If citing from this article please cite the published version:

Jagger, Suzy, Siala, Haytham, & Sloan, Diane. (2015). It's All in the Game: A 3D Learning Model for Business Ethics. *Journal of Business Ethics*, 1-21. doi: 10.1007/s10551-015-2557-9

It's all in the Game: A 3D Learning Model for Business Ethics

Dr Suzy Jagger, Dr Haytham Siala, Dr Diane Sloan

Keywords: Teaching Business Ethics; Business Simulation Game, Serious Games; Interactive Learning; Experiential learning; Business Ethics Education; Mixed Methods

Abstract

How can we improve business ethics education for the 21st century? This study evaluates the effectiveness of a visual case exercise in the form of a 3D immersive game given to undergraduate students at two UK Universities as part of a mandatory Business Ethics module. We propose that due to evolving learning styles, the immersive nature of interactive games lends itself as a vehicle to make the learning of ethics more 'concrete' and 'personal' and therefore more engaging. To achieve this we designed and built an immersive 3D simulation game[1] in the style of a visual case. The effectiveness of the game was evaluated using a mixed methods approach measuring recognised and adapted constructs from the Technology Acceptance Model (TAM). Results demonstrate that students found the game beneficial to their learning of ethics with the development of knowledge and skills applicable to the real world and that they engaged with the process due to game elements. Findings demonstrate the potential for the development of simulated games to teach ethics at all levels and modes of delivery and the contribution of this type of visual case model as a pedagogic method.

Introduction

Ethics education is now on the agenda for many business schools – often in the form of dedicated classes (Van Liedekerke & Demuijnck, 2011) and in order to meet the challenges of professional accreditation (Lawrence & Reed, 2011). Within the higher education sector the challenge is clear – to ensure business students leave university with a deep understanding of their role and responsibility towards their future employers, community and society in general; to understand what a professional is; and the important part they play in shaping a business world that is seen as contributory and responsible (Felton & Sims, 2005).

This research discusses the potential of using a visual case model in the form of a 3D interactive computer game as a method for engaging students on Business Ethics courses. Our research question being, how and to what extent can an immersive interactive Business Ethics game contribute to the development of knowledge, skills and values of Business Ethics students? The objectives of the research were:

1. An analysis of the use of games in Business Ethics education;
2. Creation of a new business ethics game aligned with current research on both ethics education and educational games;
3. Research on the adoption and impact of the game on knowledge, skills and values of Business School students;
4. New insights into theory and practice based on research results.

[1] The software development was part of a matched funding project between the University of Roehampton, the UK Higher Education Academy, and a European NGO, ORT France, and involved the design of a pedagogic framework and accompanying web-based interactive 3D animated game to support and develop ethical decision-making skills and moral sensitivity set within a professional business context.

To evaluate the effectiveness of the game we adopted a mixed method approach - an extended version of the Technology Acceptance Model (TAM) combined with qualitative focus groups targeted specifically using final year undergraduate students on a Business Ethics course. Over the last twenty years researchers have used the TAM to assess IT usage and have identified user perceptions of usefulness and ease of use as key factors in the acceptance of a particular technology (Bajaj & Nidumolu, 1998; Koufaris, 2002; Lin & Lu, 2000; Szajna, 1994). Others have extended the TAM to evaluate the impact of technology on learning (Edmunds, et al., 2012; Hsu & Lu, 2004; Yusoff, et al., 2010).

The first part of this paper will establish the context and theoretical background of using simulation games in business education. This will be followed by explanation of the methodology adopted covering the development of the ethics game and research methods used to evaluate its effectiveness. The final sections will present the findings and discussion, concluding with an evaluation of the contribution of the paper to both pedagogic research and the pedagogy of teaching business ethics.

Theoretical Background

Simulated Games in Business

Development of technology enhanced learning to engage students is an area of pedagogic research that is gaining momentum. This has been encouraged by the increases seen in the use of computer games in general – increases largely fuelled by the rise of the Nintendo DS and Wii platforms and the development of games on diverse platforms such as online and mobile (Klopfer, et al., 2009); and software development which now makes it far easier for anyone to design and build their own games. Between 2008 and 2011 the number of gamers in the US rose 241% (56 million to 135 million) (Macchiarella, 2012). *Generation Z* have now entered the education arena and are defined as the "first tribe of true digital natives" (Wallop, 2014). This new audience provides greater potential for the reach of educational games as technology expands conceptual possibilities. Often referred to as 'Educational Games' or 'Serious Games' due to their purpose being other than to entertain, there is growing research evidence supporting the use of digital games for learning at all levels (Afari, et al., 2013; Annetta, et al., 2010; Whitton, 2012).

Research has identified the powerful effect entertainment console games can have on player engagement – sometimes to the level of addiction (Kuss, et al., 2013). Our intention was to develop an immersive interactive game as a business ethics visual case exercise, including within it a combination of rules and values based ethical components requiring interactive decision-making. The use of computerised business simulations have been common practice for decades (Vos & Brennan, 2010). Research supports the view that learning instruments of this nature provide players with a 'valid representation' of real-world issues faced by managers and that students prefer simulated teaching methods to either lectures or case discussions with 'little risk and much to gain' (Anderson & Lawton, 2009:196). There is some disparity between a computer simulation and a digital game and further differences in types of simulation games. A simulation is defined as, 'a dynamic and simplified model of reality… judged by its realism, by its correspondence to the system which it represents' (Sauve, et al., 2007:253). A simulation game has the components of a simulation but often with additional gaming elements such as fictional characters, competition (often via a points system), conflict, rules, and predetermined goals. A game may be less based on reality compared to a simulation. Recent technological advancements have now made it possible to produce something previously only possible in the lucrative video games market and consequently the use and associated research on educational games or 'serious

games' has been growing steadily in response to this technological development (Steinkuehler & Duncan, 2008).

