming is a simple cycle of showing behaviour, gaining feedback on this behaviour and making judgements. Learning occurs during the game cycle, but also during the debriefing. Furthermore, the model shows that on the design end a serious game simply consists of the game characteristics and the instructional content.

To gain a better understanding on how a learning effect can be created by serious gaming, the game characteristics/learning elements that can be included in a serious game are taken into account. These elements are distilled from the articles from the literature review (see Appendix C). An overview of these elements can be found in table 2. The game characteristics as mentioned by just one author are excluded from this list and can be found in appendix D,

Table 2: Learning elements of serious gaming

Learning elements serious game	Author(s)
Adaptation: Level of difficulty adjusts to the skill level of the player by matching challenges and possible solutions.	(Wilson et al., 2008); (Greitzer, Kuchar, & Huston, 2007); (Garris et al., 2002) (Thompson et al., 2010);
Competition/challenge: A challenging serious game possesses multiple clearly specified goals, progressive difficulty, and informational ambiguity. Challenge also adds fun and competition by creating barriers between current state and goal state.	(Wilson et al., 2008); (Ricci, Salas, & Cannon-Bowers, 1996); (Garris et al., 2002); (Thompson et al., 2010)
Control/Choice: The player's capacity for power or influence over elements of the serious game. Learner control occurs when the learner has control over some aspects of the serious game.	(Wilson et al., 2008); (Garris et al., 2002); (Thompson et al., 2010)
Fantasy (Scenarios or characters). It involves the user in mental imagery and imagination for unusual locations, social situations, and analogies for real-world processes.	(Wilson et al., 2008); (Garris et al., 2002); (Thompson et al., 2010)
Feedback/Assessment: The measurement of achievement within the serious game (e.g., scoring). Feedback provides a tool for users to learn from previous actions and adjust accordingly.	(Wilson et al., 2008); (Ricci et al., 1996); (Garris et al., 2002) (Thompson et al., 2010); (Yusoff, Crowder, & Gilbert, 2010)
Goal Setting: Goal directedness can motivate players to really achieve something, stimulating involvement.	(Wilson et al., 2008); (Ricci et al., 1996); (Greitzer et al., 2007); (Thompson et al., 2010)
Interaction (Interpersonal): Face-to-face interaction; it provides an opportunity for achievements to be acknowledged by others, and challenges become meaningful, which induces involvement.	(Wilson et al., 2008); (Ricci et al., 1996); (Greitzer et al., 2007)
Interaction/shared experiences: Interpersonal activity which encourages entertaining communal gatherings by producing a sense of belonging.	(Wilson et al., 2008); (Greitzer et al., 2007)
Mystery: Gap between existing and unknown information.	(Wilson et al., 2008); (Garris et al., 2002)
Practice: Repeating for harder task, better knowledge retention	(Thompson et al., 2010); (Yusoff et al.,

and can have plenty of serious game activities for drills.	2010)
Progress/Levelling/reward Progress and surprise is how the player progresses toward the goals of the serious game.	(Wilson et al., 2008); (Greitzer et al., 2007);
Rules: Specific, well-defined rules and guidelines are a necessary component for an effective educational serious game.	(Wilson et al., 2008); (Garris et al., 2002)
Sensory stimuli: Visual or auditory stimulations, which distort perception and imply temporary acceptance of an alternate reality.	(Wilson et al., 2008); (Garris et al., 2002)

Furthermore, it is interesting to look at the effect that can be realized with these game characteristics. According to Gunter et al. (2007) , an effective serious game includes the following elements

- Relevance: The serious game must be relevant to the players and must be on the appropriate learning level.
- Embedding: Including elements to engage the player in the flow of the game, both mentally and emotionally. Learning is enhanced by fully embedding the content in the gameplay.
- Transfer: Creating the link to real-life experiences; bridging the gap from the game-world to reality. By feedback the learned content can be assessed.
- Adaption: People learn actively, constructing ideas themselves, partly based on recall of prior knowledge.
- Immersion: Presenting an environment and opportunity for belief creation; creating a shared responsibility among the players for learning; and providing opportunities for reciprocal action.
- Naturalization: Including opportunities during playing to master the content (for example by replay).

Furthermore, an important element of a serious game is the fact that it can enhance a feeling of failure. As stated by Wenzler and Chartier (1999): "if one does not experience failure in an attempt to acquire a new skill or behavior, the likelihood of success is doubtful, if not impossible. In other words, it is learning through mistakes" Wenzler and Chartier (1999) Illustrated their viewpoint in representation of 'the Valley of Despair (see figure 2).
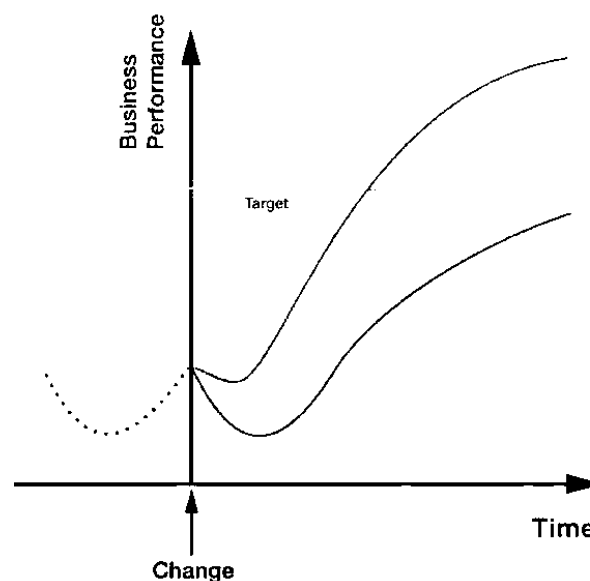

Figure 2: Vally of Change (Wenzler & Chartier, 1999)

2.1.3 Available evidence on the learning outcomes of serious gaming

Lastly, what is already known in literature about the outcomes of serious gaming is taken into consideration. Regarding the learning outcomes of serious gaming, a strong literature review was conducted by Connolly et al. (2012). In their literature review Connolly et al. (2012) elaborated on the known outcomes of serious games regarding attitude, knowledge, skills and behaviour. The most convincing outcomes of the found articles are presented below:

- Attitude: Wijers, Jonker, and Kerstens (2008) found that students found a game motivating for learning math, but in contrast to that, Huizengal, Admiraall, Dam, and Akkerman (2008) found that students did not find a mobile game motivating for learning history.
- Knowledge: Contradicting results were found, were Papastergiou (2009) and Beale, Kato, Marin-Bowling, Guthrie, and Cole (2007) showed improvements in memory and knowledge retention, while Sward, Richardson, Kendrick, and Maloney (2008) did not find any significant differences between their experimental and control-group. Furthermore several studies considered pedagogical aspects of how games were incorporated into learning.
- Skills: All papers found in this category were quasi-experiments; again contradicting results were found. Hogle, Widmann, Ude, Hardy, and Fowler (2008) found results in favour of gaming while looking at the improvement in performance on depth perception and operative performance, but found no difference on four other measures. Furthermore, while Stefanidis, Scerbo, Sechrist, Mostafavi, and Heniford (2008) found improvements in students' performance using a game; Orvis, Horn, and Belanich (2008) found that inexperienced players did not benefit as much from a similar serious game.
- Behaviour: The papers categorised under behaviour change were more varied in their focus and methodology than those in other categories. However in general limited evidence was found on the impact of serious games on behaviour. An article that focussed on behaviour change was from Lavender (2008); their experiment showed that people showed more sympathy towards homeless people after playing a serious game. Another experiment was conduct by Jouriles et al. (2009). Jouriles et al. (2009) used a randomized experiment to test a role-playing game designed to train young women to develop behavioural strategies for resisting untoward sexual advances. Although they concluded that the game could be useful, the researchers failed to focus on the specific behavioural impact of the games.

Overall the literature review of Connolly et al. (2012) indicates that already some literature is available on the learning outcomes of serious gaming. Several articles show a positive impact of serious gaming for example motivation, knowledge improvements, retention of knowledge and skill performance. However almost all evidence found is also weakened by similar researches that show opposing results. Furthermore, when looking at the impact serious gaming has on behaviour, the scope of this research, only two relevant articles were found (written by Jouriles et al. (2009) and Lavender (2008)). Moreover, both these articles did not focus the impact of serious gaming on shown behaviour, but focussed more on elements like sympathy and perceived usefulness.

2.1.4 Summary and conclusion

This chapter focussed on the definition, the learning process, the included learning elements and the known learning outcomes of serious gaming; to gain a full understanding of what is known in serious gaming literature and the way in which serious gaming can enhance the process of learning. A systematic literature review was conducted to identify all relevant serious gaming theory.

Firstly, the definition and learning process of serious gaming, games that are used for the purposes of learning and training, was discussed. In general, people learn from a serious game while playing and during the debriefing. Furthermore, it could be argued that the quality of a serious game is mainly determined by the content and the game characteristics that are included (like. competition, feedback, goal setting, rules etc.) These learning elements can e.g. enhance engagement, create knowledge transfer, enhance active learning, and enhance the feeling of failure.

Furthermore, the literature on the known learning outcomes of serious gaming was discussed. Literature indicates that the evidence on the impact of serious gaming is still fragile. In literature for example no convincing evidence was found related to the impact serious gaming has on people's shown behaviour, compared to a traditional learning method. Therefore this research is a valuable addition to what is already known in literature.

In order to look beyond the known learning outcomes of serious games, and to get a structural idea of how a serious game and a presentation might be different in their impact on people's shown behaviour, more general learning and behaviour literature should not be excluded. Therefore in the next chapter the classical learning theories will be discussed in order to identify the elements in a learning method that enhance learning.

2.2 Learning theory

In this paragraph there will be elaborated on several classical learning theories from which the essential learning elements are distilled. These learning elements give insights in the elements that must be included in a learning method to enhance the learning effect of a learning method. Additionally, both a serious game and presentation will be linked to the discussed learning paradigms.

In the first paragraph all relevant learning theories will be identified and mapped to a learning paradigm; this to gain a clear overview of all different perspectives on learning. In the second paragraph four learning theories will be discussed, one learning theory per paradigm. Consequently, per theory the elements will be distilled that enhance learning. In the third paragraph, the learning format of a presentation will be discussed. In the fourth paragraph the learning format of both a serious game and presentation will be mapped to the learning elements as identified in the second paragraph.

2.2.1 Learning paradigms

First, a search is done for available learning theories in literature. Based on this search, there was concluded that the number of learning theories available is almost infinite; the most important learning theories are classified into four types of learning paradigms: Behaviourism, Constructivism, Cognitivism and Humanism (see figure 3).
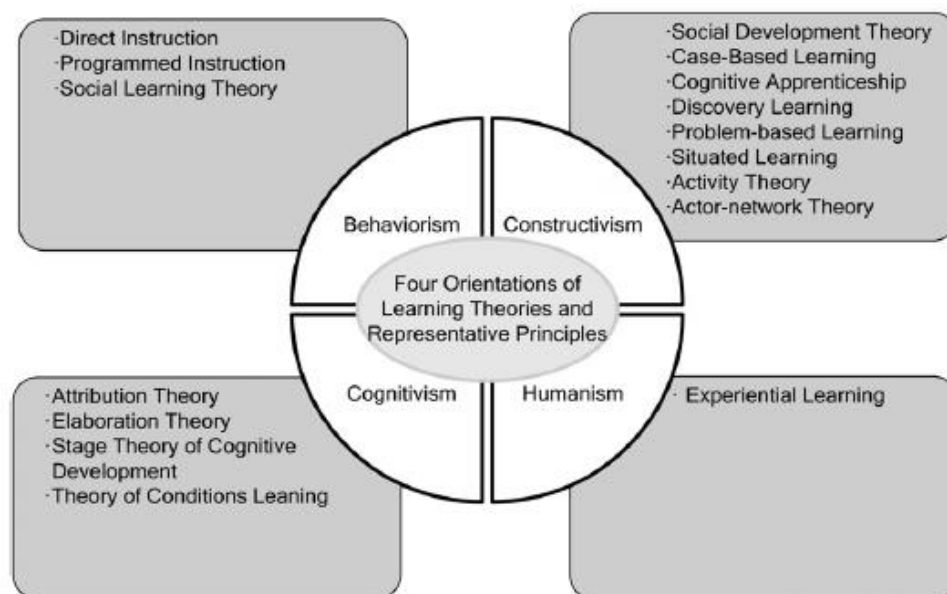
Figure 3: Overview of learning theories mapped to learning paradigms (Wu, Chiou, Kao, Alex Hu, & Huang, 2012)

Each of the four learning paradigms has a different premise on how people learn:

- Behaviourism: Behaviourists consider learning to be produced by stimulation and reinforcement"(Wu et al., 2012).
- Cognitivism: "Cognitivists, consider learning to be more than simple stimulation and reinforcement"(Moore & Fitz, 1993). Cognitivism is based on two main assumptions: that the memory system is an active, organized processor of information and that prior knowledge plays an important role in learning (Merriam & Caffarella, 1999)"(Wu et al., 2012).

- Constructivism: "Constructivists view the learner as an information constructor: individuals actively construct or create their own subjective representations of objective reality (Bednar, Cunningham, Duffy, Perry, 1995)" (Wu et al., 2012).
- Humanism: A paradigm that believes learning is a personal act to fulfil one's potential. According to Huitt (2001), the central assumption of humanism is that individuals act with intentionality and values. According to humanists, learning should be student-centered and personalized (Wu et al., 2012).

Because it is not workable to address all learning theories, the decision was made to focus on one theory per paradigm. The selection of the theories was based on the number of citations of the original author of each theory (see appendix E). Based on this criterion, the following theories were selected for further elaboration:

- Behaviourism - Social Learning Theory; based on the thoughts of Bandura (1971)
- Cognitivism - Conditions of Learning; based on the thoughts of Gagné (1965)
- Constructivism - Experiential Learning; based on the thoughts of D. A. Kolb (1984)
- Humanism - Cognitive apprenticeship; based on the thoughts of Vygotskiĭ (1978)

In the following section these theories will be discussed extensively. Consequently, in the last paragraph of next section, the effective learning elements will be distilled from each learning theory.

2.2.2 Learning theories

2.2.2.1 Behaviourism - Social Learning Theory (Bandura):

The Social Learning theory emphasizes that cognitive processes play a large role in acquiring and retaining new knowledge and skills (Bandura, 1977) The theory especially emphasizes the role of Vicarious, symbolic and self-regulatory processes. Thus learning by example and learning in a self-directed environment. According to Bandura (1971) "much human behaviour is developed through modeling" and "the acquisition of response information is a major aspect of learning" (Bandura, 1971). Observing behaviour helps gaining an understanding of how behaviour is performed, and can later "serve as a guide for action" (Bandura, 1971). This can prevent people from going through a behavioral learning process of trial and error (Bandura, 1971).

When looking more closely at the theory of vicarious and symbolic learning, Bandura stated (1971) that "virtually all learning phenomena resulting from direct experiences can occur on vicarious basis through observation of other people's behaviour and its consequences for them". People's informal feedback plays a large role in this observation (Bandura, 1977).By observing the effect of people showing certain behaviour, one's emotional response can be developed "witnessing the affective reactions of others undergoing painful or pleasurable experiences" (Bandura, 1971)). Thus the main idea is to learn from the effects of one's observed actions, rather than learning from others given examples (Bandura, 1977).

2.2.2.2 Cognitivism - Conditions of Learning (Gagné)

"The Conditions of Learning" is a theory by Gagné (1965) who constructed "a cognitive information-processing perspective on learning with empirical finding of what good teachers do in their classrooms" (Driscoll & Perkins, 2005). Information is, as mentioned by Driscoll and Perkins (2005), "presumed to undergo a series of transformations as it passes through the stages of memory". Because learning takes place only when processes are activated, the goal of instruction, according to Gagné

(1985), should be to facilitate this activation (Driscoll & Perkins, 2005). Therefore Gagné (1965) mapped an instructional event to each of the internal processes (see table 3).

Table 3: Gagnés Nine Events of Instruction Associated with the internal Learning Process

#	Internal Processes	Instructional Event
1	Reception	Gaining attention
2	Expectancy	Informing learns of the objective
3	Retrieval to working memory	Stimulating recall of prior learning
4	Selective Perception	Presenting the content
5	Semantic Encoding	Providing 'learning guidance'
6	Responding	Eliciting performance
7	Reinforcement	Providing feedback
8	Retrieval and reinforcement	Assessing performance
9	Retrieval and generalization	Enhancing retention and transfer

Regarding the number of elements that should be included in a Learning method, Driscoll and Perkins (2005) mentioned that including too little elements "has the serious consequence of inadequate learning, misdirected learning or no learning et all (…)". Including too many instructional events may however lead to boredom. An extensive elaboration on the instructional event can be found in appendix F.

Especially interesting is step 5, presenting the content. Gagné (1965) distinguishes five major 'content categories', which all require a different instructional approach: verbal information, intellectual skills, cognitive skills, cognitive strategies, attitudes and motor skills. There could be argued that shown behaviour is mainly associated with cognitive strategies. The theory of Gagné (1965) stated that important factors regarding cognitive strategies are a clear description of the behaviour and feedback on people's performance (see appendix F for the complete list).

2.2.2.3 Constructivism – Cognitive Apprenticeship (Vygotsky)

Cognitive Apprenticeship is a theory originally based on the work of Vygotskiĭ (1978). This theory claims that previous learning and instruction are the main drivers of new knowledge acquisition. An important factor in the concepts of cognitive apprenticeship is 'The Zone of Proximal Development (Vygotskiĭ, 1978). In essence, "Vygotsky's Zone of proximal development refers to the gap between what a given child can achieve alone, their 'potential development as determined by independent problem solving', and what they can achieve 'through problem solving under adult guidance or in collaboration with more capable peers" (Wood & Wood, 1996). Vygotsky (1978) suggested that "learning activities should provide adequate challenges to the learner based on his or her current knowledge state but at the same time not be so challenging as to be unattainable" (Dennen & Burner, 2007).