The take up of technology as a method for communicating and networking has been responsible for an evolution in learning styles and a change in the lecturer/student dynamic. Dede labels the *post-millennial* student as someone who regards the Internet, rather than the lecturer, as the main knowledge resource (2005) and seeks to engage with lecturer and classmates equally, often expressing thoughts and opinions via social media and other technology based methods of communication and interaction. This has led to a shift in educational methods to address this new learning style, which Kolb et al describe as the 'inside-out' approach, educators seek 'to tap the internal interest and intrinsic motivation of learners…building on their prior knowledge and experience' (2014:207). The impact of technology on learning styles was noted by Gioia and Brass (1986) in their studies advocating the use of visual imagery to cater to the TV Generation of the 1980s. More recently Properpio and Gioia (2007) extended this argument to suggest that, as a result of the Internet and gaming technologies, educators should 'explore some of the implications of the progressive shift from verbal to visual to virtual approaches to learning' (ibid p.70) their premise being that 'effective learning occurs when students' learning styles align with in-class teaching styles' (ibid p.71). Furthermore the flexibility of Internet-based learning which is neither time nor situation-dependent, influences students perceived ease of use and usefulness of the technology and this contributes to overall student satisfaction (Arbaugh, 2002).

A simulation game is an example of an experiential learner-centred approach with the educator's role being one of coach and evaluator. Debriefing plays a large part in the learning process supporting the view that learning methods of this type are better situated in a blended learning environment 'to help learners reflect on their experiences and observations in the game, share them with others, crystallize conclusions, and generalize implications for other settings' (Kolb, et al., 2014:205). For this reason our game was designed to sit within a wider business ethics course or training programme accompanied by class discussions and reflective assignments. This also allows for some control to reduce the phenomenon of 'gaming the game' whereby students complete the steps without benefiting from the learning process. Pedagogic design strategies such as requiring the player to mentally process clues in order to answer quiz questions at the end of each level (to gain more points) and as part of an overall blended learning strategy with accompanying assignments requiring the student to become familiar with game story concepts.

There are a variety of studies which discuss simulations to promote Business Ethics teaching (Buck, 2014) and a few of these simulations are currently available on the market. Most approach the topic from a utilitarian perspective – the analysis of company financials (sometimes but not always fictitious) to determine best course of action. *Deepwater* is an example of a business ethics game in which students experience how difficult it is to achieve the balance between rewards to oneself against risk to others using the real-life scenario of the BP oil disaster (ibid). There are examples of the use of case studies and role play (Lloyd & Van De Poel, 2008; Ricci & Markulis, 1990) and the development of scenarios. A current popular game in the US is the Core Values Simulation, which provides a platform for students to work in teams to discover how ethical decisions can affect the financials of a corporation (The Ethics Game, 2014). Soy-DRI behavioural simulation was an example of team-based role play designed for employees to improve their skills in ethical decision making (Thorne LeClair & Ferrell, 2000). Although some of the above utilise computer-based software, none were developed incorporating a visual case model of the type proposed in this research.

Research Methodology

The Ethics Game

The development of the business ethics game [*name removed for anonymity]* uses 3D animation technology delivered via a web browser to portray a visual model of a marketing case study in video game format. It follows the story of Anna, a marketing manager who has a target to meet. Comic book pages appear when accessed as clues within the environments and from this narrative the players discover the game objectives. As they proceed through the game they meet some of the characters they have read about in the comic book as well as others. These characters prompt them to make ethical decisions on behalf of Anna. Some of these decisions have an impact on the direction of the storyline. To complete the game a player needs to complete between 5 or 6 levels (depending on user choices). The player sees things through Anna's eyes as they walk through the different levels picking up clues (some hidden), which either cause an incrementing of points or are required in order to proceed to the next level. After each level the user completes a short multiple choice or fill-in-the-blanks quiz which is based on clues they accessed in the game, before moving on to the next level. Anna is presented with some difficult choices to make to achieve her business objectives as she proceeds through the different levels to reach a final conclusion.

Designing a game for the express purpose of developing ethical awareness and moral engagement is particularly appropriate when considering the nature of gameplay itself. Sicart contends that the ontology of a game - a system which contains rules set within the context of a structured environment - calls for an "expansion of our moral universe" as it is no longer about "how we inhabit a world but how that world allows us to inhabit it" (2009:45). He explores the notion of the computer game as a moral object with a set of rules that requires the user to take particular paths to avoid punishment or a forced ending of the game. In this way most games – even abstract games to a lesser extent – have rules which embed ethical values and it is for the game designer to be ethically responsible for the rules and the game world and the user to be responsible for the way they experience it through interpretation and enactment of the embedded ethical values.

Current pedagogy espouses a combination of rules and values based approaches to teaching business ethics although the majority of business ethics courses remain predominantly rules-based focusing on shareholder (or more recently stakeholder) analysis to aid in ethical decision making (Crossan, et al., 2013). This approach utilises deontological and consequentialist theories to underpin concepts, and principles-based methods that may typically involve case studies as foci for discussion (see for example Falkenberg & Woiceshyn, 2008; Laditka & Houck, 2006; McWilliams & Nahavandi, 2006).

Juxtaposed to this is the values-based approach emphasising personal and moral values, through the study of virtue ethics, discourse analysis and other context-related methods that stress the promotion of personal integrity and the interconnectedness of personal values and business decisions. Examples include the Moral Paradigm Test (Cooley, 2004:209), the use of honour codes (Kidwell, 2001) and exercises in practical wisdom centring on personal experience to develop moral imagination (Roca, 2008) and, more recently Gu and Neesham's moral identity-focused teaching procedure (2014).

Proponents of both approaches purport to have achieved success in improving awareness of ethical issues and skills in ethical decision making (Gu & Neesham, 2014). Our intention was to design a game that incorporates both rules and values based approaches within familiar

environments with learning elements alternating between the personal and professional to address the learning outcomes of the two paradigms. Rules based approaches through critical analysis of company stakeholders; the introduction of ethical theory; professional codes of conduct and relevant laws/acts are presented in the game as clues - philosophical books appearing on the boss's desk; a company stakeholder map and organisation chart appearing on company bulletin boards, etc. with associated questions on these topics occurring in the story by characters and in quizzes at the end of each level. Values based elements presented through play items that require personal opinion, choice and reflection on that choice. There are issues such as what to do with a wallet found on the ground and opinions on events that take place. As the player traverse the different areas, they experience philosophical and practical conversations with strangers and colleagues, which require them to reflect on and commit to a personal opinion in a typical interactive game format. The denouement of the game requires the player to make a final ethical choice from which a short animation is played providing information on how key stakeholders were affected by the player's decision. The player discovers the consequences of their actions not only to their character but other stakeholders. Figure 1 provides an example of a comic book page that shows the consequences of a player's choice (to hack into a system).

FIGURE 1 about here

The next section discusses our research method and formulated hypotheses.

Research Method

In order to gain a deep understanding of how and to what extent an immersive interactive Business Ethics game can contribute to knowledge, skills and values, we adopted a pragmatic approach using a mixed methods methodology. Traditionally researchers have tended towards either a positivist or constructivist approach in method, however there is a growing body of knowledge supporting a third paradigm that bridges the gap between positivist and constructivist contributions. Pragmatism focuses on the problem - rather than the method - to identify a suitable research approach and is less constrained by a single methodology (Johnson & Onwuegbuzie, 2004:16). The use of a validated survey instrument was designed to quantify the extent in which users felt the game contributed to their learning of ethics. Focus groups of those who had completed the game and survey were set up to determine how the game achieved this – to document user perceptions using semi-structured questions.

Morgan (1996) discusses the combination of survey plus focus group as the third combination of four ways in which focus groups and surveys are often used within mixed method research. The use of a focus group was felt an ideal method – the 'focus' being the playing of the game – to identify the more pertinent variables and explore more complex phenomena (such as game immersion and integration within the course) more difficult to measure using a quantitative method. The mixed method approach also had the added benefit of reducing common method bias (CMB) which can occur in an exploratory research that utilises a single method of data collection from a single sample (Podsakoff, et al., 2003).

As with all methods there are weaknesses in the mixed methods approach. Firstly there is the need for expertise in both qualitative and quantitative paradigms and a coordinated approach in order to integrate the studies effectively. This triangulation needs to be undertaken whilst preserving the pure paradigm approach of each study. Other issues relate to data collection often being more time consuming and thus more expensive, as the research involves more than one study; and the issue of how best to qualitatively analyse quantitative results when results are conflicting (Johnson & Onwuegbuzie, 2004:21). In order to mitigate these inherent problems, our research team consisted

of one quantitative and two qualitative experts as well as one external quantitative advisor, who worked together to ensure a balanced and coordinated approach. Survey and focus group questions were constructed by the team - the latter developed specifically to expand and build on survey questions whilst addressing the research question. The structure of the university term and the survey being online helped in the management of the two studies with focus group sessions being scheduled to take place a week after all surveys had been completed and the game closed but before the end of term (when students would no longer be available).

The Technology Acceptance Model (TAM)

The TAM has been used extensively in IS/IT research to predict and measure individuals' reactions to a technology application (Davis, et al., 1989; Kim & Malhotra, 2005; Malhotra, et al., 2006). The TAM is an adaptation of the Theory of Reasoned Action (TRA) and its successor the Theory of Planned Behaviour (TPR). The TRA and TPR have been used extensively in Business Ethics research to evaluate links between intention and behaviour (Hassan, et al., 2014). Chosen examples include the prediction of dishonest actions (Beck & Ajzen, 1991); reporting unethical behaviour (Gibson & Frakes, 1997); differences between belief and action (Weber & Gillespie, 1998); and more recently, the use of ethics codes (Stevens, et al., 2005); digital piracy (Liao, et al., 2010) and the purchase intentions of ethically-minded consumers (Carrington, et al., 2010). According to TRA, belief (an individual's subjective probability of the consequence of a particular behaviour) affects attitude (a positive or negative feeling or disposition towards a particular behaviour), which in turn shapes an individual's behavioural intention (Ajzen, 1988; Ajzen, 1991, 2002; Fishbein & Ajzen, 1975).

TAM hypothesises that the intention to use an information technology application is affected by whether the users perceive the new system to be conducive in accomplishing their tasks (perceived usefulness) with minimum effort (ease-of-use). Most past research, which utilises an extended TAM for education has focused on evaluation of more generic virtual learning environments (Huang, et al., 2007; Landry, et al., 2006; Roca, et al., 2006; Yi & Hwang, 2003). However Yusoff et al (2010) devised and used an adapted version of the TAM to test whether serious computer games can be used as effective pedagogical tools to facilitate the learning experience of students. They identified nine attributes to learning with serious games and mapped four of them to the Technology Acceptance Model. Our research builds on their work by utilising three of their constructs: *situated learning*, *transfer of learnt skills* and *reward* to provide fresh insight into the use of 3D gaming as a potential facilitator for learning business ethics particularly in relation to: games usability and the use of *gamification* techniques. See Appendix A, for a list of constructs and definitions. Figure 2 illustrates our proposed conceptual model for this study.

FIGURE 2 HERE

Games Usability

In his work with TAM, Davis (1989) posited that perceived ease of use (the extent to which a person believes that using a technology will be free of effort) and the perceived usefulness of a system (the degree a person believes that using a system will improve job performance) were key to a user's intention to use the system. Further studies expanded on these constructs to find links with other constructs. Notions of flow characterised by control of the software, focus of attention; curiosity; and an intrinsic interest in the activity (Csikszentmihalyi, 1979; Novak, et al., 2003; Webster, et al., 1993); cognitive engagement (Webster & Ho, 1997) and cognitive absorption (Agarwal & Karahanna, 2000). Agarwal and Karahanna describe cognitive absorption as being a combination of 'temporal disassociation, focused immersion; heightened enjoyment; control and

curiosity' and determine that the construct is an antecedent to the TAM's perceived ease of use and usefulness constructs (p.675).

Gee (2003) points to a number of criteria used in games design that facilitate learning. Firstly players feel empowered (control) due to the freedom to move around and do what they like due to a structured but non-linear environment within the confines of the game level. In this type of environment learners are free to fail, explore, make their own decisions and develop their own interpretations at their own pace. Secondly, requiring a completion of tasks that increase in complexity as the player moves through the game levels. This method of scaffolding allows learners to expand the zone of proximal development or concepts of learning they can master with guidance. Finally, working within the context of a distinct system so that the student engages with the content directly ensuring active rather than passive participation – preventing an over-reliance on 'lectures, talking heads, or generalities' (Gee, 2003:14).