In order to learn, the cognitive apprenticeship theory identifies three essential techniques: modelling, scaffolding and reflection; these techniques are mainly based on "observation, guided and supported practice and on feedback aimed at the acquisition of cognitive and metacognitive skills" (Järvelä, 1995). "At the heart of cognitive apprenticeship is modelling" (Järvelä, 1995), which refers to experts' internal cognitive processes, performance, knowledge, motivation and emotional impulse in problem solving (as Järvelä (1995) derived from Schoenfeld (1985). Reflection is an important factor

enhancing the development. By reflection, students can learn from the gap between their own, and an experts' performance (Järvelä, 1995). Moreover, "when the cognitive and metacognitive processes are brought into the open, they can be observed, discussed and practised mutually" (Järvelä, 1995). Scaffolding, as derived from Vygotskiĭ (1978), "consists of providing direct support at the right level of current skill while a student is carrying out the task and then gradually fading out the assistance"(Järvelä, 1995).

2.2.2.4 Humanism - Experiential Learning (Kolb)

Experiential learning is defined by D. A. Kolb (1984) as "the process whereby knowledge is created through the transformation of experience". The model of D. A. Kolb (1984) is structured as a learning cycle (see figure 4)
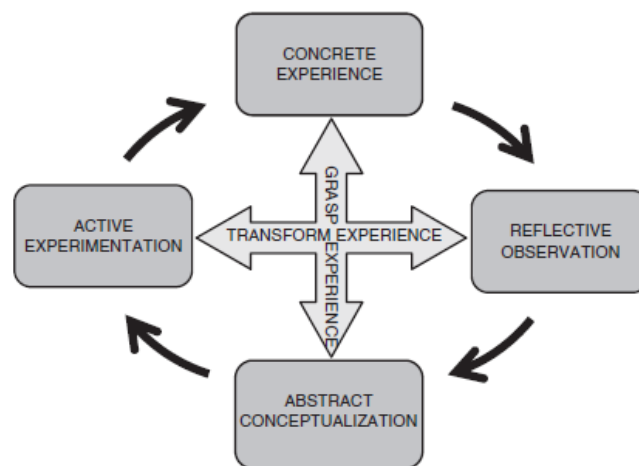
Figure 4: Kolb's Learning Cycle (figure from Kolb, 2008)

According to A. Y. Kolb and Kolb (2008) there are four learning styles that emphasize one of the main four learning modes:

- Experiencing: Learners with an Experiencing style emphasize feeling while balancing acting and reflecting. They learn by actively involving themselves in new and challenging situations and by stepping back and reflecting on their experiences from differing points of view.
- Reflecting: Learners with a Reflecting style emphasize reflection, while balancing feeling and thinking. They learn by combining the abilities of creative idea generation and putting ideas into concise, logical form. They thrive in learning environments rich in discussions, interactions, and through readings that provide them with a deeper understanding.
- Thinking: Learners with a Thinking/abstract conceptualization style emphasize thinking while balancing reflecting and acting. They are deep thinkers who are able to inductively develop a particular concept or idea and deductively evaluate its validity. They can draw both on the rich inner world of reflection and abstraction and an outer world of action. They may be uncomfortable with personal relationships and prefer working alone.
- Acting: Learners with an Acting/ concrete Experience style emphasize acting while balancing feeling and thinking. They combine the ability to find solutions to questions or problems based on their technical analysis with attention to the needs of people and sources of information in concrete situations.

Thus, according to Kolb (1984, 2008) every individual has their own preferred way of learning, which suggests that individual learning is limited to the preferred learning mode; but this is not the case according to Mainemelis, Boyatzis, and Kolb (2002). People's development moves from a specialized

to a more integrated mode of learning, where integration is seen as a process "involving a creative tension among the four learning modes that is responsive to contextual demands"(Mainemelis et al., 2002). As a result, all four learning modes are of importance for learning eventually.

2.2.2.5 Learning elements theories

In order to gain a better understanding on which specific learning element enhances learning (not taking into account the specific paradigms), the learning theories are filtered on the elements that are, according to the authors, essential for learning (see table 4).

Table 4: Elements Learning Theories

#	Learning Elements	(Bandura, 1977) - Behaviourism	(D. A. Kolb, 1984) – Humanism	(Gagné, 1965) - Cognitivism	(Vygotskiĭ, 1978) - constructivism
1	Failure	X	X	X	X
2	Practice	X	X	X	X
3	Interaction(/Sharing Knowledge)	X	X	X	X
4	Recall prior knowledge	X	X	X	X
5	Feedback(/reflecting)	X	X	X	X
6	Challenge	X	X	X	X
7	Control/Self-Regulation	X	X		X
8	Goal Setting		X	X	X
9	Guidance(/Teacher as Facilitator)		X		X

Thus in general the theories of all four learning paradigms identify similar learning elements, although each of the four learning paradigms has a different premise on how people learn. At the end of this chapter, both a serious game and a presentation will be mapped to the learning elements and paradigms as identified in this chapter.

2.2.3 Learning methods

In this section the relevant learning methods will be discussed. Because the learning elements of a serious game are already discussed in the first paragraph of this chapter, there will be solely focussed on the how learning elements can be included in a presentation.

When starting with the definition of a presentation, there could be argued that this learning method is generally seen as an activity in which someone shows, describes, or explains something to (a group of) people. The use of assisting software (i.e. a PowerPoint presentation) is nowadays also taken into account. In order to collect literature on presentations, an intuitive literature review was conducted. For this Scopus and Scholar were searched, mainly using the words '(effective) presentation' and '(traditional) lectures. As a result, the articles of Sandhu and O. Afifi (2012), Susskind (2005), Sugahara and Boland (2006), Savoy, Proctor, and Salvendy (2009) and Bartsch and Cobern (2003) were found.

According to Sandhu and O. Afifi (2012) effective lectures are characterized by Capturing and maintaining the attention of students, active participation of students, instructor-student questioning, discussion, and formative quizzes with immediate feedback. Sandhu and O. Afifi (2012) believe that a presentation is still an effective learning method, claiming that the the lack of faculty training in presenting an interactive lecture, rather than the method of delivery itself, is one of many reasons for ineffective lecturing. Sandhu and O. Afifi (2012) identified that an effective presentation basically includes five phases; Opening, Main body, Two-way interaction, Formative assessment, and Conclusions:

Step 1 - Opening: An effective lecture efficiently transfers knowledge to students by enhancing their conceptual understanding and retention of knowledge. An excellent opening summary is critical to the success of a lecture. It encourages the students to focus with anticipation and mental alertness. Several strategies have been suggested to optimize students' interest and attention during lectures: (1) Stating the purpose of the lecture to prompt the learners to be engaged; (2) Reviewing the lecture objectives that challenge the learners to a set of expectations, this also builds up curiosity and clearly outlines their role in meeting those expectations; (3) Posing a question at the beginning of the lecture for the students to think about; this creates a challenge for the learners and alerts them to focus during the lecture, with the anticipation of seeking answers to that question; (5) Creating a positive and safe learning environment by acknowledging students' responses.

Step 2 - Presentation: The core content is easily mastered if it is organized and analysed into constituent components, key concepts identified and their interrelationships explored. This involves organizing the content according to the objectives, interpreting and analysing concepts, making connections between concepts, relating to prior knowledge, and creating situations for students to think about extending their knowledge to new and hypothetical situations. This can be accomplished by for example the use of analogies, concrete examples, video images, and role-playing, which connects to the learners' background and providing a relevant context to the lecture material. To compensate for inattention and to offset ineffective learning, different types of stimulation could be used during lectures like changing the lecture format, or assigning student to short-learning tasks. To ensure that complex information is made clear and reasonably understood by the students, they must have to opportunity to ask question.

Step 3 'Learner- Instructor two-way': The instructor-learner interaction is meant to engage students in active learning. The intent of the instructor-learner interaction is to stimulate discussion and provide students with feedback. To achieve instructor-learner interaction it is the instructor's responsibility to create a safe environment for asking and answering questions. This will aid in

generating instructor-learner interaction and foster student confidence to become active learners. To create this engaging effect, the characteristics of instructors and learners should be taken into consideration. Firstly Facilitators should exploit the diverse differences in generational characteristics of the learners. Only, then, can their expectations be met, and effective lecturing and learning can occur. Secondly; instructor-learner interaction should take into consideration non-teaching related attributes, such as verbal and non-verbal skills. Affective non-verbal and verbal skills are considered behaviours that remove barriers to learning by stimulating connection between learner and instructor; and are positively correlated with teaching effectiveness. These skills include humor, direct eye contact with the learners, vocal inflections, and direct body posturing, gesturing, speaking loudly, using voice for emphasis and exaggeration, and projecting a feeling of enthusiasm and excitement.

Step 4 - Formative Assessment: The delivery of an effective lecture is giving a formative quiz at the end of the lecture. Regular formative assessments, in the form of quizzes, with immediate feedback are a vital part of effective lectures, helping to promote better learning. Instructors can enhance active learning by using several interacting methods, including quizzes, case reports, problem solving exercises and students working cooperatively. Wisely choosing the type of activity influences the retention of material. More importantly, it should be designed around the learning objectives as this helps to promote thoughtful engagement on the part of the students. Irrespective of the method used for formative assessment, one of the most important aspects is providing immediate feedback to students' responses. This helps to build up a stimulating atmosphere and encourages more students to engage in discussions, positively affecting their achievements.

Step 5 – Conclusion: Key in the delivery of an effective lecture is to provide a summary of important concepts in key points or bulleted format at the end of a lecture. It is as important as the opening summary used to introduce that lecture. It helps to draw attention towards the most important concepts, facts, or ideas. The use of the "take home messages" can provide additional reinforcement. Conclusion also allows time for elaboration and clarification of the concepts presented. Objectives stated in the beginning should be reiterated, assuming that they have been accomplished. The conclusion also highlights the important information presented and ensures that students leave the classroom with a clear understanding of the lecture materials.

Sugahara and Boland (2006) and Bartsch and Cobern (2003) focused more on the outline of the presentation. Sugahara and Boland (2006) suggested that a good presentation with use of media can lead to diversification of students' attitudes ." The results of this study show a significant relationship between students' preferences regarding PowerPoint media and their academic performance as shown in their examination scores"(Sugahara & Boland, 2006). Bartsch and Cobern (2003) indicated that during a presentation relevant graphics must be used; having a positive effect on people's performance.

2.2.4   Summary and conclusion

In this concluding paragraph the discussed theories will be summarized and integrated. The elements of a serious game and a presentation will be mapped to the learning elements as derived from the classical learning theory.

In table 5 the comparison between a serious game and a presentation is shown. On the left side of this all the learning elements from literature are included, while on the rights side the elements of both a serious game and presentation are mapped.

Table 5: Mapping a serious game and a presentation on the learning elements

#	Learning Elements	Serious game	Presentation
1	**Failure**	In-game experience of problems	(1) Provide a problem – (2) ask questions to the audience
2	**Practice**	Practice while playing	Stimulate active thinking by showing examples
3	**Interaction**	(1) In-game interaction – (2) interaction among players	Involve the audience
4	**Recall prior knowledge**	Include elements which require recall of prior knowledge	Address previous learned knowledge
5	**Feedback (/reflecting)**	(1) In-game feedback on made decisions – (2) debriefing	Presenter-audience interaction
6	**Challenge**	(1) In-game goal setting – (2) competition	(1) Question the audience – (2) provide case
7	**Control/Self-Regulation**	(1) Players can make their own choices (control) – (2) game adapts to player	Address content based on audience preferences
8	**Goal Setting**	(1) Presents learning goals at the start – (2) in-game goals	Present learning goals at the start
9	**Guidance (/Teacher as Facilitator)**	(1) In-game game help – (2) games can adjust to the level of the player	Address problems of the group

Thus in general both a serious game and a presentation possess corresponding learning elements. Although, the format in which the learning elements are included in both learning methods, is different for both a serious game and presentation. The format of a serious game is more related to the humanistic learning theory of D. A. Kolb (1984), taking a more learner centered approach and integrating the learning elements in the flow of the serious game. The format of a presentation is more related to the cognitivist theory of Gagné (1965), looking at humans as 'processors of information, including the learning elements more stepwise. To asses which method is more effective, it will be interesting to compare the impact both learning methods have on shown behaviour. However, to compare the impact of the learning methods on shown behaviour, first an understanding must be gained of which factors influence people's shown behaviour.

2.3   Behavioural Theory

This section will elaborate on the determinants of human behaviour. This chapter contributes to a better understanding on how one's shown behaviour can be influenced and the variables that must be controlled for.

To identify the most influential behavioural theories, the Scientific Database of Scopus was used. After a literature search for behavioural articles, the most cited articles were selected; the theories of Ajzen (1991) and Bandura (1977). These theories will be discussed below. Afterwards a more recent model of Fishbein and Ajzen (2011) will be discussed which combines both the theories of Ajzen (1991) and banBandura (1977).

2.3.1   Classical behavioural theories

According to the theory of Ajzen (1991), behaviour is mainly determined by one's intention, stating that "Intentions are assumed to capture the motivational factors that influence a behaviour; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behaviour" . According to Ajzen's (1991) "theory of planned behaviour, intention can be predicted by three variables:

1. The attitude toward the behaviour: refers to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question
2. The subjective norm; referring to the perceived social pressure to perform or not to perform the behaviour
3. Perceived behavioural control: refers to the perceived ease or difficulty of performing the behaviour and it is assumed to reflect past experience as well as anticipated impediments and obstacles.

Regarding the importance of the three variables, Ajzen (1991) stated that "the more favourable the attitude and subjective norm with respect to behaviour, and the greater the perceived behavioural control, the stronger should be an individual's intention to perform the behaviours under consideration".

According to the theory of Bandura (1977) , behaviour is determined by people's expectancies and incentives (Rosenstock, Strechter, & Becker, 1988). The "Social Learning Theory of Bandura (1977) is summarized by Rosenstock et al. (1988):

1. Expectancies
    (a) Expectancies about environmental cues (that is, beliefs about how events are connected- about what leads to what).
    (b) Expectancies about the consequences of one's own actions (that is, opinions about how individual behaviour is likely to influence outcomes).
    (b) Expectancies about one's own competence to perform the behaviour needed to influence outcomes (i.e. self-efficacy).
2. Reinforcement
    (a) The value of a particular object or outcome. The outcome may be health status, physical appearance, approval of others, economic gain, or other consequences. Behaviour is regulated by its consequences (reinforcements), but only as those consequences are interpreted and understood by the individual.

The "Social Learning Theory" of Bandura (1977) also excises a learning part. Nevertheless this chapter mainly focuses on behaviour. The learning part will be discussed in the next chapter.

2.3.2 Combining the classical behaviour theories

The models of Ajzen (1991) and Bandura (1977) are both established and proven models, yet they are also relatively old. More recently Fishbein and Ajzen (2011) created a more up-to-date behavioural model; '"the reasoned action approach". This theory includes both the theories of Ajzen (1991) en Bandura (1977) (see figure 5).
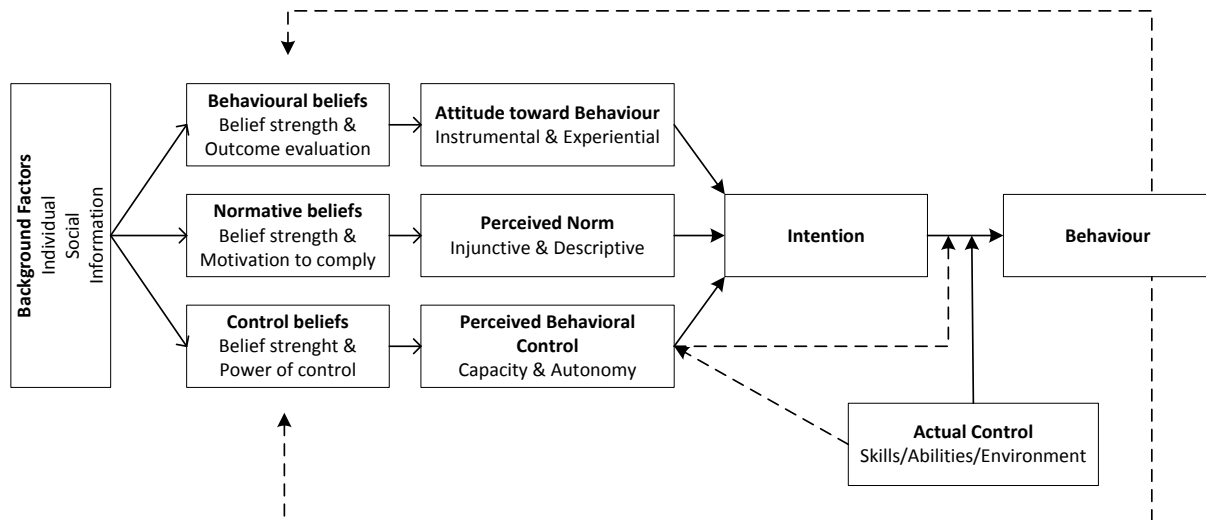
Figure 5: Reasoned Action Approach

In this new model actual control and people's beliefs gained a larger amount of attention. The "reasoned action approach "more explicitly mentions the role of actual control to perform certain behaviour. As mentioned by Ajzen (1991): behavioural intention can find expression in behaviour only if the behaviour in question is under volitional control, i.e., if the person can decide at will to perform or not perform the behaviour". Thus one's must have not constraints from the environment; and one' must have knowledge, skills to perform the behaviour (Miller, Galanter, & Pribram, 1960)

The main driver of behaviour is however still one's intention, influenced by people's attitude, perceived norm and perceived behavioural control. In this model these determinants are more refined than in the model of Ajzen (1991):

- Attitude (Experiential and Instrumental): "Experiential attitude is the individual's emotional response to the idea of performing a recommended behaviour" (derived from Fishbein 2007, by Glanz, Rimer, and Viswanath (2008)). Instrumental attitude refers to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question (Ajzen, 1991).
- Perceived norm (Injunctive and descriptive norm): Injunctive norm is "the perceived social pressure to perform or not to perform behaviour" (Ajzen, 1991). Descriptive norm is described as "Perceptions about what others in one's social or personal networks are doing "(Glanz et al., 2008).
- Perceived Behavioural control (Capacity and Autonomy): Capacity is similar to Ajzen's (1991) definition of perceived behavioural control; described by Bandura (2006) as "bringing one's influence to bear on one's own functioning and environmental events"(Glanz et al.,

2008). Autonomy is similar to the Self-efficacy theory of Bandura (1977), defined as "one's degree of confidence in the ability to perform the behaviour in the face of various obstacles or challenges" Glanz et al. (2008).

A significant difference in this model is the explicit recognition that these values are mainly driven by one's belief in these values, and the recognition that one's believe is influenced by one's individual social background, and by reflection on previous behaviour.