Yusoff et al described the situated learning (SL) construct as 'placing the learner in an authentic environment, where they would be able to develop mental models of their experience and relate it to real life' (2010:49). The construct transfer of learnt skills (TS) related to the ability to transfer those skills learnt to real life situations. Both these constructs are particularly relevant to ethics teaching bearing in mind Nyberg's (2008) work which identified that students' have difficulty applying an ethical principle outside of a particular context. By placing the student within a virtual reality setting or 'microworld' we posit that they will engage in a virtual experience to gain practice in making ethical decisions within familiar contexts where they would also experience (to some degree) the impact of their chosen actions. Microworlds were incorporated into the game in the form of an office, a park and a party - typical environments in which business is done or influenced. The objective was for the player to become immersed in the story and engage with it on a personal level whilst making ethical decisions for their character. Figures 3 and 4 depict scenes from the office and park levels.

FIGURES 3 and 4 about here

To test the effectiveness of situated learning (SL) and transfer of learnt skills (TS) within the context of our ethics game we posited that:

H1. Perceived ease of use (EOU) is positively related to situated learning (SL)

H2: Perceived ease of use (EOU) is positively related to the transference of knowledge and skills learned in ethical decision-making (TS).

Perceived usefulness (U) determines the level to which players believe using the game will improve job performance. We therefore posit that:

H3: Perceived usefulness (U) is positively related to the transference of skills (TS) and knowledge in ethical decision-making because it relates to real life (SL)

Gamification

The *reward* (R) construct refers to incentives in the game designed to encourage the learner in order to keep motivation high. Malone (1981) explored theories of intrinsic motivation within the context of highly motivating games to determine the characteristics of intrinsically motivated environments. Building on the work of other theorists (Berlyne, 1965; Bruner, 1965; Csikszentmihalyi, 1979; Moore & Anderson, 1969; Piaget, 1951), Malone refers to three distinct

areas: challenge (which will involve goals of different levels, hidden information and randomness), fantasy (primarily intrinsic - which can cater to emotional desires and needs), and curiosity (both sensory and cognitive). Building on this research, content and play strategy were incorporated in a way that would challenge the players by gamifying content and story logic through scoring systems and level progression, hidden clues and a comic book genre to provide a fun, fantasy element.

We therefore posit that:

H4: A simple points system incentivises people to complete the game (R) and results in a perception that they have learned ethical concepts relevant to real life (SL)

Research Context and Sample

Prior to pre-testing constructs and questions were evaluated for validity and consistency. The online survey was comprised of questions representing (i) demographics; (ii) previous gaming experience and familiarity with different game categories; and (iii) the endogenous and exogenous constructs that constitute the conceptual model that was adopted for this research.

Questionnaire Design

To ensure content validity, the constituent items representing the measurement constructs were drawn from previous research studies that used extended versions of the Technology Acceptance Model (Moon, 1986; Yi & Hwang, 2003; Yusoff, et al., 2010). 26 Likert-type scale questions representing the endogenous and exogenous constructs asked respondents on a scale of 1 (strongly agree) to 7 (strongly disagree) to indicate their extent of agreement or disagreement with a statement. To ensure face validity, the questions were presented to an academic colleague from the Department of Psychology at [inst1], with over 20 years experience as a quantitative researcher, who corroborated question style, content and number of questions for each construct (Anastasi, 1988; Litwin & Fink, 1995). This resulted in a reduction in the original number of TAM related questions to 26 (four questions for each of 4 constructs, and five questions for two constructs) as it was felt any more than this could incur respondent fatigue. Some subtle word changes were also implemented. We followed some of Podsakoff's (2003) tips to anticipate the effect of CMB by (i) randomising the order of the items representing the endogenous and exogenous constructs and (ii) using 'negatively' worded questions in some of the items. A pre-test was carried out on a sample of 15 second year business students. The pre-test identified some browser issues with the game, which were recoded before commencement of the main research. A copy of the 26 questions – with annotated construct - can be found in Appendix B.

Results

Descriptive statistics

Students on one first year module and the ethics modules at both institutions were invited to play the game with lab sessions booked after lectures for two consecutive weeks. These sessions began with explanations of the game components and objectives, how to log in and use the controls, and a request to complete the survey on completion. The majority of players finished within 2 hours although there were a few that subsequently logged on later to complete the survey after further requests. 177 undergraduate students completed the game and of those 103 completed the survey – a response rate of 58%. This was later reduced to 100 due to the removal of 3 outliers whose responses did not produce a consistent answering pattern and thus displayed traits of acquiescent

response bias (Knowles, 1963; Ware, 1978). Although the game was made available to all three year groups through advertising in classes, 89% of those who played the game and completed the survey were final year students on the Business Ethics modules of both institutions. This may have been due to the added incentive of 2 marks to a student's overall module mark if the game was completed but also the obvious additional learning resource relevant to their course. For ethical reasons we did not require students to complete the game survey to receive the 2 extra marks. Table 1 summarises the demographics and other pertinent characteristics of the sample. Both university ethics committees approved the two studies. All students completed consent forms either in online format (survey) or in hard copy (focus groups).

INSERT TABLE 1 ABOUT HERE

The sample consists of slightly more female participants (56%) with all subjects between 18 and 25 years of age and a variety of ethnic mixes with 38% white Caucasian, 17% black African or Caribbean, 32% Asian, and the remainder falling in the 'other' category. The majority were employed (63%) and, of those, most with work experience of over 2 years (56%). 56% of the respondents never or rarely play video and online games although 19% of the respondents who do play are avid gamers (respondents' answers to the question gauging their frequency of playing games varied between "often" and "all the time").

Construct validity and reliability

A construct validity test in the form of a factor analysis was conducted to examine the extent to which the set of questions in the survey measured the latent construct they purported to represent (Campbell & Fiske, 1959; Churchill, 1979). A set of preliminary tests that test the data for normality, outliers and missing cases were performed prior to the exploratory factor analysis test to anticipate any anomalies in the data set. Preliminary test results revealed that a few variables displayed a moderate positive skew and there were a few missing cases and three outliers. The outliers were discarded from further analysis because they displayed traits of the acquiescent set (Knowles, 1963; Ware, 1978) but instead of discarding the variables that violated the normality test from subsequent analysis or opting for an alternative non-parametric test, a suitable transformation technique (Stern, 2010) was applied on the non-normal variables. Missing responses were adjusted using the series mean method (George & Mallery, 2010; Malhotra, 2010).

The factor analysis showed that some of the items cross-loaded between factors with values of 0.3 or higher, which some researchers perceive as a sign of potential overlap loading. Kachigan (1991) contends that there is no universal standard that defines the magnitude of a high and low loading, albeit it seems that factor loadings of 0.4 and 0.5 are commonly used as the threshold for identifying significant loadings (Guadagnoli & Velicer, 1988; Stevens, 1992; Zwick & Velicer, 1982). In addition, MacCallum et al (1999) conducted an investigation concerning prerequisites to factor analysis such as sample size and the ratio of participants to variables. He concluded that the supposition that a larger sample size would yield more accurate results was not always pertinent and from that premise we consider our results to be consistent with suggested approaches.

The communalities of the majority of the variables was higher than 0.6 (see Appendix C for communality scores of scale items). According to MacCallum et al (1999), this augurs a fairly accurate data set which can be utilised subsequently for interpreting the latent constructs of this research. We have followed Tabachnick et al's (2007) advice on selecting only factors that have loaded significantly on at least three items.

The items representing the TAM's Perceived Playfulness (PP) construct failed to load consistently on a single factor and therefore were eliminated from further analysis. On the other hand, the representative items of Ease of Use (EOU), Reward (R), and Situated Learning (SL) scales loaded fairly consistently on separate factors. The representative items of the Perceived Usefulness (U) and Transfer of Learnt Skills (TS) scales loaded on a single factor signifying that they measure a similar concept, that is the perceived usefulness of the game in improving the ethical decision making process – the transfer of learnt knowledge and skills in evaluating ethical issues. We have therefore created a compound construct PPSK (Perceived Practicability of Skills & Knowledge).

The Cronbach Alpha test for a scale's internal reliability was conducted on the selected factors and the results showed that the Cronbach Alpha scores of the selected factors were above the 0.7 threshold of reliability (Nunnally, 1978; Reynolds & Santos, 1999) and thus, they are assumed to be reliable (Table 2).

INSERT TABLE 2 ABOUT HERE

Since the items on the questionnaire have satisfied the main criteria for construct validity and reliability, the scale items of the selected factors were retained for subsequent analysis. Figure 5 illustrates our revised conceptual model of perceived augmented learning, based on the outcome of the factor analysis solution.

INSERT FIGURE 5 ABOUT HERE

Students' performance and results

To gain an initial overview of results, responses were divided into four categories (Agree, Disagree, Neither and Unanswered) and the overall average score for each construct calculated as a percentage (see Appendix D). These results indicated that 66% found the game easy to use (EOU) with 70% finding it fun and entertaining (PP). 71% found themselves motivated to complete the game due to the gamification elements (progression through levels and points system (R)); 64% felt they had acquired new knowledge that would be useful to them (TS); 69% felt the game environment aided their ability to relate their learning to real world ethical dilemmas (SL); and 62% felt the game useful in making ethical decisions (U). A sample question representing each construct is also provided in Appendix D.

The estimates of factor scores were computed using the simple sum score method, which involves adding the respondents' scores on the items loading significantly on a factor (Comrey & Lee, 1992). According to Hair (2006), the sum score method is suitable for measurement scales used in exploratory studies where the scale items are new and there is no substantial evidence of construct reliability or validity and it also simplifies the interpretation of the data and enables the factor scores to preserve the variation in the original data. Three categories of respondents were created based on the respondents' answers to the question asking them how often they play online and video games. The categories represent different levels of game playing experience - low (never or seldom), medium (occasional) and high (often and always i.e. frequent). These 3 categories together with the variables representing gender and employment status were later recoded into dummy variables and subsequently included in a multiple regression analysis.

The data were tested for the presence of multicollinearity and heteroscedasticity in the predictor variables and the results indicated that neither was inherent in our data set. For example, the absence of multicollinearity is evidenced by the low tolerance and VIF scores (below 10) on the

predictor variables (George & Mallery, 2010; Stern, 2010). We used an appropriate selection method for the regression analysis to ensure that we did not end up with an 'over-fitted' or 'spurious' regression model (Babyak, 2004). For each dummy variable, K-1 categories were included in the multiple regression analysis to leave the K^{th} category as a reference category or group (Hardy, 1993; Malhotra, 2010). For example, the non-player dummy variable was chosen as a reference category and it was excluded from the analysis to examine whether the medium-player and frequent-player category had (each compared to the non-players) a significant effect on the game-driven SL (perceived augmented learning in ethics) construct (Princeton University, 2007). The reference category will be represented by the constant in the regression analysis output. A multiple regression analysis test was used to develop a model for predicting the effect of ease-of-use (EOU), perceived practicability of learnt skills and knowledge (PPSK) and rewarding schemes (R) on situated learning (SL). Table 3 and Table 4 summarise the results of the multiple regression analysis.

INSERT TABLE 3 ABOUT HERE

Table 3 shows that a significant model has emerged from the multiple regression analysis $F(3, 96) = 65.72$, $p < 0.001$, $R^2 = .673$. The R-square value indicates that a substantial proportion of the variance (67.3%) in situated learning is explained by the predictor variables. The Beta values display the relative influence of each predictor variable (EOU, R, and PPSK) on the dependent variable (SL) and the results clearly show that PPSK has the greatest influence (Beta = 0.414, $p < 0.001$) followed by R (Beta = 0.397, $p < 0.001$). The Beta value for EOU on SL was not significant but EOU had a significant effect (Beta=0.643, $p <0.01$) on PPSK (Table 4) and thus it confirms its role as a predictor of the adapted version of the perceived usefulness variable (perceived practicability of learnt skills and knowledge). The significant intercept in the model means that in addition to the explanatory variable EOU, there are other extraneous variables that account for the variance in the PPSK scale. We have also included three categorical variables in the regression analysis - gender, gaming experience and employment status - as 'dummy' variables to see if these had a significant effect on the criterion variable SL. The outcome of the analysis showed that the three categorical variables had no significant impact on SL. Finally, the Adjusted R^2 value of 0.662 (significant at $p < 0.001$) indicates that the measurement model overall has an acceptable "goodness-of-fit".