2.3.3 Summary and conclusion

This chapter focussed on the determinants of human behaviour; contributing to a better understanding on how one's shown behaviour can be influenced and the variables that must be controlled for. People's behaviour is mainly determined by one's intention (taking into account that one possesses the skills to perform the behaviour). Intention is driven by one's behavioural, normative and control believes. Consequently these 'believes' are influences by individual background factors and previous experienced behaviour.

Thus, in order to make someone show a specific set of behaviours, a learning method must enhance peoples believes regarding these behaviours. A presentation is a passive learning method, thus using a presentation; one must convince the audience of the importance of this specific set of behaviours by using mainly words. A serious game makes use of the feedback loop as identified by Fishbein and Ajzen (2011), having an impact one one's behavioural believes by reflecting on their past behaviour (as experienced during the process of playing).

2.4 Summary and conclusion

In this chapter a comprehensive overview is provided of serious gaming literature, presentation learning, and behaviour literature. The purpose of the theoretical section was to establish an academic foundation for this research, which will be used to answer the main research question.

In the serious gaming section, the definition and learning process of serious gaming, games that are used for the purposes of learning and training, was discussed. In general, people learn from a serious game while playing and during the debriefing. Furthermore, there could be argued that the quality of a serious game is mainly determined by the content and the game characteristics that are included (like. competition, feedback, goal setting, rules etc.) These learning elements can e.g. enhance engagement, create knowledge transfer, enhance active learning, and enhance the feeling of failure. Furthermore, literature indicates that the evidence on the impact of serious gaming is still fragile. For example, literature did not show convincing evidence related to the impact serious gaming has on people's shown behaviour, compared to a traditional learning method. Therefore this research will be a valuable addition to what is already known in literature regarding serious gaming.

In the learning section the elements are identified that enhance the learning effect of a learning method (like e.g. failure, challenge and goal setting). Furthermore the learning elements that can be included in both a presentation and a serious game are compared. This comparison shows that both a serious game and a presentation possess corresponding learning elements. Although, the format in which the learning elements are included in both learning methods is different. The format of a serious game is more related to the humanistic learning theory of D. A. Kolb (1984), taking a more learner centered approach and integrating the learning elements in the flow of the serious game. The format of a presentation is more related to the cognitivist theory of Gagné (1965), looking at humans as 'processors of information, including the learning elements more stepwise.

In the behavioural section the determinants of human behaviour are identified. People's behaviour is mainly determined by one's intention (taking into account that one possesses the skills to perform the behaviour). Intention is driven by one's behavioural, normative and control believes. Consequently these 'believes' are influences by individual background factors and previous experienced behaviour. Thus, in order to make someone show a specific set of behaviours, a learning method must enhance peoples believes regarding these behaviours. A presentation is a passive learning method, thus using a presentation; one must convince the audience of the importance of this specific set of behaviours by using mainly words. A serious game makes use of the feedback loop as identified by Fishbein and Ajzen (2011), having an impact one one's behavioural believes by reflecting on their past behaviour (as experienced during the process of playing).

Thus in general both methods can include similar learning elements, but both learning methods are structurally different when looking at the learning format. In order to gain a better understanding on the learning effectiveness of both learning methods, it would be interesting to see whether the people's shown behaviour playing a serious game, highlighting the need for a specific set of behaviours, differs from people's shown behaviour after attending a presentation with the same content. Therefore, an experiment is constructer in the method section.

3 Methodology

In this chapter the methods will be described that are used to test whether people's shown behaviour after playing a serious game, highlighting the need for a specific set of behaviours, differs from people's shown behaviour after attending a presentation with the same content

In the first paragraph there will be elaborated on the general research design and the participants that took part in this research. The result of this chapter will be a general understanding on how this research was constructed. The second paragraph will explain the instructional designs used in this research. The serious game and presentation used in this experiment will be explained, and compared on element level. The result will be an understanding of the similarities and differences between both methods. The third paragraph focusses on the content and the measurement. There will be an explanation of which behavioural constructs are assessed during the experiment, and how these behaviours will be measured. In the fourth paragraph the variables that could bias the results of this experiment will be controlled, using the model of Fishbein and Ajzen (2011). The results of this paragraph will strengthen the validity and reliability of this research. In the fifth paragraph there will be elaborated on how the data will be processed and analyzed in the result section. In the last paragraph this chapter will be summarized, elements will be integrated and a link is made to the results section.

3.1 Research design and participants

In this paragraph an overview will be given of the research design and the participants that took part in it; this to gain a full understanding of the steps taken and to make reproducibility possible.

To answer the research question, an experiment is conducted within a consulting company (Accenture). An experiment is the best suited research design for the type of research question as addressed in this research, due to his explorative nature (Babbie, 2007; Grant & Wall, 2009). A randomized experiment would be the most preferred experimental design. However this is not feasible in the context of Accenture, which makes a quasi-experiment the best method.

Accenture is specialized in management consulting, technology services and outsourcing and operates in five (self-identified) service groups: Resources (energy and utility companies), Financial Services (banks, insurance, and capital organizations), Public Services (governance related customers), Products (automotive, consumer goods, detail, healthcare and transport), Communications & high Tech (communication, electronics, and media & entertainment). Accenture aims at sustainable collaborations with large customers to ensure growth of the company.

The experiment took place during the 'new hire days; an introduction program for all new employees , which takes place during the first two days of their new job. During these 'new hire day's' people are expected to understand the Core Values of Accenture, a statement describing how employees of Accenture are supposed to act. For the purpose of this experiment, these core values were presented during the first morning of the 'new hire days' in two different ways; using a serious game and using a presentation. There will be elaborated on both the serious game and the presentation in the next paragraph. The experiment was conducted four months in total; twice a serious game was played, and twice a presentation was given. People's behaviour was observed three hours after the completion of the learning method, in a simulated environment. An environment in which all behaviour related to Core Value related could be shown. Therefore the impact could be observed of both the presentation and the serious game on people's shown behaviour. A graphical representation of the experimental research design is shown in figure 6.
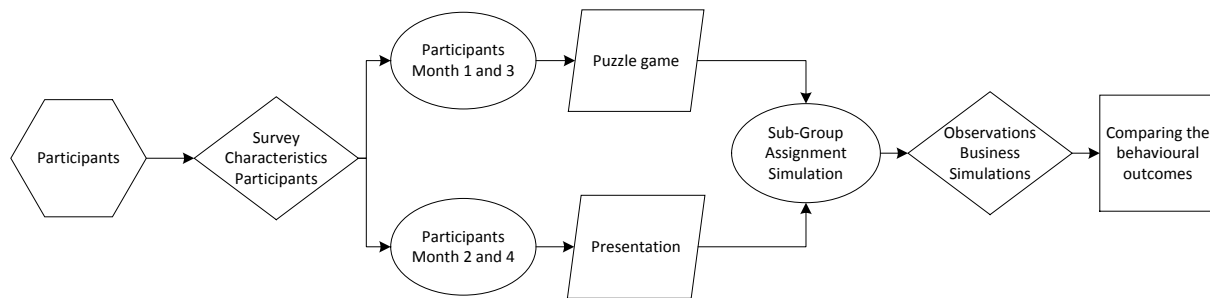
Figure 6: Research design experiment

During the simulation, called the 'Slogan Game', people were divided in teams, representing companies on a 'slogan market'. Each company is in charge of a CEO and consists of one of the following roles: Research, Development, Production, and Marketing teams. The teams need to produce slogans, which required finding out where the resources (letters and art images) are. Combining these into words, using the words for making 'slogans' and bringing them to the market where they competed was the next step. The slogans, to be created with available resources, were valued based on several criteria which are not known by the participants. In this setting all measures were included related to the Core Values. Elaboration on the used measurement will take place in the next paragraphs.

In total 154 people took part in the experiment; 34 in the first month (serious game), 32 in the second month (presentation), 48 in the third month (serious game) and 40 in the fourth month. This makes 82 participants that played the serious game and 72 that attended the presentation. To create equality among both the experiment and control group, sub-groups were based on a survey the participants were asked to fill in one week prior to their first day. The survey was based on the model of Fishbein and Ajzen (2011),   controlling for possible third-variables that could influence people's behaviour. There will be elaborated extensively on the control for third variables in a consecutive chapter. The results of this survey can also give an idea of the how the sample is constructed. In general the results showed that on average the people in the sample are:

- – 30 years old;
- – Possessing 4 years work experience;
- – High educated;
- – Possessing different nationalities. Two third of the sample is Dutch; one-third of the sample originates from a 'different' country;
- – Mainly interested in consulting and/or IT;
- – Possessing strong social skills

It was furthermore observed that the new hires were on average really ambitious and eager to learn. There could be argued that the new employees, except from their age and work experience, are a representative sample for all employees of Accenture in the Netherlands.

In addition to the experiment six interviews were conducted with experts in the field of serious gaming and/or learning and behaviour. This to gain a better understanding regarding the impact of serious games, and moreover to gain a better understanding why people's shown behaviour after a playing serious game, highlighting the need for a specific set of behaviours, might differ from people's shown behaviour after attending a presentation with the same content. The conducted interviews were semi-structured, and input of the conversation was the theory, method and results of the conducted experiment (Form used during the interviews can be found in appendix G).

The following six 'experts' were interviewed: 'Expert 1' is a researcher within TNO who focusses primarily on serious games, 'expert 2' is a professor and co-founder of the Netherlands Simulation and Gaming Association, 'expert 3' is program manager of E-Learning at the Medical Centre of the Erasmus University and is conducting a PHD research on the effectiveness of a specific serious game. Expert 4 is a senior Manager within Accenture and an expert on learning & collaboration, expert 5 is owner of a serious gaming company, and was involved in the development of more than 400 serious games and expert 6 is a senior manager within Accenture and a professor on the topic of serious gaming.

3.2 Instructional designs

In this paragraph an overview will be given of the serious game and the presentation used for the experiment. Consequently the learning elements that are included in both methods will be compared with each other.

The Puzzle Game is an analogue game; a multi-player social interaction game, mostly at a higher level of abstraction of real-life processes/systems. The Puzzle Game simulates a process in which players need to collaborate with each other and the client to complete pictures of their choice as quickly as possible. The different puzzles in the game consist each out of 9 pieces and have a picture and a quote that relate to the topics that should be discussed during the debriefing (the Core Values). The players are divided in small teams, each receiving an incomplete set of 9 pieces and one short and vague assignment from the client. During the playing process participants need to cooperate, with both the other teams and the client, in order to create the complete picture for the client. At the end of the game, during the debriefing , there is reflected on the playing process and the participants realize that this simple assignment took a long time because they operated based on unconfirmed assumptions and didn't work in the most efficient and effective way. Often people were not client focused, did not work together, did not stimulate each other to engage, did not use the strengths of their team and acted internally focused.

During this presentation, the same behavioural content is transferred as with the serious game, only in the 'effective presentation format' as emphasized in the theoretical section by e.g. Sandhu and O. Afifi (2012). The presentation was developed specifically for this experiment, including all the elements as addressed by Sandhu and O. Afifi (2012), although the core of the presentation was derived from a 'official' Core Value Presentation, as available in the database of Accenture. In the used presentation first an introduction is given, including the outline of the presentation, the goal of the presentation and an overview the main content that will be discussed. Secondly the main body is presented, showing an overview of all elements that will presented. Consequently each Core Value is discussed intensively by creating interaction, explaining the content and providing real-life examples of the consultants themselves. At the end of the presentation a short wrap-up is given of the discussed content, and people are invited to ask questions. Furthermore, several digital elements are included; for example at the start and at the end a movie of Accenture employees explaining their experience with the Core Values, and moreover a small interactive game was included asking the audience to identify the behaviours that are related to each Core Value.

The content in both the serious game and the presentation was based on a standardized form that included the definition of the Core Values and related behaviours (see appendix H). This form ensured that similar content was addressed in both learning methods. Moreover, this form was used as a control mechanism during the Puzzle Game and Core Value Presentation. The specific behaviours that were included will be discussed in the next paragraph.

When looking at both the serious game and the presentation, there could be argued that both the serious game and presentation possess most learning elements as discussed in the theory section. Thus, in general there could be argued that the presentation and serious game are both of high quality. In order to gain a more objective view on how the Puzzle Game and the Core Value Presentation differ, both these methods are mapped on the learning elements as identified in the theoretical chapter (see table 6).

Table 6: Learning Elements included in the Core Value Game and Presentation

Elements	Puzzle Game	Core Value Presentation
Failure	People experience failure during the serious game; during every Puzzle Game the players make unconfirmed assumptions, and experience the consequences of these assumptions	Questions are asked regarding their knowledge on Core Values
Practice	While playing, people actively experience the emphasized 'Core Value behaviours'	People are encouraged to think actively about why the 'Core Value behaviours' are important
Interaction (sharing knowledge)	People have interaction with the facilitators, and can share knowledge with each other	Presenter-Audience is encouraged regarding the presented content
Recall prior knowledge	No stimulation is given for recall of prior knowledge, however previous knowledge and skills are used while playing	People are encouraged to think actively about their own experiences regarding the content
Feedback (reflecting)	People gain feedback during the game and get feedback (and reflect) on their behaviour afterwards during the debriefing	People get feedback when asking questions
Challenge	The Puzzle Game included competition, and the	People are encourage to think actively
Control/Self-Regulation (learner centred)	People have the freedom to make their own choices during the serious Game	The content is presented; teacher centred
Goal Setting	People are encourage to work towards the provided goal, delivering a complete picture	At the start of the presentation the learning goals are stated
Guidance (Teacher as Facilitator)	Little guidance is given during the game, afterward a facilitator reflects on people's behaviour	The content is presented, thus little guidance is given, only questions are answered

In general both the Puzzle Game and the Core Value Presentation possess similar learning elements. The main difference between the Puzzle Game and the presentation is that during the Puzzle Game people actively play, while during the Core Value Presentation people mainly listen. Therefore, both learning methods are suitable to assess whether people's shown behaviour after playing a serious game, highlighting the need for a specific set of behaviours, might differ from people's shown behaviour after attending a presentation with the same content, and why.

3.3   Content and measurement

In this paragraph there will be discussed which behaviours are emphasized during this experiment, and how the measurement of these behaviours is constructed.

The behaviours used for this research are the behaviours underlying the Core Values of Accenture. The Core Values of Accenture are: "Client Value Creation", "One Global Network", "Respect for the Individual", "Best People", "Stewardship" and "Integrity. Accenture believes that these Core Values are the main driver of a high performing company. To make these Core Values less abstract; there was decided to operationalize the Core Values into measurable behaviours. This operationalization was based on Accenture's "Core Value Action Statements (statements about how to put these Core Values into action). Furthermore, during the operationalization, there was taken into account that behaviours as emphasized during the learning methods could be observed in the simulated environment. The complete operationalization can be found in appendix I. The operationalized definition of each Core Value can be found below:

(1) One Global Network: Cross-team collaboration to deliver exceptional service to the client
(2) Client Value Creation: Approach the client and validate his needs
(3) Stewardship: Help each other, and stimulate others to engage
(4) Respect for the individual: Treat each other with respect
(5) Best People: Use people potential and allocated roles based on peoples capabilities
(6) Integrity: Be honest and take responsibility

Thus, based on whether people show these behaviours, as mentioned above, in the simulated environment after playing a serious game of a presentation, the main research question will be answered.

Regarding the measurement of these behaviours, an analysis is conducted focussing on how each variable could be measured most valid and reliable in the simulated environment. The best method to measure behaviour is by observation. Observations are the link between "laboratory research and "real world behaviour"(Altmann, 1974). There was found that behaviour underlying the Core Values of Client Value Creation, One Global Network and Stewardship could be observed. The behaviour underlying 'One Global network' could be observed by whether participants cooperated; the behaviour underlying 'Client Value Creation' could be observed by whether participants approached the in-game client (both the market and the shareholder) and the behaviour underlying stewardship could be observed by whether participants helped each other. The behaviours of cooperation and helping each other were observed by two external spectators who did not participate in the game. The number of behaviours were counted and moreover a total score was given according to whether the behaviours were shown never/incidental (0-1 time), occasionally (2-5 times) or constantly (more than 5 times). These methods are based on the observational sampling procedures of Altmann (1974). Observation forms can be found in appendix J. Both observers were instructed, and used the same code form as starting point for their observations (see appendix K). The number of times the participants approached the 'customer' was logged by the facilitators. For this observation special forms were developed (see appendix L) and the facilitators were also briefed.

Due to practical limitations (the number of observers was limited, and filming was not feasible), the behaviours related to 'Respect for the individual', 'Best People' and 'Integrity" could not be observed despite the fact that an attempt was made. Therefore there was decided to use the strength of the participants, and make people reflect on these behaviours themselves. Thus, reflection forms were

provided after the simulation to get insight how people experienced the behaviour of their group behaviour themselves. Furthermore, because of the opportunity to make people reflect on their behaviour, there was decided to make people reflect on all their behaviour (thus also the behaviours related to Client Value Creation, One global Network and Stewardship). This is to strengthen and validate the found evidence of these constructs. The questions of the reflection form were based on Accenture's own action statements. The reflection forms included 12 statements related to their shown behaviour (two statement per Core Value), and the participant were asked to fill in a 5-point response scale (1= "strongly disagree", 5= "strongly agree"). The reflection form can be found in appendix M.

3.4 Validity and reliability

In this paragraph there will be controlled for variables that could bias the results of this experiment; this to strengthen the validity and reliability of this research.