INSERT TABLE 4 ABOUT HERE

We summarise the findings from the multiple regression analysis below. Figure 6 shows the results within the conceptual model.

- Ease-of-use (EOU) was found not to be a significant predictor of situated learning (SL) and therefore hypothesis 1 is rejected.
- Ease-of-use (EOU) was found to be a significant predictor of the adapted version of perceived usefulness (i.e. perceived practicability of learnt skills and knowledge (PPSK)), which corroborates the findings in the extant TAM literature (Davis, 1993; Davis, et al., 1989) and therefore hypothesis 2 is accepted.
- Perceived practicability of learnt skills and knowledge (PPSK) had a significant positive impact on game-driven situated learning (SL) and thus hypothesis 3 is accepted ($p < 0.001$)
- Reward (R) had a significant positive impact on game-driven situated learning (SL) and thus hypothesis 4 is accepted ($p < 0.001$).

INSERT FIGURE 6 ABOUT HERE

These findings lead us to conclude that the majority of students benefited from using the ethics game in developing their ethics knowledge and decision-making skills and this can be attributed to a number of factors:

- They felt the game was easy to use and therefore useful for developing knowledge and practicable ethical skills;
- They felt that the knowledge and skills learned in the game was useful because it related to real life;
- They were motivated and engaged by the use of a points/rewards scheme within the virtual environment;
- The positive experience was not dependent on gender, gaming experience or employment status suggesting it is a suitable method to be used across this type of participant group.

Focus Groups

Focus group composition was an opportunistic sample of students on both institutions' final year Business Ethics courses who had played the game and completed the survey. During an ethics lecture at both institutions, students were encouraged to come forward with the incentive of a £10 gift voucher to take part. The first ten students from each institution who put their name down were notified by email of the date and time the following week for the group session. On the designated day, seven students from institution 1 attended the session and five students from institution 2. Both sessions were just over an hour in length and took place in a designated meeting room in each institution. The sessions were recorded as an MP3 file and transcribed verbatim to ensure systematic analysis of the discussion. The groups were moderated and co-moderated by two of the authors of this paper who have over ten years experience in moderation of focus groups. Neither moderator was involved in teaching the students on the modules nor involved in marking their work although one (X1) had taught them previously and marked previous work. Both universities' ethics committees approved the studies and consent forms outlining the details of the research and treatment of the data were distributed and signed by participants. Group 1 from [inst1](X1) consisted of 5 women and 2 men between the ages of 20 and 24. Group 2 from [inst2](X2) consisted of 3 men and 2 women in the same age group. Both groups of students were from mixed ethnic backgrounds and were nearing the end of their ethics courses. All members of both focus groups had played the game in the scheduled lab sessions in the previous week.

Focus Group Questions

Focus group questions were designed by the research team to address the research question by identifying pertinent variables experienced whilst playing the game; explore more deeply specific constructs to corroborate survey findings; and determine overall views with regard to the ethics game and preferred level of integration within the ethics module. A semi-structured questioning approach was taken to ensure consistency between the groups but allow for some flexibility in order to capture specific experiences of the different group members. The moderators used a table providing the research question and sub questions plus the agreed group questions as an aid for both sessions. A copy of this is included in Appendix E. The sessions began by establishing the level of game experience each member of the group had prior to playing the ethics game and to confirm that all members had in fact played and completed the game the previous week. Both groups were then quizzed on particular ethical issues they remembered from each of the game

levels. This was to remind them of each of the levels, to get them talking, and to establish how much they actually had remembered of the game issues. This naturally led to discussions about specific elements within the game and their impressions of them in relation to their learning of ethics. Although there was some latitude to permit free discussion and encourage unsolicited opinions and responses, the transcripts confirm that both sessions followed a similar level of standardisation to allow for comparisons across the two groups.

Analysis and Discussion

Two main themes emerged from the discussions. One related to the competition through point scoring and the other the impact of the game on helping develop ethical decision making knowledge and skills – both of which corroborate survey findings. The next section will discuss the results of the focus groups within the context of the quantitative study and hypotheses to integrate findings.

Competition through Point-Scoring

We hypothesised that the use of reward in the form of points would sustain interest and prove motivating (H4) and this hypothesis was accepted. The use of reward in the form of points is often used in computer games but we were interested in how it would work in the more serious context of business ethics. Incentivisation is a prominent topic in educational research with evidence that incentives enhance students' learning abilities and expectations (Benowitz & Busse, 1970, 1976; Bisett & Rieber, 1966; Cartwright, 1970; Figlio & Kenny, 2007; Kennedy & Willcutt, 1964; Witryol & Hayne, 1971) and that perceived rewards in their extrinsic and intrinsic form can augment the learning experience and motivations of learners (Facteau, et al., 1995; Lepper, 1988). The power of reward found in our research to be a significant motivator was supported by comments from students in the focus groups. In the X1 group gaining 2% toward their final mark and achieving a place in the top ten on the game web site's Leader Board was a chief motivator. One male X1 student commented that he and his friends set up a competition between themselves to see who could score the highest points, "I was convinced I was going to get over 1000".

Another female X1 student expressed her extreme desire to get more points on the Leader Board than the highest:
I was convinced I was going to get better than the girl at the top. Yeah, I was like B you are going to do this, let's go, and by level three I was nearly puking. I was like xx. Didn't get that far off though I don't think, but we weren't at a thousand, like eight hundred and something.

Despite taking part in the focus group one week after completing the game these students still remembered their score aspirations and how much they had succeeded or fallen short.

However there was also the discussion that although the competition made them try harder, it also distracted them from the reading of particular texts present in the game. This led to a discussion in which students commented that the game should reduce the amount of on-screen text – 'less is more' citing particular parts in the game that work better than others. One student commented that she stopped reading the quiz feedback, which appeared when an answer was wrong because it was too long.

Students commented that the marking scheme of providing 2 marks to the course mark for completing the game was not the best approach. Although it was an incentive for finishing, it hindered their learning as they rushed to finish instead of concentrating on the content.

If you'd have done it like you'll get a percentage, based on an equation that will work out from your points that you get from the game, then everyone would have been there all day I think. Yeah.

Developing Ethical Decision-Making

We hypothesised that respondents would find the game useful for developing ethical decision making knowledge and skills for transference to real life situations (H2, H3) and these hypotheses were accepted. To evaluate to what degree these occurred respondents were asked to identify and evaluate the various ethical issues they had encountered and the rules and values based approaches used.

In terms of the rules-based components students identified and commented on particular knowledge elements – the stakeholder map, the laws and acts, and the philosophical writings and related these back to what they had learned in their lectures. One X2 female made the comment that the game was a much easier way to learn these components, supporting the H2 hypothesis that ease of use is a factor in developing knowledge.

…you understand the theory and you get rewarded for that and by this you are learning in an interactive way and I think that's really.. it's easy to learn this way.

One X2 student commented that she was really frustrated that she had confused Kantian theory with Virtue Ethics and she was going to return to her lecture notes to study these theories again. Another male X2 student supported the hypotheses that the transference of skills and knowledge was useful because of its relation to the real world as he commented that the game, "…gave the real world examples linked to the theory and that was really helpful". And a further student corroborated this view of how theory is linked to practice.

….makes you aware of yourself and what are you going to do when the situation arises. I know the theory part, the theoretical part of it but not so much the application. I've never been in a huge company – I haven't been a CEO yet – I haven't been in a decision-making situation.

And a female X2 student explained how the game provided this practice in decision-making:

You go through the process? You know? Like, although I know it's just a virtual experience, you get a little bit of experience.

However it was the values-based components, which seemed to have provided the most discussion and enthusiasm. Both groups made a point of mentioning two specific ethical issues that had occurred in the game – both of which were personal rather than business related. One involved finding a wallet on the ground in a park and the other overhearing a conversation about tweeting between two girls at a party. In both cases they were 'in the moment' in being a part of the surroundings and being required to interact in some way – they 'find' the wallet in a park and have to decide there and then what to do with it and they 'overhear' the girls talking at a party and are asked their opinion of the conversation.

X1 Group:

Student 1: And they related to more everyday life situations, and things that happen.
Student 2: Yeah.

Student 3: And that like overheard their conversations, finding the wallet was more personal ethics. It was just very more relatable.
Facilitator: OK, so the everyday life thing was a good thing.
Student 1: Yes but the overhearing, that's it, the banker, selling mortgages to people who couldn't afford it.
Student 4: Twitter. Talking about how she expressed her feelings about her boss.

The familiarity of the environments was also mentioned with one student commenting that he didn't relate much to the office environment and much preferred the park and party levels because he felt more at home. The same student commented that he was frustrated that he was going to the party but didn't have a gift to take:

The party was like the park as well, you could relate, like you could relate to that as well and I was almost like getting annoyed about the present, I wanted to take a present.

Feeling frustrated at not being able to take a gift to a make believe party provides an insight into the level of immersion this student experienced. The fact that the player experiences the game through the eyes of the character of Anna was discussed as a reason why the player feels involved in the experience.

And the fact that you can't see the person you're moving, you were like looking through their eyes, so that helps feel like you are there, definitely.

Having a personal involvement seemed to link well with people coming to terms with what decisions they would make – putting them in touch with and challenging their personal values. One male X2 student commented on how the game made him resort to his own values to make a time pressured decision:

It made you more aware of how when you might encounter those decisions and how you might deal with them in the future. You have to apply your principles – time pressure is there – you have to make a decision right away.

And another X2 female member, "For me it made it more realistic about what ethical issues there could be".

And another X2 female member:

I felt the game was a more personal approach so you're not just thinking about theoretical things but you're really thinking about 'what would I do' and it's more in a personalised way that I'm thinking this is more valuable to me and I can relate it to what I value and… yeah.

In the game a major choice for students to make is whether to choose to get needed information from a hacker or use a reputable market research company. Half of the students indicated they chose the hacker option. On being questioned as to why this was the reasons given were that they liked the idea of being able to try out and 'see what would happen' if you go against your own values. The fact the game was not real gave them the opportunity to experiment. This supports Gee's (2013) 'free to fail' idea – that students benefit from being able to try out in a safe environment. They chose the option knowing they would lose some points but were curious to see what would happen.

Integration into a Business Ethics Course

Students were asked about their views of the degree to which the game should be integrated into the course. There was unanimous agreement from both groups that the game should not replace the module and classroom experience but be an adjunct to it. When asked if they preferred the game to other methods of learning one member of the group stated she preferred books and case studies so that she could highlight text and take notes.

Because I don't like playing games unless I want to, so for me books are always going to be there and points you want to write down for which question. But with the game once you've passed that level you've just passed that level.

All others said they liked the game over the other methods although one student commented this could be partly due to the novelty of it. When asked to clarify why they preferred this approach two students commented that they much preferred learning this way over reading texts with one commenting:

Only because reading just the document it does sort of get really boring, and you won't take anything in, it will just be like briefly going over, flicking pages, where at least with the game you can break it up, information, so you are doing something different, so you are going to actually take more in at a time.

Conclusion

This paper responds to the growing recognition of the importance of the inclusion of ethics within business education and how best to deliver this to the students of Generation Z. By positing the research question, "how and to what extent can an immersive interactive Business Ethics game contribute to the development of knowledge, skills and values of Business Ethics students?" this paper aims to address this challenge.

Our analysis of the use of games in the teaching of business ethics underlined the importance of the use of experiential learning methods to support a population which now does many things online, corroborated by pedagogic research supporting the view that learning styles are evolving as a result of technological innovation. XX, a new simulation game, developed as part of this research, provides a unique solution as it responds to a gap in existing studies by addressing the potential for visual 3D and immersive simulations as a tool for teaching ethics.