This research is constructed in such a way that the people's shown behaviour after playing a serious game can be compared with people's shown behaviour after attending a presentation with the same content. However, to ensure that such a causal conclusion can be drawn, there must be controlled for the factors that could bias the results. Because human behaviour is the scope of this reserach; there must be controlled for all other factors that could explain a possible difference in participants shown behaviour between the experimental and control group, except from the influence of the serious game or presentation. To identify the variables that could influence human behaviour, there is again looked at the model of Fishbein and Ajzen (2011), as addressed in the theoretical section, that explains the determinants of human behaviour (see figure 7)
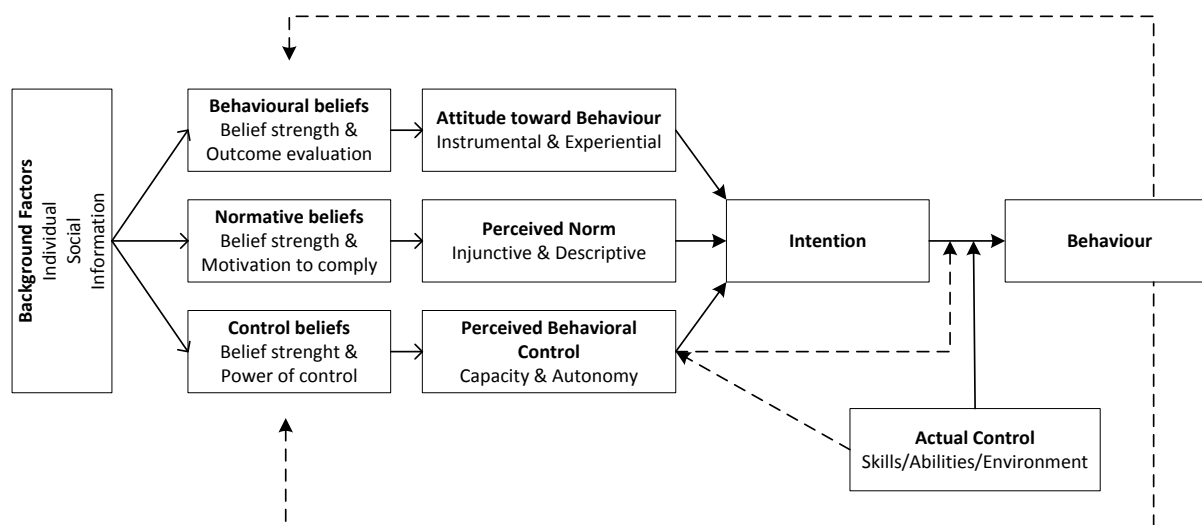
Figure 7: Determinants Behaviour (Fishbein and Ajzen (2011)

Human behaviour is, as shown in figure 7, mainly determined by intention and actual control. Intentions are driven by one's behavioural, normative and control believes, which originate from one's background factors. Actual control mainly enhances the skills and possibilities to show certain behaviour. Thus to ensure comparability of the experimental and control group, groups must be made comparable on these variables, and there must be controlled for external factors that could influence these variables apart from the serious game and presentation.

To identify the possible third variables that could threaten the validity of this experiment, the model of Fishbein and Ajzen (2011) is applied to the setting of this experiment. When looking at the required

actual control to perform the behaviours related to the Core Values, it mainly comes to people's personality and social skills which can be reflected in the nature of the participants to approach customers, cooperate, help each other etc. Intention is as stated determined by behavioural, normative and control believes, which is mainly influenced by individual's (background) factors. So, there must be controlled for social demographic variables like experience, nationality, gender, education etc. to get a basic idea of the participant's background, experience, interests and intelligence. The assumption can however be made that the participants have at least to some degree a similar intention, since they all start working at Accenture. External factors of the environment will not play a role. The setting of all four experiment is similar, and the first day of the 'New Hire Days' takes place in a screened setting, thus interference of third variables is not likely. Only factors that could bias the results are observed in a simulated environment. The customer plays an important role in the simulation for example; therefore this extra stimulation could bias the results.

To control for third variables related to social demographics, social skills and personality, a survey was send to the 'New Hires' , in the name of HR, one week prior to their first day (the survey is included in appendix N). In this survey questions were included regarding participants 'social styles', 'personality traits' and general social demographics. The questions were derived from 'a social styles assessment tool' as used by Accenture, an article on social styles by Gosling, Rentfrow, and Swann (2003), and basic social demographic questions as included in (almost) all survey's.

Based on the outcomes of this survey, comparable sub-groups were created. In total 154 'new hires' took part in the experiment: 34 in the first month (serious game), 32 in the second month (presentation), 48 in the third month (serious game) and 40 in the fourth month. This makes 82 participants that played the serious game, and 72 that attended the presentation. The potential group of participants was in total 195 people, but 41 people were excluded from the experiments because they did not fill in the survey, or they threatened the comparability of the experimental and control group. Exclusion was done prior to the experiments by assigning these people to separate groups.

There was chosen for four experiments in total, instead of two, to strengthen the reliability of this experiment. According to Yin (2009) "having at least two cases should be your goal", and analytic conclusions independently arising from two cases, as with two experiments, will be more powerful than those coming from a single case. "If two or more cases are shown to support the same theory, replication may be claimed (Yin, 2009). Furthermore Yin (2009) claimed that a "fatal flaw in doing case studies is to conceive of statistical generalization as the method of generalizing the results"; "cases are not "sampling units" and should not be chosen for this reason". The mode of generalization is an analytic generalization, in which a previously developed theory is used as a template with which to compare the empirical results of the case study. "Each case must be carefully selected so that it either (a) predicts similar results (a literal replication) or (b) predicts contrasting results but for anticipatable reason".

In this case, the results of the experimental and control group will be compared, which means that contrasting results are expected for an anticipated reason. In table 7 the comparability of both groups is shown.

Table 7: Characteristics experimental and control group

	Serious Game	**Presentation**
General		
Number of participants (N)	82	72

Average Age (Years)	30,26	28,65
Average Work experience (Years)	4,34	3,48
Nationality		
Dutch Nationality (%)	72	69
Non-Dutch Nationality (%)	28	31
Education		
< Bachelor (%)	5	4
Bachelor (%)	28	26
Master and > (%)	67	69
Social Styles		
Assertiveness (1-3 score)	2,07	2,15
Responsiveness (1-3 score)	2,05	1,99
Personality Traits		
Extraverted (1-3 score)	2,26	2,21
Agreeableness (1-3 score)	1,99	2,13
Consciousness (1-3 score)	2,60	2,67
Emotional Stability (1-3 score)	2,48	2,53
Openness to new experiences(1-3 score)	2,61	2,60

A complete and more extensive elaboration on the variables can be found in appendix O. When looking at the outcomes of table 7, comparability can be assumed regarding age, work experience, nationality, education and also regarding education and workforce (see appendix O). Furthermore people's social styles and personality traits were analyzed. People were, for the purpose of groups assignment, mapped on a three point skills, based on whether the possessed the variable: (1) little, (2) average or (3) a lot. In general these variables also show a comparable pattern, therefore comparability of both the experimental and control group can be assumed.

3.5 Analysis

In this paragraph there will be elaborated on how the data will be processed and analyzed in the result section

Behaviour was observed for four consecutive months: twice after a serious game and twice after a presentation. Each month data is gathered by observation and by reflection of participants on their behaviour. Because people operated as groups in the observational setting, there was decided that all data will be processed on group level. Thus not only the observational data, but also the individual reflection forms will be transformed to group level (the average score will be calculated for each group).

In the result section, the results will be processed per Core Value. During the analyses the average scores of all groups that played a serious game will be compared with the average scores of the group that attended a presentation. Conclusions will be made whether people's shown behaviour after playing a serious game differs from people's shown behaviour after attending a presentation with the same content.

The data will be analyzed following the guidelines of Bock, Velleman, and Veaux (2010). According to Bock et al. (2010) the gathered data can be categorized as "Independent two Sample Problem with no equal variance". This data can best be analyzed using an Independent Samples T-Test. This test can be conducted when the following assumption is met:

- (Assumed) randomization: Comparable groups
- Independent participants: Participants of treatment and control group must be independent from each other
- Independent groups: Sub-Groups of the treatments and control group must be independent from each other
- Nearly normal condition: Data is normally distributed

Several assumptions are already met. Firstly randomization is assumed; this is due to the fact that there is controlled for variances between the treatment and control group based on the conducted survey. Secondly the independent assumption is met. Due to the fact that the experiments are conducted in consecutive months, interaction would not be likely between participants of the experimental and control group. Lastly, it depends per variable whether or not the nearly normal condition is met. To test whether the data is normally distributed; a Kolmogorov-Smirnoff test is conducted for each measure (see appendix Q). Without a normal distribution of the data, the Wilcoxon Rank Sum Test will be completed. For each statistical test the following starting point is taken:

- *H_0 = people's shown behaviour after playing a serious game does not differ from the people's shown behaviour after attending a presentation with the same content. Thus $\mu_{Serious\ Game} - \mu_{Presentation} = 0$.*
- *H_A = people's shown behaviour after playing a serious game does differ from people's shown behaviour after attending a presentation with the same content. Thus $\mu_{Serious\ Game} - \mu_{Presentation} \neq 0$.*
- *$\alpha = 0,10$*

An alpha of 0,10, was chosen due to the explorative nature of the research question. An alpha of 0,10 is statistically convincing and leaves more room than an alpha of 0,05 or 0,01 to recognize all interesting results. When the significance (α) of the conducted test is below a p-value 0,10, it means that the 0 hypothesis is rejected and that there is a significance difference in the observed behaviour between the experimental and the control group. A p-value above 0,10 means that there is no significant difference. Furthermore, to not solely rely on the measures, also a more general descriptive impression is given of what was observed per value.

Furthermore, in order to create extra context and validation for the outcomes, also several interviews were conducted with serious gaming and/or learning and behaviour experts. These interviews had as a purpose to create extra context for the experiment and strengthen the results. The minutes of the interviews will be not be coded; only a summary of the findings will be presented.

3.6 Summary and conclusion

In this paragraph all elements from this chapter are combined and a link is made to the results section.

To answer the research question, an experiment is established in which people's behaviour is observed after playing a serious game or presentation with similar content. The experiment was conducted for four consecutive months; using a comparable experimental and control group. Participants' behaviour was observed in a simulated environment a three hours after playing a serious game of presentation. Measurements were done on six measurements constructs.

In general the serious game and presentation used for this experiment included similar content and learning elements. The construct of both learning methods however differs structurally; during the Puzzle Game people played, while during the presentation people are mainly observers. Therefore, both learning methods are suitable to assess whether people's shown behaviour after playing a serious game, highlighting the need for a specific set of behaviours, differs from people's shown ehaviour after attending a presentation with the same content, and why.

The behaviours used for this experiment are related to the Core Values of Accenture; One Global Network, Client Value Creation, Stewardship, Respect for the individual, Best People and Integrity. During the presentation the six measurement constructs were addressed in a structured way; for each variable first interaction is created with the audience, secondly the content is presented, and thirdly examples are provided. During the Puzzle Game, the measurement constructs were embedded more in the game; therefore differences existed regarding the importance of each measurement construct. Most profound behaviour during the Puzzle Game are behaviours related to cooperation and gaining understanding the client need; these behaviours are essential to end the game. Other important variables are related to in-group cooperation, like using the ideas of the group, and taking responsibility. Elements like integrity and respect were basic values while playing the game, but were less essential elements of the Puzzle Game.

Using these construct, there will be analysed whether peoples shown behaviour after playing a serious game, highlighting the need for a specific set of behaviours, differs from people's shown behaviour after attending a presentation with the same content, and why. Furthermore, among variables, differences can be analysed regarding the impact of both learning methods. However first, in the next paragraph, the results of the experiment are presented.

4   Results Experiment

In this chapter the results of this experiment will be presented and a descriptive analysis will be conducted per variable. Explanatory explanations will be given in the analysis section.

The participants were observed on group level after 82 participants played the Puzzle Game, and 72 participants attended the Core Value Presentation. Measurement took place on group level (14 groups played the serious game, and 12 groups attended the presentation) and the data was gathered by external observers, in-game observers and by making people reflect on their own behaviour. The descriptive data of these measurements, both the mean and standard deviation (SD) can be found in appendix P.

The data will be, as discussed in the method section, analyzed using an Independent Samples T-test or Wilcoxon Rank Sum Test. When normality is assumed, the Independent Samples T-Test will be conducted. When Normality is not assumed the Wilcoxon Rank Sum Test will be conducted. To determine the normality of the data a 'Kolmogorov-Smirnov' test of normality' is conducted for each variable (see appendix Q). The results of the conducted test will be discussed below. Furthermore per variable also a general impression will be given of what was observed

4.1   One Global Network

Firstly, the results related to One Global Network are examined; whether people cooperated after playing a serious game or attending a presentation. The data was gathered by external observers, marking whether people cooperated, and by making people reflect on their own behaviour. The observational data is not normally distributed; therefore the Wilcoxon Ranks Sum Test is conducted. The reflective data is normally distributed for both variables; as a result the Independent Samples T-Test is conducted. The results of the statistical tests are shown in table 8.

Table 8: Statistical Tests One Global Network

	Significance (P-value)
Observations	
Cooperation Among Teams	,001*
Reflection	
Cooperation Among Teams	,001*
Knowledge Exchange Teams	,26

* $p < .10$

When looking at the observed cooperation, 0,001 (p) < 0,10 (α), the null hypothesis is rejected. There is a significant difference in observed cooperating behaviour; people that played the serious game cooperated more than the people that attended the presentation. When looking at the 'reflected cooperation' the null hypothesis is also rejected (0,001 (p) < 0,10(α)); thus a significant difference in cooperating behaviour exists between the experimental and control group. Because 0,26 (p) > 0,10 (α), the null-hypothesis is not rejected for the knowledge exchange. No significance exists between the experimental and control group when looking at the experienced knowledge exchange. Thus in general the participants showed more cooperating behaviour after playing the Puzzle Game then after a Core Value Presentation. This happened mainly by exchanging resources.

The general impression of people's shown behaviour during the four observations is in line with the measures. During the two months that the Puzzle Game was played, it was observed that a lot of

dynamic interaction occurred among the sub-groups. Some sub-groups almost cooperated as one big team; constantly sharing knowledge and resources. In both months that a presentation was given, almost no cooperation was observed and all teams were really internally focused.

4.2 Client Value Creation:

Secondly, the results related to Client Value Creation are discussed; whether participants were client focused after playing a serious game or attending a presentation. The data was gathered by in-game observations, marking whether the' market 'and 'shareholder' were approached and by making people reflect on their own behaviour. For the observations of the market, normality is assumed and an Independent Samples T-Test is conducted. Regarding the shareholder approaches, normality cannot be assumed, so a Wilcoxon Ranks Sum Test will be conducted. When looking at the reflective data of Client Value Orientation, the Kolmogorov-Smirnov test indicates normal distributions for all measures, so the reflective data is analyzed using an Independent Samples T-Test. The results of the statistical tests are shown in table 9.

Table 9: Statistical Tests Client Value Creation

	Significance (P-value)
Observations	
Market Approaches	,514
Shareholder Approaches	,94
Reflection	
Idea Market Need	,500
Involved Shareholder	,801

When looking at the observed market approaches, 0,514 $(p) > 0,10$ (a), the null-hypothesis is not rejected. No difference exists between market behaviour between the experimental and control group. On the contrary, the score of the shareholder approaches indicates (0,094 $(p) > 0,10$ (a)) that significant differences exist between the observed experimental and control group. Though this score is not convincing when the skewedness of the data is taken into account. The reflected data shows a similar pattern because 0,5 $(p) > 0,10$ (a) and 0,801 $(p) > 0,10$ (a). The null-hypotheses is not rejected for both measures and no significant differences are found between the experimental and control group regarding market understanding and the involvement of the shareholder. Both groups experienced a similar focus on the client. The reflection of the participants indicates that people that played the serious game experience a similar focus on the client as the people that attended the presentation. Furthermore, based on the observational and reflective data, there could be argued there is no convincing difference between the experimental and the control regarding their observed client orientation.

The general impression during the observations was that that the participants were really client oriented during all four months. The market was approached often and many questions were asked to understand the market need. Moreover, participants were constantly looking for extra market information, for example by looking at the work of their competitors.

4.3 Stewardship

Thirdly, the results related to Stewardship are discussed; the degree in which the participants helped and stimulated each other. The data was gathered by external observers, marking whether people helped each other, and by making people reflect on their own behaviour. Regarding the observation data a non-normal distribution is assumed; therefore the Wilcoxon Ranks Sum Test will be conducted. When looking at the reflective data of Stewardship, normality is assumed for the variable of being pro-active (pro-actively sharing ideas); therefore an Independent Samples T-Test will be conducted. Regarding participants reflection on their helping behaviour, normality is not assumed. As a result for this variable a Wilcoxon Ranks Sum Test will be conducted. The results of the statistical tests are shown in table 10.

Table 10: Statistical Tests Stewardship

	Significance (P-value)
Observations	
Help Team Members	,861
Reflection	
Pro-Actively Sharing Ideas	,442
Help Team Members	,498

When looking at the observed helping behaviour towards teammates, $0,861 > 0,10$, the null-hypothesis is not rejected; no significant differences are found between the experimental and the control group. Both the people that played a serious game and attended a presentation showed a lot of helping behaviour in the observational setting. The reflective data shows a similar pattern. Due to the fact that $0,442$ (*p*) $> 0,10$ (*a*) and $0,498$ (*p*) $> 0,10$ (*a*), the null-hypothesis is not rejected for either measures. No significant differences are found between the experimental and control group regarding pro-activity in sharing ideas or helping teammates. The reflection of the participants indicates that people that played the serious game experience a similar focus on helping and stimulating each other as the people that attended the presentation.

The general impression during the observations was similar to the results. People were really helpful towards each other in these four months. It was observed that there were always people willing to provide help when this was asked. The intensity of each role really varies during the game and there was observed that team members helped each other when they noticed that a team member could use assistance. This reflects in both the results of the observations as in the reflections of the team members themselves.

4.4 Respect for the Individual

Fourthly, the results related to 'Respect for the Individual' are discussed; the degree to which the people treat each other with respect. The data was gathered by making people reflect on their own behaviour. For both measures normality can be assumed; therefore twice an Independent Samples T-Tests was conducted. The results of both tests are shown in table 11.

Table 11: Statistical Test Respect for the Individual

	Significance (P-value)
Reflection	
Feel Free To State Opinion	,089*
Feel Trusted in Role	,226

* $p < .10$

Because 0,226 (p) > 0,10 (a), the null-hypothesis is not rejected for the degree 'people feel trusted in their role'. No significance exists between the experimental and control group. Regarding the degree 'feel free to state their opinion', the null hypothesis is rejected (0,089 (p) < 0,10(a)). The reflection of the participants indicates that people who played a serious game felt a higher degree of freedom to state their opinion than the people that attended a presentation.

The general impression during the observations was that people were really respectful towards each other in both the experimental and the control group. No disrespectful behaviour was observed in these 4 months. However, difference was observed between the experimental and control group regarding their approach. In the control group it was observed that some people wanted to make all the decisions, and sometimes forgot to involve other team members. This resulted sometimes in disengagement of team members because they did not feel recognized. The measures also showed that people who attended the presentation felt that they had fewer opportunities to express their opinion than the people who played a serious game.

4.5   Best People

Moreover, the results related to Best People are examined; whether people are aware of the importance of using and leveraging people's individual qualities. The data was gathered by making people reflect on their own behaviour. Normality can be assumed for both measures; therefore Independent Samples T-Tests were conducted. The results of both statistical tests are shown in table 12.

Table 12: Statistical Tests Best People

	Significance (P-value)
Reflection	
Have The Role That Fit Best	,984
Team Listens To Me	,009*

* $p < .10$

Because 0,894 (p) > 0,10 (a), the null-hypothesis is not rejected for the degree 'people have the role that fit them best'. No significance exists between the experimental and control group. When looking at the degree people feel listened to, the null hypothesis is rejected (0,009 (p) < 0,10(a)); thus significant difference exists between the experimental and the control group. The reflection of the participants indicates that people who played a serious game felt more listened to than the people that attended a presentation.

The general impression during these four months was that people really tried to operate their teams in the best way possible, respecting each role. However, as mentioned earlier, some people in the control group forgot the importance of involving the team, and wanted to make all the decisions by themselves. Therefore it was observed that in some groups not all people were involved, causing a loss of potential.

4.6 Integrity

Lastly, the results related to Integrity are discussed; whether people were honest and open and took responsibility when it was asked. The data was gathered by making people reflect on their own behaviour. When looking at the reflective data on whether people were honest and open, normality cannot be assumed; therefore a Wilcoxon Ranks Sum Test will be conducted. Normality can be assumed for the degree people took their responsibility; therefore for this variable an Independent Samples T-Test will be conducted. The results of both statistical tests are shown in table 13.

Table 13: Statistical Tests Integrity

	Significance (P-value)
Reflection	
Honesty and Openness	,208
Everyone took their responsibility	,076*

* $p < .10$

Because 0,208 (p) > 0,10 (a), the null-hypothesis is not rejected regarding people's honesty and openness. No significance exists between the experimental and the control group. Regarding the degree indicating whether people took their responsibility or not, the null hypothesis is rejected (0,076 (p) < 0,10(a)). So, significant difference exists between the experimental and the control group. The reflection of the participants indicates that people that played a serious game took more responsibility than the people who attended a presentation.

The general impression during all four months was that there was a high degree of integrity. In both the experimental and control group the participants were really open and honest towards each other. It must be mentioned that an individual was caught eavesdropping in both the experimental and control group, but this was one incidental, so it did not have an impact on the very open and respectful atmosphere that was experienced.

4.7   Summary and conclusion

The results state that people who played a serious game showed more cooperating behaviour, felt significant more free to state their opinion, felt more listened to and had the idea that all members took their responsibility. The variables that indicate a difference are all essential elements of the Puzzle Game. It was observed that during the Puzzle Game people often struggled to cooperate with other teams but also within teams.

No differences were observed in helping behaviour, the respect towards each other, people's role satisfaction, the degree people felt trusted in their role, honesty and openness, and the focus on the client. The variables that show no difference between the experimental and the control group are deeper values (like respect integrity) or less prominent values (help was not an essential element during the Puzzle Game, since the teams were relatively large). Remarkable was that no difference in client focussed behaviour was observed, since this is an essential element in the Puzzle Game. Though, this variable was biased by the observational setting.

The results will be further explained in chapter 6. In the next chapter the results of the expert interviews will be discussed to create extra context and validation for the conducted experiment.

5 Results expert interviews

In this paragraph an overview will be given of the outcomes of the interviews with six serious gaming and/or learning and behaviour experts. The interviews were conducted to create extra context and strengthen the validity of the conducted experiment. The outcomes of the interviews will be discussed descriptive way, while in the next paragraph a more explanatory analysis will be conducted.

In total six experts were interviewed: 'Expert 1' is a researcher within TNO who focusses primarily on serious games, 'expert 2' is a professor and co-founder of the Netherlands Simulation and Gaming Association, 'expert 3' is program manager of E-Learning at the Medical Centre of the Erasmus University and is conducting a PHD research on the effectiveness of a specific serious game. Expert 4 is a senior Manager within Accenture and an expert on learning & collaboration, expert 5 is owner of a serious gaming company, and was involved in the development of more than 400 serious games and expert 6 is a senior manager within Accenture and a professor on the topic of serious gaming. In general four main topics were discussed: (1) the general elements of a learning method that creates a learning effect, (2) the elements of learning methods that create a learning effect, (3) the learning effect of a serious game compared to the learning effect of a presentation, (4) the contribution of new research to literature.

First the elements that enhance learning effectiveness in a learning method are discussed. The goal of this topic is to validate the elements that are distilled from the classical learning theories and to get a better understanding of the most important learning elements.

In general the most experts mentioned similar elements, although they all had slightly different viewpoints. For example expert 3 mentioned that the learning method itself is just a 'shell'. It is important to look at the elements that can be included in a learning method because these elements determine the effectiveness of your research method. Elements in a learning method that enhance a learning effect are elements like: Clear learning goals, assessment, active learning/being in control, feedback, a link with the audience, challenge and context. All the other learning experts also mentioned these elements. Expert 1 also emphasized the importance of emotional involvement of the audience. Expert 4 additionally mentioned that 4 elements are important in an effective learning method: Engagement/Involvement (people understand why something is important), Reflection (people gain feedback), Applicability (people can work actively with the given information), and a link with a real-life situation (all elements that focus on the link between the learning method and the audience). Expert 2,5 and 6 also mentioned these elements and elaborated on how to create this link with the audience. Expert 5 stated that the most effective method to make people learn is to trigger the people to search for an answer themselves. Important factors to realize this are problem driven learning, learning by doing, a clear link to the real world, context, personalization, and stepwise learning. Expert 6 also mentioned that learning by doing, creating engagement and creating a representation of the reality are the most important factors in a learning method.

Secondly, how a serious game can enhance this positive learning effect is discussed. The goal of this topic is to validate the elements as derived from serious gaming literature and to understand the possibilities of serious games.

In general the answers of the experts were focused on how the aforementioned elements could be included in a serious game. All experts though, acknowledged that a serious game is potentially a really effective learning method. Expert 5 even mentioned that a serious game can be 'potentially

more effective than real life', including all effective learning elements. According to expert 5 a serious game is so effective because it makes use of special characteristics of the brain; a brain cannot distinguish reality-based emotions of reality from those in a simulated environment. By involving people into a serious game and making the brain believe something 'real' is happening, one can bring fiction to reality, gaining real life experiences in a controlled simulated environment. Expert 4 also mentioned the strength of simulating the reality. However, it is important that a serious game creates a valid representation of the reality, a save environment to learn and a feedback mechanism at the same time. All these elements were also mentioned by expert 2 and 6. Both experts for example stated that the strength of serious game is that people can experience the consequences of their choices in a safe environment, a 'memory of the future'. According to expert 2 there must be mentioned that differences in effectiveness exist per content, environment and design of serious games. What makes a serious game so effective though, according to expert 6, is the fact that during a serious game people experience the content with all senses; touch, smell , listening etc. Furthermore, according to expert 6, there is something evolutionary in the nature of humans that likes playing (look for example at how young animals learn the capabilities of their body by playing). Apart from the more overarching differences between a serious game and a presentation, also the importance of more specific learning elements were emphasized by the experts. Expert 1 for example, is currently working on an evaluation framework of serious games. Important design elements in this framework are the game world, action language, human interaction, rules & goals, control and feedback. Furthermore the model makes a distinction between the small game and the big game; the small game is the game itself, while the big game also includes elements like a clear goal setting prior and a debriefing afterwards. It is a common belief that especially the 'big game' enhances a positive learning effect. The elements were also mentioned by the other experts. Furthermore, what hat makes a serious game effective, according to expert 3, is the cooperating element of a serious game which enhances engagement and fun.

Thirdly, how both a serious game and a presentation might differ regarding their impact on behaviour is discussed with the experts. The outcomes of the interviews can be used as extra context for the results of the conducted experiment.

In general the experts mention it is difficult to generalize, because the quality of a serious game and presentation mainly depends upon on the learning elements that are included. According to expert 2, also speakers (See the TEDx event) and a book can be engaging and can include effective learning elements. However, when looking at behaviour, experts 1, 4,5 and 6 explicitly mentioned that they believe that a serious game has more potential to have an impact. According to expert 6, comparing a serious game with a presentation is comparing the learning effect of 'doing' with learning effect of listing, where 'doing' will always be the more effective learning method. During a serious game people create their story and their own thoughts which enhance learning, while during a presentation people are spectators of someone else's story. Expert 5 believes that the difference in potential can be explained by the format in which the content is presented. During a serious game the specific set of behaviour is already experienced, while during a presentation the specific set of behaviour is only theoretical explained. Since the excepted learning outcome is also behaviour, there could be argued that the 'gap' between the learning format and the expected learning outcomes is smaller for a serious game than for a presentation. Expert 2 and 3 are more restrained regarding the effectiveness of serious games compared to a presentation; they believe more in the strength of the elements that are included in a learning method. Though these experts also mentioned that a serious game can have advantageous elements like a high engagement level (which is often a problem in for example today's classroom setting), a story line, scores and context. The experts furthermore also mentioned situations in which a presentation would be more beneficial. According to expert 4, a learning method must fit its purpose.

For developing skills and capabilities a serious game is more effective than a presentation, because these learning outcomes are related to behaviour (and can be experienced during a serious game). For the development of pure knowledge, a presentation might be a better learning method. It might be that when looking at knowledge a serious game is still more effective than a presentation, but a presentation might be more appropriate when looking at the costs and effort to transfer the message. Expert 6 also mentioned that a presentation might be more effective to deliver certain content in less time (for example a lot of information). However, when looking at the learning effect, experiencing will be always more effective than listening, because it creates a deeper learning effect.

Lastly, what is already known about serious gaming and behaviour in literature and how this research contributes to literature is also discussed with the experts.

In general all experts believe that more evidence is needed, about the effects of serious gaming. Expert 3 for example mentioned that some evidence is available that shows that a game is more effective than no-game. Though, there is lack of structural evidence regarding the effectiveness of a serious game compared to a book, e-learning or a presentation for example. The expert however did mentioned interesting related evidence on serious gaming. Expert 5 for example mentioned that neuroscience research shows that during an active learning session exponentially more brain activity is observed than during a passive learning session, providing evidence for serious games. Furthermore, expert 2,5 and 6 mentioned that most evidence is available on time-on-task and skills training (for example flight simulators), creating a virtual representation of a real-life situation, and giving people the opportunity to exercise this task repeatedly in a safe environment. Lastly, expert 1 stated that although there is still relatively little known when looking at the outcomes and the design of serious games, more research is however in progress. This means that is a matter of time before more evidence is available about this specific scope.

6 Explanatory analysis

In the analysis section the results of the experiment are discussed using information from the literature and from the interviews with the serious gaming experts. Based on this paragraph, conclusions can be made whether and why people's shown behaviour after playing a serious game, highlighting the need for a specific set of behaviours, differs from people's shown behaviour after attending a presentation with the same content .

In general, the results of the conducted experiment indicated that people showed more highlighted behaviour after playing a serious game than after attending a presentation. The results indicate that people that played a serious game showed more cooperating behaviour, felt significant more free to state their opinion, felt more listened to, and had the idea that all members took their responsibility; measures all related to essential elements of the Puzzle Game. The results of this experiment will be discussed below based on the theory section and the expert interviews.

First of all, the results indicated that a serious game is a more effective learning method than a presentation when it comes to making people show certain behaviour. As mentioned by expert 5, during a serious game people already experience the highlighted content gaining a practical understanding of the expected behaviour, while after a presentation people only have a theoretical understanding. During a serious game, as indicated by Wilson et al. (2008), Garris et al. (2002) and Thompson et al. (2010), people are self-in control an can regulate their own actions and learning process. This in line with the humanistic approach and the theory of D. A. Kolb (1984) . During a presentation trainees are more bound by the structure of the presenter; which is more in line with the cognitivist theory of Gagné (1965). Comparing a serious game with a presentation is like comparing the learning effect of doing with the learning effect of listening, where people find it easier to learn behaviour from an active learning method than from a passive learning method, as mentioned by expert 5. This results are strengthened by the behavioral theory as shown by Fishbein and Ajzen (2011), indicating that past behaviour has an impact on future intentions of people to show certain behaviour. Thus, the behaviour experience while playing a serious game already helps to frame future behaviour while after a presentation this effect is less profound.

Building further upon the first argument, the results indicate that in general a serious game is more engaging than a presentation. Both the Core Value Game and Presentation included similar learning elements (as the learning elements of a serious game and presentation were mapped on classical learning literature from from Bandura (1977), Gagné (1965), D. A. Kolb (1984) and Vygotskiǐ (1978)), though only during a serious game the learning elements are embedded, which enhance engagement of people in the flow of the learning method/serious game, both mentally and emotionally (Gunter et al., 2007). , As explained by expert 6, during a serious game people experience the content with several senses (touch, smell, listening), while during a presentation engagement must stimulated mainly by the presenter. During a serious game people create their own story, while during a presentation people are spectators of someone else's story. There must however be mentioned that effectiveness of all learning methods is mainly determined by its included learning elements. This makes it in general difficult to generalize about the level of engagement of all serious games and presentations (as mentioned by expert 2, a motivational speaker at TEDx might be also really engaging).

Thirdly, the results indicate that especially failure is an important factor in a serious game. As mentioned by expert 6, during a serious game people really experience the consequences of their own choices. During a presentation, failure is a less profound learning element, often only experienced

when the presenter asks questions to the audience). The results show that the more people experienced failure during the serious game, the larger the difference becomes in observed behaviour (compared to the people that attended a presentation). During the puzzle game people failed to cooperate, failed to work as a team and acted as individuals. Though, there was observed that in the observational setting the people showed more cooperating behaviour, felt significant more free to state their opinion, felt more listened to and took more their responsibility than the people that attended a presentation. On the contrary, no significant difference in behaviour was found when looking at the variables that were less profound during the Puzzle Game, like respectful and integer behaviour. These results can be explained by the 'valley of despair' as shown by Wenzler and Chartier (1999)), indicating that in order to learn, people must first experience a setback. When looking at the learning cycle of a serious game, as stated by Garris et al. (2002), there could furthermore be argued that the debriefing plays a really important role during a serious game.

Fourthly, building upon the third argument, the results indicate that learning elements like competition, goal setting and feedback are important elements in a serious game (as mentioned by expert). These elements are, as derived from e.g. (Wilson et al., 2008), factors that enhance and create the feeling of failure. As mentioned by expert 6 and 2, people mainly experience failure when they're engaged and challenged to reach certain goals, were challenge adds fun and competition by creating barriers between current state and goal state (Wilson et al., 2008). Feedback provides a tool for users to learn from previous actions and adjust accordingly ((Wilson et al., 2008). As shown in the 'cycle' of D. A. Kolb (1984), feedback provides reflection and helps people to conceptualize.

Last but not least, the results indicate that elements like fun, interaction and a shared responsibility play an important rule during a serious game. During the serious game it was observed that people were really motivated to participate, while during the presentation often interaction was forced. Furthermore, as mentioned by expert 6, humans are social animals, and there is something evolutionary in the nature of humans which likes playing; look for example at how young animals learn explore the possibilities of their body. Expert 3 furthermore mentioned that interaction and cooperation makes serious gaming fun, which is also an essential element. This is in line with the theories of e.g. Wilson et al. (2008) and Greitzer et al. (2007).

7 Conclusions and recommendations

This chapter elaborates on the conclusions, managerial implications, scientific implications, limitations and future research recommendations of this research.

7.1 Conclusions

In this paragraph the main conclusions of this research are stated.

The main purpose of this research was to assess whether people's shown behaviour after playing a serious game, highlighting the need for a specific set of behaviours, differs from people's shown behaviour after attending a presentation with the same content, and why.

In general the results indicate that people's shown behaviour does differ after playing a serious game or attending a presentation. The results indicate that people that played a serious game showed more cooperating behaviour, felt significant more free to state their opinion, felt more listened to and had the idea that all members took their responsibility. Based on these results and the validation of the expert interviews, several conclusions can be drawn that explain why a difference is observed in shown behaviour between the experimental and control group.

Firstly, a serious game is more effective than a presentation when it comes to making people show a specific set of behaviours. During a serious game people gain experience with the expected behaviour, while during a presentation people gain only a theoretical understanding.

Secondly, a serious game is more engaging than a presentation. During a serious game people are in control of their own learning experience, creating their own thoughts, while during a presentation people are mainly absorbing information.

Thirdly, failure is an important learning element in a serious game. During a serious game people can experience the consequences of their own choices. During a presentation, failure is a less profound learning element (often only experienced when the presenter asks questions to the audience).

Fourthly, also learning elements like goals setting, feedback and challenge are important aspect of a serious game, since these are the learning elements that drive failure.

Fifthly, the debriefing is an essential aspect of a serious game. Most of the learning happens when people reflect on their in-game experiences, which mainly happens during the debriefing.

Finally, a serious game is more fun than a presentation. People are social animals, and interaction and cooperation enhance (in general) the fun factor of a learning method.

Furthermore, it is difficult to make generalizations about all serious games and presentations, since the effectiveness of each learning method depends upon the learning elements that are included. However, since a serious game and presentation were compared which both include similar learning elements; this research is a good indication of the extent to which the impact of both learning methods differs.

7.2   Contribution to literature

In this chapter there is elaborated on the contribution of this research to literature.

Firstly, this research contributes to a more holistic understanding on the topic of serious gaming. Although the community of   serious gaming is growing rapidly, the current academic foundation is still quit broad. In this research both a comprehensive literature research was conducted, using four different searching methods, identifying the relevant serious gaming literature. Also, the viewpoints of several serious gaming experts were included in this research. This provides a comprehensive picture of what is currently known about serious gaming.

Secondly, the results of this research contribute to the serious gaming literature. Gunter et al. (2007) already mentioned that "little empirical evidence exists that demonstrates games providing any more positive systematic outcomes for content learning than traditional teaching methods".   The article of Connolly et al. (2012) shows that some evidence on serious gaming is available, but that more evidence is needed regarding the learning outcomes. The conducted experiment compared a serious Game with a presentation, providing more evidence on the 'academic gap' as defined by Gunter et al. (2007).

Thirdly, the effectiveness of a more humanistic approach is explored. In the conducted experiment, a learning method, similar to the humanistic approach of D. A. Kolb (1984), is compared with a learning method similar to the more cognitive approach of Gagné (1965). Furthermore, how these differences in learning approach also result in different behavioural outcomes was also examined.

At last, a framework is constructed that can be used to compare both a serious game and presentation on similar learning elements. These learning were distilled from classical literature of Gagné (1965), Vygotskiĭ (1978), Bandura (1977) and D. A. Kolb (1984).

7.3   Managerial implications

In this chapter the managerial implications for the business environment are discussed.

Despite the fact that the number of serious gaming initiatives is growing in the educational, healthcare and consulting sector, there is still experienced that: (1)Potential clients are sceptical about the effectiveness of serious games and (2) serious gaming practitioners have difficulties in telling a convincing story about the effectiveness of serious games, due to the lack of academic evidence. The problems faced by practitioners are therefore mainly related to theoretical problems. Using these problems as a starting point, two main categories of implications are identified. These are presented below:

Firstly, the results of this research can be used for marketing purposes. Especially within Accenture, there is experienced that many potential clients are skeptical about the effectiveness of serious games, since there still is little known about this topic in general. This research provides positive evidence on the impact that a serious game has on people's shown behaviour, compared to a presentation. Within the business environment, a change in behaviour is the goal of many training sessions, while presentations are traditionally used to transfer the content. Therefore, the evidence of this research can be used to tell a convincing story about the potential of serious gaming.

Secondly, the results can be used to design more effective learning methods. As expert 4 mentioned, too often learning methods are designed from the perspective of the presenter, focusing on how to include as much information as possible in minimum time instead of taking the perspective of

the audience, focusing on how to effectively transfer this information. An effective learning method however depends on the learning elements included. The results of this research indicated that learning elements like failure, interaction, goal setting and feedback are important factors enhancing the learning effect of a learning method (when looking at behaviour). Therefore it is recommended to use these elements as a starting point when designing a serious game or presentation.

7.4 Limitations

In this paragraph the limitations of this research are discussed.

The first limitation of this research is the fact that the experimental and control group are not randomized, threatening the internal validity of this research. To overcome this, comparable experimental and control groups were created based on social demographics, (variables like nationality, education, age etc.), personality traits and social styles. Moreover, the observation setting was identical for all months that the research was conducted and all participants were motivated since they all just started working at their new job. Randomization would however still be the most preferred method, because by randomization there can be controlled theoretically for all possible intervening results that could bias the outcomes (Babbie, 2007).

The second limitation of this research is the fact that the impact of a serous game and a presentation on behaviour was observed in a simulated environment. This might threaten the external validity; whether the results can be generalized. It could be that people show different behaviour in a 'real-life situation'. There could however be argued that this did not had a significant impact on the outcomes since there was observed that participants took the simulated environment really seriously (which could be explained by the fact that it was their first day at their new job). The simulated environment also has some clear advantages. Firstly, behaviour can be observed in similar settings for each consecutive month. This enhances the comparability of the behavioural outcomes of the experimental and the control group. Secondly, since people where in an isolated environment, it was easier to control for intervening variables. It would however be interesting to conduct this experiment in a 'real life' environment to assess the reliability of the observations in a simulated environment.

A third limitation of this research is the relative small sample size (Participants N = 156, group N=26). The experiment was conducted twice for both the experimental and the control group; strengthened by the statement of Yin (2009) that when two or more cases are shown to support the same theory, replication may be claimed. It does however not exclude the influence of coincidence completely; therefore a larger sample could be considered for future research.

A fourth limitation of this research is the fact that the presentations and serious games were given by different persons; this might threaten the internal validity of the research. Though, there could also be argued that this did not have a significance impact on the results because both the serious game and the presentation were provided by experienced consultants from the Talent & Organization department of Accenture. Moreover, there could be argued that the fact that different people provided the serious game and the presentation strengthened the quality of the learning methods. Consultants specialized in serious games provided the Puzzle Game, and consultants specialized in presenting provided the Core Value Presentation. Furthermore, the facilitators all received similar instructions and no significance difference in quality was observed among the learning methods.

The fifth limitation of this research is the fact that the results were only measured several hours after the serious game/presentation. There could be argued that the results would have been strengthened by measures later in time. Expert 3 and 4 already mentioned that behaviour change takes time; and that it cannot be expected that structural behavioral change occurs after a single training

session. However, because the impact of the serious game and the presentation is measured just after both learning methods, one can judge the initial impact by the shown behaviour of the participants. To establish structural behavioral change, follow ups sessions must follow; conducting more training sessions.

7.5 Future research

In this paragraph, in addition to those already mentioned earlier, the implications for future research are discussed.

Only a cross method observation was conducted; comparing people's shown behaviour after playing a serious game with people's shown behaviour after attending a presentation. No measure was made regarding the degree to which people changed their behaviour after playing a serious game or attending a presentation. This was outside the scope of this research and was also practically impossible despite the fact that it would be an interesting topic for research. Still little evidence is available how much impact a serious game can have on people's behaviour.

It would be interesting to gain a better understanding on the learning effectiveness of each individual learning elements as (can be) included in a serious game (like goal setting, feedback etc.). In general, in serious gaming literature, still little is known about the importance of each element solely. It would for example be interesting to set up an experimental setting where it is possible to include and exclude sole elements; and consequently observe whether there are differences observed in the outcomes.

. In the research of Connolly et al. (2012) a comprehensive overview is already given regarding the learning outcomes of serious gaming. The outcomes of this literature review however indicate that not much is known regarding the learning impact on behaviour. Therefore it would be valuable to conduct additional research on the learning impact of serious gaming.

8 References

Abt, C. (1970). Serious Games. New York: Viking Press.

Ajzen, I. (1991). The Theory of planned Behavior. *Organizational Behavior and Human Decision Processes*(50), 179-211.

Altmann, J. (1974). Observational Study of Behaviour: Sampling Method. *Behaviour*, 227-267.

Babbie, E. (2007). *The Practice of Social Research*. Wadworth: Cengage Learning.

Bandura, A. (1971). *Social Learning Theory*. United States of America: General Learning Press.

Bandura, A. (1977). Self-Efficacy: Toward a Unifying Theory of Behavioral Change. *Psychological Review, 84*(2), 191-215.

Bandura, A. (2006). Toward a Psychology of Human Agency. *Perspectives on Psychological Science, 1*(2), 164-180. doi: 10.1111/j.1745-6916.2006.00011.x

Bartsch, R. A., & Cobern, K. M. (2003). Effectiveness of PowerPoint presentations in lectures. *Computers & Education, 41*(1), 77-86. doi: 10.1016/s0360-1315(03)00027-7

Beale, I. L., Kato, P. M., Marin-Bowling, V. M., Guthrie, N., & Cole, S. W. (2007). Improvement in cancer-related knowledge following use of a psychoeducational video game for adolescents and young adults with cancer. *J Adolesc Health, 41*(3), 263-270. doi: 10.1016/j.jadohealth.2007.04.006

Bock, D. E., Velleman, P. F., & Veaux, R. D. D. (2010). *Stats: Modeling the world*: Addison-Wesley.

Connolly, T. M., Boyle, E. A., MacArthur, E., Hainey, T., & Boyle, J. M. (2012). A systematic literature review of empirical evidence on computer games and serious games. *Computers & Education, 59*(2), 661-686. doi: 10.1016/j.compedu.2012.03.004

Crookall, D. (2011). Serious Games, Debriefing, and Simulation/Gaming as a Discipline. *Simulation & Gaming, 41*(6), 898-920. doi: 10.1177/1046878110390784

Dennen, V. P., & Burner, K. J. (2007). *Handbook of Research on Educational Communications and Technology*.

Driscoll, M. P., & Perkins, M. (2005). *Psychology of learning for instruction*. Boston: Pearson/Allyn and Bacon.

Fishbein, M., & Ajzen, I. (2011). *Predicting and Changing Behavior: The reasoned Action Approach*: Taylor&Francis.

Gagné, R. M. (1965). The Conditions of Learning.

Garris, R., Ahlers, R., & Driskell, J. E. (2002). Games, Motivation, and Learning: A Research and Practice Model. *Simulation & Gaming, 33*(4), 441-467. doi: 10.1177/1046878102238607

Glanz, K., Rimer, B. K., & Viswanath, K. (2008). *Health Behavior and Health Education: Theory, Research, and Practice*: John Wiley & Sons.

Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality, 37*(6), 504-528. doi: 10.1016/s0092-6566(03)00046-1

Grant, A. M., & Wall, T. D. (2009). The Neglected Science and Art of Quasi-Experimentation: Why-to, When-to, and How-to Advice for Organizational Researchers. *Organizational Research Methods, 12*(4), 653-686. doi: 10.1177/1094428108320737

Greitzer, F. L., Kuchar, O. A., & Huston, K. (2007). Cognitive science implications for enhancing training effectiveness in a serious gaming context. *Journal on Educational Resources in Computing, 7*(3), 2-es. doi: 10.1145/1281320.1281322

Gunter, G. A., Kenny, R. F., & Vick, E. H. (2007). Taking educational games seriously: using the RETAIN model to design endogenous fantasy into standalone educational games. *Educational Technology Research and Development, 56*(5-6), 511-537. doi: 10.1007/s11423-007-9073-2

Hogle, N. J., Widmann, W. D., Ude, A. O., Hardy, M. A., & Fowler, D. L. (2008). Does training novices to criteria and does rapid acquisition of skills on laparoscopic simulators have predictive validity or are we just playing video games? *J Surg Educ, 65*(6), 431-435. doi: 10.1016/j.jsurg.2008.05.008

Huizengal, J., Admiraall, W., Dam, G. T., & Akkerman, S. (2008). *Cognitive and affective effects of learning history by playing a mobile game.* Paper presented at the The 2nd European Conference on Games-Based Learning, Barcelona, Spain.

Järvelä, S. (1995). The Cognitive Apprenticeship Model in a Technologically Rich Learning Environment: Intepreting The Learning Interaction. *Learning and Intruction, 5*, 237-259.

Jouriles, E., McDonal, R., Kullowatz, A., Rossenfield, D., Gomez, G., & Cuevas, A. (2009). Can Virtual Reality Increase the Realism of Role Plays Used to Teach College Women Sexual Coercion and Rape-Resistance Skills? *Behaviour Therapy, 40*(4).

Kolb, A. Y., & Kolb, D. A. (2008). The Learning Way: Meta-cognitive Aspects of Experiential Learning. *Simulation & Gaming, 40*(3), 297-327. doi: 10.1177/1046878108325713

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development* (Vol. 1). Englewood Cliffs: NJ: Prentice-Hall.

Lavender, T. (2008). *Homeless it's no game – measuring the effectiveness of a persuasive videogame*. Paper presented at the Games for Change: 4 th Annual Festival., New York.

Mainemelis, C., Boyatzis, R. E., & Kolb, D. A. (2002). Learning Styles and Adaptive Flexibility: Testing Experiential Learning Theory. *Management Learning, 33*(1), 5-33. doi: 10.1177/1350507602331001

Miller, G. A., Galanter, E., & Pribram, K. H. (1960). *Plans and the Structure of Behavior*. The United States of America: Holt, Rinehart and Winston inc.

Noe, R. A. (1986). Trainees Attributes and Attitudes; Neglected Influences on Training Effectiveness. *The Academy of Management Review, 11*(4), 736-749.

Orvis, K., Horn, D., & Belanich, J. (2008). The Roles of Task Difficulty and Prior Videogame Experience on Performance and motivation in Intructional Videogames. *Computers in Human Behavour, 24*(52415-2433).

Pannese, L., & Carlesi, M. (2007). Games and learning come together to maximise effectiveness: The challenge of bridging the gap. *British Journal of Educational Technology, 38*(3), 438-454. doi: 10.1111/j.1467-8535.2007.00708.x

Papastergiou, M. (2009). Digital Game-Based Learning in high school Computer Science education: Impact on educational effectiveness and student motivation. *Computers & Education, 52*(1), 1-12. doi: 10.1016/j.compedu.2008.06.004

Randel, J. M., Morris, B. A., Wetzel, C. D., & Whitehill, B. V. (1993). The effectiveness of games for educational purposes. *Simulation & Gaming, 23*(3), 261-276.

Ricci, K. E., Salas, E., & Cannon-Bowers, J. A. (1996). Do Computer-based games facilitate knowledge acquisition and retention? *Military Psychology, 8*(4), 295-307.

Rosenstock, I. M., Strechter, V. J., & Becker, M. H. (1988). Social Learning THeory and the Health Belief Model. *Health Education Quarterly, 15*(2), 175-183.

Sandhu, S., & O. Afifi, T. (2012). Theories and Practical Steps for Delivering Effective Lectures. *Journal of Community Medicine & Health Education, 02*(06). doi: 10.4172/2161-0711.1000158

Savoy, A., Proctor, R. W., & Salvendy, G. (2009). Information retention from PowerPoint™ and traditional lectures. *Computers & Education, 52*(4), 858-867. doi: 10.1016/j.compedu.2008.12.005

Stefanidis, D., Scerbo, M. W., Sechrist, C., Mostafavi, A., & Heniford, B. T. (2008). Do novices display automaticity during simulator training? *Am J Surg, 195*(2), 210-213. doi: 10.1016/j.amjsurg.2007.08.055

Sugahara, S., & Boland, G. (2006). The effectiveness of powerpoint presentations in the accounting classroom. *Accounting Education: An international Journal, 15*(4), 391-403.

Susskind, J. E. (2005). PowerPoint's power in the classroom: enhancing students' self-efficacy and attitudes. *Computers & Education, 45*(2), 203-215. doi: 10.1016/j.compedu.2004.07.005

Sward, K., Richardson, S., Kendrick, J., & Maloney, C. (2008). Use of a web-based game to teach pediatric content to medical students. *Academic Pediatrics, 8*(6), 354-359.

Thompson, D., Baranowski, T., Buday, R., Baranowski, J., Thompson, V., Jago, R., & Griffith, M. J. (2010). Serious Video Games for Health How Behavioral Science Guided the Development of a Serious Video Game. *Simul Gaming, 41*(4), 587-606. doi: 10.1177/1046878108328087

Vygotskiĭ, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge: Harvard university press.

Wenzler, I., & Chartier, D. (1999). Why Do We Bother With Games and Simulations: An organizational Learning Perspective. *Simulation & Gaming, 30*(3), 375-384.

Wijers, M., Jonker, V., & Kerstens, K. (2008). *MobileMath: the phone, the game and the math.* Paper presented at the The 2nd European Conference on Games-Based Learning, Barcelona, Spain.

Wilson, K. A., Bedwell, W. L., Lazzara, E. H., Salas, E., Burke, C. S., Estock, J. L., . . . Conkey, C. (2008). Relationships Between Game Attributes and Learning Outcomes: Review and Research Proposals. *Simulation & Gaming, 40*(2), 217-266. doi: 10.1177/1046878108321866

Wolfswinkel, J. F., Furtmueller, E., & Wilderom, C. P. M. (2011). Using grounded theory as a method for rigorously reviewing literature. *European Journal of Information Systems, 22*(1), 45-55. doi: 10.1057/ejis.2011.51

Wood, D., & Wood, H. (1996). Vygotskyu, Tutoring and Learning. *Oxford Review of Education, 22*(1), 5-16.

Wu, W.-H., Chiou, W.-B., Kao, H.-Y., Alex Hu, C.-H., & Huang, S.-H. (2012). Re-exploring game-assisted learning research: The perspective of learning theoretical bases. *Computers & Education, 59*(4), 1153-1161. doi: 10.1016/j.compedu.2012.05.003

Yin, R. K. (2009). *Case Study Research: Design and Methods* (Vol. 5): SAGE Publications.

Yusoff, A., Crowder, R., & Gilbert, L. (2010). Validation of Serious Games Attributes Using the Technology Acceptance Model. 45-51. doi: 10.1109/vs-games.2010.7

9 Appendix

Appendix A: Systematic Literature Review

A systematic approach to a literature review consists of five stages which are shown in the table 14. The systematic approach is based on the approach of Wolfswinkel et al. (2011).

Table 14: Five-stage method for reviewing literature (from Wolfswinkel et al., 2011)

Number	Task
1. Define	
1.1	Define the criteria for inclusion / exclusion
1.2	Identify the fields of research
1.3	Determine the appropriate sources
1.4	Decide on the specific search terms
2. Search	
2.1	Search
3. Select	
3.1	Refine the sample
4. Analyse	
4.1	Open coding
4.2	Axial coding
4.3	Selective coding
5. Present	
5.1	Represent and structure the content
5.2	Structure the article

1: Define

First the criteria for inclusion and exclusion are the defined. By identifying the criteria, the purpose of the literature review was taken into account, as the abilities and access to resources. The 'Social Sciences & Humanities database' of Scopus will be used for the literature review. The selected criteria relate to serious gamin, the expected outcomes of serious gaming and the context of behaviour. The criteria for inclusions, the requirements and the search terms can be found in table 15.

Table 15: Criteria for inclusion, requirements and search terms for the literature research on serious gaming

Subject	Criteria for inclusion, requirements and search terms serious gaming
Document type	Articles; reviews
Subject areas	Computer science, Social sciences, Psychology, Business management and accounting, Economics Econometrics and Accounting, Decision sciences.
Language	English; Dutch
Source type	Journals
Citations	Ten citations or more since publication of the article
Search terms	Obligatory; games OR gaming OR serious games OR serious gaming OR business games
	Additional; learning OR behaviour OR knowledge OR training,

3: select

The search based on the defined boundaries, criteria and search terms provided generated a selection of articles. Initially 433 articles were found. Furthermore, based on the theory of Wolfswinkel et al. (2011), only the most relevant articles were selected. Firstly the doubles were filtered, resulting in 400 articles remaining, secondly the articles were filtered on the relevance of the abstract, resulting in 28 articles remaining, thirdly the articles were filtered on full text, resulting in 11 articles remaining, and lastly 1 article was added after forward and backward citation, 12 left. The low percentage of actually selected papers can be explained by the fact that a game is a really broad term.

4: Analyse

During the readings of the articles in full, a number of excerpts were highlighted. Only open coding was used. Three dimensions were discussed. First the content related to the definition of serious gaming was distinguished. Secondly the content related to the learning process and learning elements of serious gaming was distinguished. Lastly the known learning outcomes of serious gaming were discussed.

5: Present

The dimensions discussed in the previous section were used to structure the content of paragraph 1 of the theoretical section accordingly. The dimensions were used as paragraphs, and the further discussion of the content was structured on the dimensions as distinguished earlier.

Appendix B: Rating journals in the field of gaming

Journal	SJR factor
Civil Aviation Training	0.46 (Impact factor)
Clinical Simulation in Nursing	0,91
Communications in Statistics: Simulation and Computation	0,38
Developments in Business Simulation and Experiential Exercises (ABSEL)	No index found
Eludamos. Journal for Computer Game Culture	No index found
Game Journal	No index found
Game Studies: The International Journal of Computer Game Research	No index found
Games and Culture: A Journal of Interactive Media	0,714
International Journal of Computer Games Technology	0,27
International Journal of Engineering Simulation (with Industrial Applications)	0,30
International Journal of Mathematics and Computers in Simulation	0,836 (Impact factor, 5 year impact factor 1,033)
International Journal of Modelling and Simulation	0,12
International Journal of Role-Playing	No index found
International Journal of Simulation and Process Modelling	0,34
International Journal of Simulation Modelling	0,60
International Journal of Simulation Systems, Science & Technology	0,11
International Journal of Soft Computing Simulation and Software Engineering	No index found
International Journal of Game-Based Learning	0,61 (Impact factor)
International Journal of Gaming and Computer-Mediated Simulations	0,64
Journal of Artificial Societies and Social Simulation	0,38
Journal of Defense Modeling and Simulation	0,14
Journal of Game Development	No index found
Journal of Gaming and Virtual Worlds	No index found
Journal of Policy Modeling	0,72
Journal of Simulation	0,80
Journal of Statistical Computation and Simulation	0,57
Journal of System Simulation	0,27
Journal of Virtual Worlds	No index found
Journal of Virtual Worlds and Education	No index found
Journal of Virtual Worlds Research	No index found
Modelling and Simulation in Materials Science and Engineering	1,13
Simulation and Gaming	1,01
Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare	0,64 (Impact Factor 1,635!)
Simulation Modelling Practice and Theory	0,728 (Impact Factor 1,159)
Studies in Simulation and Gaming (JASAG)	No index found
Training and Simulation Journal	No index found
Transactions on Modeling and Computer Simulation (TOMACS)	0,49
Transactions on Simulation Tools & Techniques	No index found
World Journal of Modelling and Simulation	0,17

The SJR indicator measures the scientific influence of the average article in a journal, it expresses how central to the global scientific discussion an average article of the journal is. Cites per Doc. (2y) measures the scientific impact of an average article published in the journal, it is computed using the same formula that journal impact factor ™ (Thomson Reuters).

Appendix C: Overview Articles Literature Review Serious Gaming

Below an overview is provided of the literature found by conducting a systematic literature, searching Google Scolar, and consulting Igor Mayer for relevant articles. No interesting additional papers were found during the review of the journal as stated in appendix D.

Articles systematic literature review serious gaming(Wolfswinkel method)	Author	Year
A systematic literature review of empirical evidence on computer games and serious games	Connolly, Boyle, Macarthur, Hainey and Boyle	2012
Serious games, debriefing, and simulation/gaming as a discipline	Crookall	2010
Relationships between game attributes and learning outcomes: review and research proposals	Wilson, Bedwell, Lazzara, Salas, Burke, Estock, Orvis and Conkey	2009
Taking educational games seriously: Using the RETAIN model to design endogenous fantasy into standalone educational games	Gunter, Kenny and Vick	2008
Serious video games for health: How behavioral science guided the development of a Serious video game	Thompson, Baranowski, Buday, Baranowski, Thompson, Jago and Grifith	2008
Cognitive science implications for enhancing training effectiveness in a serious gaming context	Greitzer, Kchar and Huston	2007
Games and learning come together to maximize effectiveness: The challenge of bridging the gap	Pannese and Carlest	2007
A simple classification model for debriefing simulation games	Peters and Vissers	2004
Game-based learning in universities in lifelong learning: "Unigame: social skills and knowledge training" game concept	Pivec and Dziabenko	2004
Games, motivation, and learning: A researcher and practice model	Garris, Ahlers and Driskell	2002
Do computer-based games facilitate knowledge acquisition and retention?	Ricci, Salas and Cannon-Bowers	1996

Articles explorative literature review serious gaming	Author	Year
The research and evaluation of serious games: Toward a comprehensive methodology	Mayer, Berkebrede, Harteveld, Warmelink, Zhou, van Ruijven, Lo, Kortmann, Wenzler	2013
Serious games and learning effectiveness	Nieto, Carbonell	2012
Learning trough games? Evaluating the learning effect of a policy exercise on European climate policy	Haug, Huitema and Wenzler	2010
Serious gaming: From learning experience towards user experience	Le Marc, Mathieu, Pallot and Richir	2010
Distinguishing games, serious games, and traing simulator on the basis of intent	Johnston and Whithead	2009
It is not just a game!	Shubik	2009
Performance measurement in simulation-based training: A review and best practices	Salas, Rosen, Held and Weissmuller	2009
Serious games - An overview	Susi, Johanneson and Backlund	2007
A framewerok for developing serious games to meet learner needs	Freitas and Jarvis	2006
The changing nature of business simulation/gaming research: A brief History	Faria	2001
Why do we bother with games and simulations: An organisational learning perspective	Wenzler, Chartier	1999

Articles "(serious) Gaming" (Additions from overview Igor Mayer)	Author	Year
Systematic review of serious games for medical education and surgiacal skills training	Graafland, Schraagen and Schijven	2012
Learning in a game-based virtual environment: a comparative evaluation in higher education	Mayer, Warmelink and Bekebrede	2012
Developments in business gaming : A review of the past 40 Years	Faria, Hutchinson, Wellington and Gold	2008
How can exploratory learning with games and simulations within the curriculum be most effectively evaluated?	De Freitas and Oliver	2006
The validity of Games	Peters, Vissers and Heijne	1998
Teaching with simulation games: A review of claims and evidence	Greenblat	1973

Appendix D: Serious gaming elements mentioned (by one author)

Elements Serious Game	Author(s)
Conflict: The presentation of solvable problems within the game and usually drives the game's plot or in-game action by providing interaction.	(Wilson et al., 2008)
Incremental Learning: Learning material is delivered incrementally. Learner feels and learns in a natural way and less complex.	(Yusoff et al., 2010)
Language/ Communication: Specific communication rules of the game, and may be a significant part of the game.	(Wilson et al., 2008)
Location: the physical or virtual world that the game takes place in. It influences rules, expectations, and solution parameters.	(Wilson et al., 2008)
Novelty: Increased intention due to novelty of the training method	(Ricci et al., 1996)
Pieces or players: Objects or people (e.g., proxy items, avatars, or human participants) being included in the game narrative or scenario.	(Wilson et al., 2008)
Safety: Disassociation of actions and consequences (i.e., a safe way to experience reality). The only consequence is loss of dignity when losing.	(Wilson et al., 2008)
Scaffolding: Support and help during learning within the games.	(Yusoff et al., 2010)
Representation/Authentic Learning: The player's perceptions of the game's reality. It is a subjective feature that makes the serious game appears psychologically real.	(Wilson et al., 2008);

Appendix E: Learning Theories

<u>Behaviourism</u>

Theory	Original Author	Year	Citations
Direct Instruction	Engelmann	1982	<500
Programmed Instruction	Skinner	1954	<1.500
Social Learning Theory	Bandura	1977	<26.000

<u>Constructivism</u>

Theory	Original Author	Year	High Sited
Social Development Theory	Vygotskij	1962	< 24.000
Problem-Based Learning	Barrows	Dated from 60's , published in 1980	<2.900
Cognitive Apprenticeship	Vygotskij	1978	<46.000
Discovery Learning	Bruner	1961	<1.600
Case based learning	JL Kolodner	Adapted from problem based learning in the 90s	<5.200
Situated Learning	Lave, Wenger	1991	<36.000
Activity Theory	Leontjev	1978	<3.300
Actor-network Theory	Latour	1987	<16.000

<u>Humanism</u>

Theory	Original Author	Year	High Sited
Experiential Learning	Kolb	1984	<24.000

<u>Cognitivism</u>

Theory	Original Author	Year	High Sited
Attribution Theory	Weiner	1974	<1.600
Elaboration Theory	Reigeluth	1983	<700
Stage Theory of Cognitive Development	PIaget	1969	<600
Theory of Conditions Learning	Gagne	1965	<7000

Appendix F: Gagné's (1965) learning theory

Gagné's (1965) nine's learning steps

- Event 1: Gaining attention: Learning cannot occur unless the learner is in some way oriented and receptive to incoming information.
- Event 2: Informing the learner of the objective. An expectancy about what one is to learn will influence subsequent processing of information related to that expectancy.
- Event 3: Stimulating recall of Prior learning: New Learning depends to a large extent on what has been learned before, student do not always call to mind and use relevant information when face with it. To prepare learners for encoding or transfer, instructors should assist them in recalling relevant and prerequisite information.
- Event 4: Presenting the Stimulus: The event of instruction depends upon what is to be learned. The theory of Gagné (1965) stipulates that there are several different types or levels of learning. The significance of these classifications is that each different type requires different types of instruction. Gagne identifies five major categories of learning: verbal information, intellectual skills, cognitive strategies, motor skills and attitudes.
- Event 5: Providing learning guidance: How or what learning guidance is provided in instruction depend upon the desired outcome, but specifically instructional activities should promote the entry of what is to be learned into long-term memory in a meaningful way.
- Event 6: Eliciting Performance: Enables the learners to confirm their learning. It requires the learner to produce a performance, something that is an appropriate indicator of what was learned. This event provides an opportunity to gauge progress, with the assumption that errors are still undergoing correction, and performance is still being improved.
- Event 7: Providing feedback: Having shown what they can do, learners should be provided informative feedback on their performance. Feedback plays an important role in your correcting, and you will pay close attention to it.
- Event 8: Assessing Performance: A new skill must be performed dependably before most teachers will agree that it has been learned. Therefore, after learners have had opportunities to demonstrate and refine their knowledge, it may be formally assessed.
- Event 9: Activities to enhancing Retention and Transfer: The point of these activities is to encourage student to reflect upon their own knowledge and belief systems as they are expose to those of other people.

Gagné's (1965) five different instructional approaches

Learning content	Instructional Approach
Verbal Information	(1) Draw attention (2) Present information so that it can be made into chunks, (3) Provide a meaningful context (4) Provide cues for recall and generalization of information
Intellectual Skills	(1) Call attention (2) Stay within the limits of working memory, (3) Stimulate the recall of previously learned component skills, (4) Present verbal cues (5) Schedule occasions for review, (6) Use a variety of context
Cognitive Strategies	(1) Describe or demonstrate the strategy (2) Provide a variety of occasions for practice using the strategy (3) Provide informative feedback as to creativity or originality of the strategy outcome
Attitudes	(1) Establish an expectancy of success associated with the desired attitude (2) Assure student identification with an admired human model, (3) Arrange for communication or demonstration of choice personal action, (4) Give feedback for successful performance
Motor Skills	(1) Present verbal or other guidance to cue the executive subroutine, (2) Arrange repeated practice, (3) Furnish immediate feedback as the accuracy of performance, (4) Encourage the use of mental practice

Appendix G: Format semi-structured interviews experts

Opzet interview Serious Gaming Experts		
Opbouw	**Onderdelen**	**Vink**
1: Inleiding (10m)	• Wie zit er tegenover mij? • Algemene idee sessie • Mijn onderzoek (Vraag + Methode) • Wat ik eruit wil halen (Validatie + Context) • Wat gaan zij hierin bijdragen Learning & Gaming	O O O O O
2: Elementen m.b.t. Serious Gaming & Learning (25 m)	• Definitie Serious Game? • Elementen die aanwezig moeten zijn om iets een Serious Game te noemen? • Welk echt Serious Gaming bewijs, gericht op het leereffect, is er al naar jouw mening al? – Wat ontbreekt? • Elementen Essentieel voor een leereffect? • Leer elementen Serious Gaming? • Leer elementen Presentatie? • Verschillen Elementen Game-Presentatie? (Onderscheidend?) • Nadelen Serious Game?	O O O O O O O O
3: Theorie (15m)	• Learning -> mee eens? • Behaviour (Bandura en Ajzen)-> mee eens? • Link leren – gedrag - > Mee eens?	O O O
4: Methode - Uitkomen (10m)	• Methode onderzoek • Verwachte impact leermethoden op gedrag? Waarom? (Kijkende naar de elementen die in een serious game zitten)	O O O
5: Conclusie	• Opsomming • Uitwerking opsturen	O O

Appendix H: Observation form used for the serious game and the presentation

CLIENT VALUE CREATION - Enabling clients to become high-performance businesses and creating long-term relationships by being responsive and relevant by consistently delivering value						
In game translation	Understand and validate the client needs to create value for the client					
Not-effective	1	2	3	4	5	Effective
Internal focus, don't ask client, but make assumptions						Client focus, ask questions, and validate assumptions
Comment/example						

ONE GLOBAL NETWORK - Leveraging the power of global insights, relationships, collaboration and learning to deliver exceptional service to clients wherever they do business						
In game translation	Cross-team collaboration to deliver exceptional service to the client					
Not-effective	1	2	3	4	5	Effective
Working as separate teams						Working as one team
Comment/example						

RESPECT FOR THE INDIVIDUAL - Valuating diversity and unique contributions, fostering a trusting, open and inclusive environment and treating each persons in a manner that reflects Accenture's values						
In game translation	Treat each other with respect in order to create an open and trusting environment					
Not-effective	1	2	3	4	5	Effective
Treat others as you don't like to be treated						Treat others as you do like to be treated
Comment/example						

BEST PEOPLE - Attracting developing and retaining the best talent for our business, challenging our people, demonstrating a "can-do" attitude, and fostering a collaborative and mutually supportive environment						
In game translation	Roles are allocated based on peoples capabilities to create an effective and motivated team					
Not-effective	1	2	3	4	5	Effective
Everybody is performing the same roles						Different roles (client, coordination, trading etc)
Comment/example						

STEWARDSHIP - Fulfilling our obligation of building a better, stronger and more durable company for future generations, protecting the Accenture brand, meeting our commitments to stakeholders, acting with an owner mentality, developing our people, and helping improve communities and the global environment						
In game translation	Level of engagement/degree to which people stimulate each other to engage					
Not-effective	1	2	3	4	5	Effective
Certain people are disengaged and left out the process						Everybody is involved and engaged in the process
Comment/Example						

INTEGRITY - Being ethically unyielding and honest and inspiring trust by saying what we mean, matching our behaviours to our words, and taking responsibility for our actions						
In game translation	Honesty as a cornerstone to build trust					
Not-effective	1	2	3	4	5	Effective
Unfair trading, not being fair and transparent to client						Fair trading, being fair and transparent to client
Comment/Example						

Appendix I: Operationalization

	Core Values	Elementen	Sub-elements
1	**Client Value Creation** *Enabling clients to become high-performance businesses and creating long-term relationships by being responsive and relevant by consistently delivering value*	- Weten wat de klant wil	- Bij de klant uitvinden wat deze wilt - Onderling bedenken wat de klant wil
		- Een relatie opbouwen met de klant	- Tijd steken in onderhoud met de klant - De klant betrekken bij het process - Houding richting de klant
		- Handelen naar wat de klant wil	- Uitkomst gericht handelen
2	**One Global Network** *Leveraging the power of global insights, relationships, collaboration and learning to deliver exceptional service to clients wherever they do business*	- Krachten bundelen	- Contact maken met andere partijen - Gedachtes uitwisselen met andere partijen - Concrete samenwerking met andere partijen - Spreek als een eenheid
3	**Respect for the Individual** *Valuating diversity and unique contributions, fostering a trusting, open and inclusive environment and treating each persons in a manner that reflects Accenture's values*	- Respectvol handelen	- Iedereen respecteren in wie ze zijn - Ruimte geven om te luisteren naar elke individu - Vertrouwen hebben in elke individu - Problemen op een goede manier oplossen
4	**Best People** *Attracting developing and retaining the best talent for our business, challenging our people, demonstrating a "can-do" attitude, and fostering a collaborative and mutually supportive environment*	- Sterke punten benutten van mensen	- Juiste rol koppelen aan de juiste persoon - luisteren naar elk individu
		- Een elkaar stimulerende omgeving creeren	- Open communicatie - Beloon excellence
5	**Stewardship** *Fulfilling our obligation of building a better, stronger and more durable company for future generations, protecting the Accenture brand, meeting our commitments to stakeholders, acting with an owner mentality, developing our people, and helping improve communities and the global environment*	- Elkaar helpen/ondersteunen	- Iemand helpen als deze daarom vraagt - Iemand ondersteunen als je ziet dat dit nodig is
		- Ondernemend handelen	- Neem initiatief waar nodig - Iets op een innovatieve manier proberen op te lossen
6	**Integrity** *Being ethically unyielding and honest and inspiring trust by saying what we mean, matching our behaviours to our words, and taking responsibility for our actions*	- Eerlijkheid	- Eerlijk zijn in woorden - Eerlijk zijn in daden
		- Verantwoordelijkheid	- Daad bij woord voegen - Verantwoordelijkheid nemen wanneer dit gevraagd wordt

	In-game situatie	Waar vindt het plaats				
		Markt	Shareholder	Marktplaats Slogans	Team	Tussen Teams
1	Vragen stellen aan de klant	X				
	Vragen stellen aan de shareholder		X			
	Discussies over de wensen van de klant				X	
	Veel tijd doorbrengen met de shareholder	?	X			
	De Share-holder meenemen in de gedachtes/ontwikkelingen van de groep	?	X			
	Houding t.o.v de klant; respectvol, niet respectvol etc.	X	X			
	Goed resultaat bij het spel (tussenstand en eindstand)			X		
2	Benaderen groepen elkaar voor samenwerking				X	X
	Worden er gedachtes uitgewisseld tussen groepen				X	X
	Vindt er samenwerking plaats tussen groepen				X	X
	Verteldt iedereen hetzelfde verhaal (welk verhaal>?)	X	X	X		X
3	Ruimte geven aan elk individu, probeer elkaar niet gedrag op te leggen				X	
	Mensen uit laten praten, geef elkaar de ruimte input te geven in de groep				X	
	Niet proberen bepaalde rollen over te nemen				X	
	Respectvol conflicten oplossen op basis van argumenten				X	
4	Zitten mensen op de rol die het beste bij hun past				X	
	Wordt er naar iedereen geluisterd				X	
	Directe onderlinge communicatie				X	
	Complimenten aan elkaar geven				X	
5	Als iemand om hulp vraagt proberen deze persoon zo goed mogelijk te helpen				X	
	Als iemand ergens niet uitkomt, dit herkennen en vragen of deze persoon hulp nodig heeft				X	
	Mocht iemand een goed idee hebben, probeert deze dan gelijk hier initiatief in te nemen				X	
	Out of the box aanpak (hoe?)	X	X	X	X	?
6	Geen halve waarheden vertellen en eerlijk zijn in wat je zegt	X	X	X	X	X
	Niet valsspelen	X	X	X	X	X
	Handelen naar wat je zegt, geen valse verwachting scheppen	X	X	X	X	X
	Verantwoordelijkheid nemen voor je eigen woorden en daden	X	X	X	X	X

	Hoe te observeren		Wie observeert
	Kwantiteit (strepen)	Kwaliteit (likert)	
1	Aantal vragen aan klant	Kwaliteit vraag (met of zonder pitch)	Markt
	Aantal vragen aan shareholder	Kwaliteit vraag	Shareholder
	Aantal discussies over de wensen van de klant	Uitkomsten Ja/Nee (+Toelichting)	Observer
	-- (Timen, Filmen)	Kwaliteit	Shareholder
	Aantal keren dat de groep de shareholder betrekt	Mate van succes	Observer
		Mate van respect	Shareholder
		Hoeveelheid punten (tussen en eind)	Markt(et place)
2	Aantal benaderingen	Mate van succes	Observer
	Aantal indhoudelijke gesprekken	Mate van succes	Observer
	Aantal samenwerkingen	Mate van succes	Observer
	Wordt afgestemd welk verhaal verteld wordt?		Markt, Shareholder, observer
3	-- (Questionnaire)	-- (Questionnaire)	--
	Aantal onderbrekingen	Mate van oplossen problemen	Observer
	Aantal keren dat mensen zich ongevraagd met elkaar bemoeien	Mate van hinderlijkheid	--
	Aantal conflicten	Wordt er een oplossing gevonden	Observer
4	-- (Questionnaire)	-- (Questionnaire)	--
	-- (Questionnaire)	-- (Questionnaire)	--
	Aantal keren afstemmen	Mate van afstemming	Observer
	Aantal complimenten	Positiviteit compliment	Observer
5	Aantal keren hulp n.a.v. hulp vragen	Mate van hulpt	Observer
	Aantal keren vragen of iemand hulpt nodig heeft	Indien ja, Mate van hulp	Observer
	-- (Questionnaire)	-- (questionnaire)	Observer
		Out of the box (Ja/nee)	Observer
6	-- (Questionnaire)	-- (questionnaire)	--
	Aantal keer valsspelen	Mate van valsspelen	Observer
	Aantal keren dat dit gebeurt		Filmen en nakijken!
	-- (Questionnaire)	-- (questionnaire)	--

	Input voor in-game questionnaire
1	Heeft jullie groep een goed genoeg beeld van wat de klant wil?
	Heeft jullie groep de shareholder voldoende bij de groep proberen te betrekken?
2	Hebben jullie voldoende geprobeert de kennis te gebruiken van andere groepen?
	Hebben jullie voldoende jullie verhaal op elkaar afgestemd
3	Heb jij persoonlijk genoeg ruimte gekregen voor je ideeen in de groep
	Heb jij het idee dat je team je voldoende vertrouwd in je rol?
4	Heb jij binnen de groep de rol die het beste bij je past?
	Heb je het idee dat binnen de groep naar jou geluisterd wordt?
5	Hebben jullie elkaar voldoende geholpen binnen het team?
	Vind jij dat jullie als groep voldoende initiatief hebben genomen?
6	Heb je het gevoeld dat iedereen eerlijk en open naar elkaar is?
	Vind jij dat iedereen zijn verantwoordelijkheid neemt binnen de groep?

Appendix J: Observation forms observers

Slogan Game - Oberservation form before break - Accenture

Naam Observer:

Team 1

Gedrag	Aantal keer	Overall Score (1-3)	Aantekeningen/ opmerkingen
Samenwerking tussen groepen (en/of benadering hiervoor)			
Hulp groepsgenoten			
Niet integer handelen			
Bediscusseren ze de rollen, en wie het beste op elke rol past?			

Team 2

Gedrag	Aantal keer	Overall Score (1-3)	Aantekeningen/ opmerkingen
Samenwerking tussen groepen (en/of benadering hiervoor)			
Hulp groepsgenoten			
Niet integer handelen			
Bediscusseren ze de rollen, en wie het beste op elke rol past?			

Team 3

Gedrag	Aantal keer	Overall Score (1-3)	Aantekeningen/ opmerkingen
Samenwerking tussen groepen (en/of benadering hiervoor)			
Hulp groepsgenoten			
Niet integer handelen			
Bediscusseren ze de rollen, en wie het beste op elke rol past?			

Team 4

Gedrag	Aantal keer	Overall Score (1-3)	Aantekeningen/ opmerkingen
Samenwerking tussen groepen (en/of benadering hiervoor)			
Hulp groepsgenoten			
Niet integer handelen			
Bediscusseren ze de rollen, en wie het beste op elke rol past?			

Appendix K: Codebook observers

Observation Codebook

Core Value	Behavior	When to observe	What to observe	How to measure
One Global Network	Cooperation among teams	During the whole game; when the market is opened and the groups are actually playing	Every time someone from a team starts approach other teams to share/exchange knowledge and/or merchendise	Count every time someone from a team starts approaching other teams + Score teams on a one 1-3 score (never, occasionally or always)
Stewardship	Helping Each other	During the whole game; when the market is opened and the groups are actually playing	Every time when someone within a team assists another member in another role	Count every time new help is given + rate the overall help in a team on 1-3 (never, occasionally or always)
Integrity	Acting Integer/Fair	During the whole game	All ways of cheating; for example stealing stuff, unappropriatly looking at the work of other teams tec.	Count and kwalitative describe every type of non-integer behavior
Best People	Using the power of the people, assigning them to the roles that fit them best	When the team hase to come up with a team name an their roles; and during the break, when they evaluate the first playing phase	The degree they made effort to discuss the roles, and to assign people to roles that fit them best	Kwalitative observation of what is happening + rankin teams on a 1-3 scale (non, a little, al lot)

Appendix L: Observation forms facilitators

Market

Slogan Game - Observation Form Market - Accenture

Name Market:

General Information		Before the Break		After the Break	
Team	Variable	Total	Sum	Total	Sum
Team 1	Question/				
	Pitch				
	Relevance/Quality (+ or -)				
Team 2	Question/				
	Pitch				
	Relevance/Quality (+ or -)				
Team 3	Question/				
	Pitch				
	Relevance/Quality (+ or -)				
Team 4	Question/				
	Pitch				
	Relevance/Quality (+ or -)				
Team 5	Question/				
	Pitch				
	Relevance/Quality (+ or -)				
Team 6	Question/				
	Pitch				
	Relevance/Quality (+ or -)				

Shareholder

Slogan Game - Observation Form Shareholder - Accenture

Name Shareholder:

General Information		Before the Break		After the Break	
Team	Variable	Total	Sum	Total	Sum
Team 1	Number of Questions				
	Attitude (+ or -)				
Team 2	Number of Questions				
	Attitude (+ or -)				
Team 3	Number of Questions				
	Attitude (+ or -)				
Team 4	Number of Questions				
	Attitude (+ or -)				
Team 5	Number of Questions				
	Attitude (+ or -)				
Team 6	Number of Questions				
	Attitude (+ or -)				

Appendix M: Reflection Form

Name: Group: Current role: **Please Indicate to which level you agree or disagree with the following statements:**	*Disagree strongly*	*Disagree a little*	*Neither agree nor disagree*	*Agree a little*	*Agree strongly*
Our team understands the requirements of the client					
Our team involved the shareholder in our internal group process					
Our team used the knowledge of other teams					
Our team cooperated with other teams					
I have the feeling that I get the time and possibility to state my own opinion within my team					
I have the feeling that my team trusts me in my current role					
I have the role that fit me best					
I have the feeling that my team listens to me					
I helped my teammates					
I proactively shared my ideas with the team					
Within our team everyone is honest and open to each other					
Within our team everyone took his/her responsibility					

Appendix N: Pre-Measure Survey New Hires

E-mail to New Hires:

<div style="border: 1px solid black; padding: 10px;">

Action Required: Please fill in the survey included in this email before the 31th of December!

Dear New Colleague,

For the New Hire Days we would like you to fill in a short survey which will take approximately 5 minutes of your time.
The results of this survey are of importance for the New Hire Day and for Academic Research that is currently conducted at Accenture.

During the new hire days, you will play a game in which a business environment is simulated. A key element of this game is the equality of sub-groups that will be created. This survey is a tool to achieve this and will therefore include some questions about you as a person, which will be used for the group-selection process prior to this game.
While filling in the survey, try to be as honest as possible! The data from this survey will **only** be used for in-game and Academic purposes, will be threated confidentially and will absolutely not be shared with other colleagues from Accenture.

Please make sure to complete this survey before Tuesday the **31th of December**.

Thank you in advance for you cooperation.

Start Survey

Kind regards,

Human Resources team Accenture

</div>

Introduction:

<div style="border: 1px solid black; padding: 10px;">

Dear New Hire,

During the New Hire Days you will play a game in which a business environment is simulated. For this game groups have to be made which have, for Academic and In-game purposes, to be as equal and balanced as possible (details will be provided at the end of the game). In order to create these equal groups, we want you to fill in our survey which includes four categories of questions:

- Demographics: Question regarding general information like you name, gender, work-experience etc.
- Social Styles: Questions regarding your social appearance
- Personality Traits: Questions regarding you personality
- Core Values: A Question regarding your prior knowledge of Accenture's Core Values, which will have a role in the game

Please fill in all the questions. When something is not clear to you, please fill in the question using your intuition, and mention this in the "remark" box at the end of the Survey. Remember while filling in the survey that your information will be threated confidentially and that this is not a test, thus be as honest as possible! Thank you in advance!

</div>

Main survey

Demographics				
Name				
Gender	Male		Female	
Date of birth				
Country of birth				
Years of professional work experience				
Latest completed study (For example: Business Administration, Philosophy etc.)				
Highest level of education (For example: Bachelor, Master etc.)				
Level (For example, Intern, Service Employee, Analyst, Consultant, Senior Manager etc.)				
Workforce (Enterprise, Services, Managing Consulting, Technology Consulting, Outsourcing etc.)				

Social Styles		
Please indicate were you see yourself on the scale for each behaviour		
1	I speak slowly and deliberately	1 2 3 4 5 6 7 8	I speak quickly
2	I speak with little hand animation	1 2 3 4 5 6 7 8	I speak with a lot of hand animation
3	I ask questions	1 2 3 4 5 6 7 8	I make statements
4	I control my emotions	1 2 3 4 5 6 7 8	I show my emotions
5	I speak with a soft voice	1 2 3 4 5 6 7 8	I speak with a loud voice
6	I see myself as a cool person	1 2 3 4 5 6 7 8	I see myself as a warm person
7	I lean backward when stating my opinion	1 2 3 4 5 6 7 8	I lean forward or upright when stating my opinion
8	I little change my tone of voice when talking	1 2 3 4 5 6 7 8	I often change my tone of voice when talking
9	I am indecisive, I don't form my opinion quickly	1 2 3 4 5 6 7 8	I am decisive, I form my opinion quickly
10	I communicate facts, logic	1 2 3 4 5 6 7 8	I communicate feelings and opinions

Personality Traits								
Please indicate how much you agree or disagree								
	I see myself as:	Disagree strongly	Disagree moderately	Disagree a little	Neither agree nor disagree	Agree a little	Agree moderately	Agree strongly
1	Extravert, Enthusiastic							
2	Critical, Disagreeable							
3	Self-Disciplined							
4	Anxious, Easily upset							
5	Open to new experiences							
6	Reserved, Quiet							
7	Sympathetic, Warm							
8	Disorganized, Careless							
9	Calm, emotionally Stable							
10	Conventional, Uncreative							

Core Values

How many of the six core values do you know (Again this is not a test, don't look them up)	
When relevant, please state the known core values here	- - - - - -

Remarks	

Appendix O: Specific Measures Control Variables

Firstly there will be looked at the social demographic variables. In table 16 the average age and work experience is shown of both the experimental and control group.

Table 16: Work experience and age

Game_Presentation	Age		Work_Experience	
	N	Mean	N	Mean
Serious Game	82,00	30,26	82,00	4,34
Presentation	72,00	28,65	72,00	3,48

Based on table 16 there can be concluded that the participants in the experimental and the control group have similar age and work experience. The age difference is on average less than 1,5 year, and the difference in work experience is less than 1 year. Thus similar work and life experience is assumed. In table 17 participants' nationality is shown.

Table 17: Nationality

Game_Presentation	Valid		
	Dutch	Non-Dutch	Total
Serious Game	72%	28%	100%
Presentation	69%	31%	100%

The ratio of Dutch-Non-Dutch participants in the treatment and control group is almost similar. Therefore similar cultural backgrounds are assumed for both groups. In table 18 people's highest education is assessed.

Table 18:Highest Education

Game_Presentation	Valid			
	< Bachelor	Bachelor	Master and >	Total
Serious Game	5%	28%	67%	100%
Presentation	4%	26%	69%	100%

The percentages of participants that completed a bachelor or master study are almost similar in both the experimental and control group. Thus a comparable degree of intelligence can be expected in both groups. In Table 19 participants' field of study is shown.

Table 19: Field of study

Game_Presentation	Management & Business	Organization & People	Financial & Economical	Technical	IT	Other	Total
Serious Game	33%	10%	9%	11%	22%	16%	100%
Presentation	28%	13%	8%	15%	25%	11%	100%

The percentages of participants' completed type of study in the experimental and control group completed is almost similar. Thus similar profession interest can be assumed. In table 20 an overview is given of the workforce people will be operating in within Accenture.

Table 20: Workforce

Game Presentation	Management Consulting	Technology	Solutions	Services	Enterprise	Outsourcing	No Idea	Total
Serious Game	24%	49%	9%	6%	5%	7%		100%
Presentation	22%	43%	11%	4%	8%	7%	4%	100%

The percentages show the participants in the experimental and control group will be deployed in comparable workforces. Thus similar work related interest can be assumed. Between the experimental and control group

Lastly participant's social styles and personality traits are shown. The constructs are measured to assess to which degree people possess the qualities to show the experiment related behaviours. People were mapped on a three point skills; whether the possessed the variable: (1) little, (2) average or (3) a lot. The results are shown in table 21.

Table 21: Social Styles and Personality Traits

Game Presentation	Assertiveness	Responsiveness	Extraverted	Agreeableness	Consciouthess	Emotional_stability	Openess_to_new _experiencess
Serious Game	2,07	2,05	2,26	1,99	2,60	2,48	2,61
Presentation	2,15	1,99	2,21	2,13	2,67	2,53	2,60

Thus in general people in the general and control are on average similar regarding assertiveness, responsiveness, extraversion, consciousness, emotional stability and openness to new experience. Only the variables on agreeableness show a significant difference.

Appendix P: Descriptive data experiment

Table 22: Descriptive Data Reflection Sheets

	Serious Game		Presentation	
	Mean	SD	Mean	SD
One Global Network				
Knowledge Exchange Teams	2,66	,52	2,39	,65
Cooperation Teams	2,97	,50	1,92	,70
Client Value Creation				
Market Need	3,14	,31	3,23	,37
Involved Shareholder	1,90	,48	1,95	,52
Stewardship				
Helped Teammates	4,48	,20	4,43	,17
Shared Ideas	4,58	,25	4,50	,26
Respect for the individual				
State Opinion	4,53	,27	4,34	,27
Trusted in role	4,35	,27	4,20	,35
Beste People				
Roles that fit people best	3,72	,46	3,73	,40
Team listens to me	4,44	,18	4,20	,24
Integrity				
Honest and open	4,66	,16	4,55	,26
Took responsibility	4,58	,23	4,38	,31

Table 23: Describtive Data Observations

	Serious Game		Presentation	
	Mean	SD	Mean	SD
One Global Network				
Cooperation Among Teams	2,14	,77	1,08	,29
Client Value Creation				
Market Approaches	,79	,89	,25	,62
Shareholder Approaches	4,29	2,23	4,83	2,48
Stewardship				
Help Teammates	2,43	,65	2,50	,52

Appendix Q: Test of Normality

Normality is assumed with a p-value above 0,05 in both the experimental and control group. When normality is assumed an Independent Samples t-test will be conducted. When the p-value in the experimental and/or control group is below 0,05; normality is not assumed; and aWilcoxon Rank Sum Test will be conducted.

Table 24: Test of Normality Reflection Variables

	Kolmogorov-Smirnov			
	Statistic		Sig.	
	Serious_Game_Presentation		Serious_Game_Presentation	
	Serious Game	Presentation	Serious Game	Presentation
One Global: Exchange Teams	,119	,162	,200	,200
One Global: Cooperation Teams	,165	,202	,200	,188
Client Value: Market Need	,195	,191	,156	,200
Client Value: Involve Shareholder	,155	,112	,200	,200
Stewardship: Helped Teammates	,320	,272	,000	,015
Stewardship: Shared Ideas	,212	,167	,088	,200
Respect: State Opinion	,146	,212	,200	,142
Respect: Trusted in Role	,149	,213	,200	,138
Best People: Roles that fit best	,160	,159	,200	,200
Best People: Team Listens To Me	,183	,134	,200	,200
Integrity: Honest And Open	,299	,175	,001	,200
Integrity: Took Responsibility	,202	,226	,127	,090

Table 25: Test of Normality External Observation

	Kolmogorov-Smirnov			
	Method			
	Serious Game		Presentation	
	Statistic	Sig.	Statistic	Sig.
One Global: Cooperation Among Teams	,224	,055	,530	,000
Stewardship: Help Teammates	,312	,001	,331	,001

Table 26: Test of Normality In-Game Observation

	Kolmogorov-Smirnov			
	Method			
	Serious Game		Presentation	
	Statistic	Sig.	Statistic	Sig.
Client Value: Shareholder Approaches	,262	,010	,490	,000
Client Value: Market Approaches	,194	,163	,223	,101