The survey results were significant in confirming that students perceived the approach to learning business ethics through this particular form of visual simulation as useful in helping them relate and apply their learning of ethics to their needs and interests in the outside world. This addresses important aspects of business ethics teaching: providing real-life scenarios the students can relate to, allowing the students to engage in decision making with differing consequences (enhancing transferability of cause and effect) and ultimately through the case and vehicle of delivery engage students sufficiently for them to see why ethics is important to them personally, rather than as an academic exercise or box-ticking requirement.

The work supports previous research on the benefits of using games for learning but also contributes to the pedagogic business ethics debate by offering an experiential method that develops ethical decision-making through immersive learning. Results from the survey also indicated that this appreciation of the game as a learning method was not affected by gender,

gaming prowess or job experience. Specific contributions in the area of pedagogy, theory and research and business ethics pedagogy are discussed below.

Implications for Pedagogic Theory & Research (TAM Models)

This research provides a subtle theoretical contribution to the extant TAM literature. Our findings indicate that the use of 3D gaming technology as a pedagogical facilitator can foster a positive learning experience. The theoretical foundation of our TAM-based variant model has been corroborated when ease-of-use was found to be a significant predictor of an adapted version of perceived usefulness in the form of perceived practicability of learnt skills and knowledge (PPSK), a phenomenon that recurred consistently in the extant TAM literature (Davis, 1993; Davis, et al., 1989). Our findings also showed that this developed construct (PPSK) had a significant effect on situated learning (SL). From this we contend that our 'pedagogical' variant of the TAM model can potentially be used and adapted in future studies to measure and understand technology acceptance in the context of serious games.

Implications for Business Ethics Pedagogy

In response to our question as to whether the game could contribute to the development of knowledge, skills and values, our mixed method approach proved useful in corroborating quantitative findings. The strength of an interactive immersive game was evident in three main areas. Firstly, the game utilises a new learning style that has evolved with the changing demographic of Generation Z and the parallel development of technology as an educational enabler. This is demonstrated in hypotheses 2 and 3 as students found the game easy to use and this impacted on their belief that it was useful to them in developing knowledge and skills in ethical decision-making – skills which they considered transferable to real life situations. It extends the research to support the use of games of this type to develop ethical decision-making. As demonstrated in hypothesis 4, students were motivated to learn by moving to new levels and gaining points to be mentioned on the leader board thus supporting the potential of this aspect of games design as a way to engage learning.

Secondly, the game offers an interactive environment that mirrors the real world in which students can experiment and experience to some degree the consequences of their ethical choices. Learning theoretical concepts can make ethics a dry subject and students clearly appreciated this alternative pedagogical approach through which to apply the theory to real life dilemmas. Furthermore the nature of gameplay, in which the player is required to make choices, which affect their character, suggests games are naturally suited as a method to help develop ethical insight and awareness as students explore their own values within the context of rules based requirements. Focus group comments suggested that the immersive quality of games allows the player to experience beyond the cognitive as they become a part of the environment. They are allowed to fail in ways they are not ethically permitted to do in real life and are free to make their own decisions and 'see what happens'. This makes the game useful in helping to reduce that 'concrete/abstract and personal/impersonal' divide that currently exists in business ethics education (Gu & Neesham, 2014). As one student pointed out, 'it makes you aware of yourself' as you are required to make a decision, and then gain insight into the impact that decision has on others.

Thirdly, pragmatically, it is possible to engage participants in active learning without the instructor having to be physically present or having to mark large volumes of student work. In response to the economic crisis there has been an increase in the number of standalone ethics courses on university programmes (May, et al., 2013) and employee induction schemes (Jondle, et

al., 2014) and methods to engage and motivate large numbers to engage personally with the issues is a challenge. This is where web-based technology can play a part in reaching large numbers in any location with a suitable broadband connection. Games of this nature could be used on employee training and induction schemes in conjunction with other methods of e-learning interaction (forums and discussion groups and assessment) to provide employees with a more interactive way of understanding particular ethical dilemmas that may occur in their work environment. This is an avenue for further exploration.

Limitations and Further Research

It cannot be said from this research what impact this form of learning experience will have had on future ethical motivation and subsequent behaviour in the workplace. The research measured students' perceptions of their ethical decision-making and utility in the real world but did not attempt to judge the morality of their choices, only their own perceptions of the game to improve their learning and awareness of the issues within the context of their own values. As with any subject of this nature, to accurately assess an individual's capability for moral judgment is a difficult task, fraught with ideological pitfalls. Anderson and Lawton (2009) also acknowledge that establishing external validity in evaluating the pedagogic effectiveness of simulations in terms of actual learning has proved problematic. Studies tend to focus on affective elements via player perceptions and lower level cognitive function. They surmise that reasons for this are due to a better understanding amongst researchers in ways to measure lower levels rather than high levels of understanding and the complications involved in designing higher-level measurement tools (ibid: 212). That said, students' belief in whether they have learned – and their enjoyment of the process - are important components in determining the impact of their educational experience particularly in the light of integration and retention (ibid). Although our primary concern should be whether our students are actually learning the fact they *think* they are is of great value in and of itself. In terms of evaluating the effectiveness of a game designed to help students develop an understanding of professional ethics within the context of their own values, their perceptions would be even more relevant as ethics involves an understanding of issues from one's own and other situational perspectives.

From a statistical perspective, although the size of the sample in this research is appropriate for exploratory studies and the type of tests that we have conducted, care should be taken when generalising the results to a wider population. Future studies are planned with larger sample sizes and over different geographical and cultural contexts to determine the extent to which these findings will replicate. Future work is also planned to evaluate the effectiveness of the game through an analysis of game scores against achieved learning outcomes. Finally, as the majority of the students were in employment, it seems likely that ethics games of this type would be beneficial on employee training and induction programmes, and thus a potentially exciting opportunity for future research.

APPENDIX A

Measurement Construct	**Acronym/ Code**	**Description**
Ease of Use (TAM)	EOU	Ease of use is where participants feel that minimal effort is required to learn the Game.
Perceived Playfulness (TAM)	PP	Perceived enjoyment in playing the game (hedonic).
Perceived Practicability of Learnt Skills and Knowledge (New Construct*)	PPSK	Drawn from the items that represent the U and TS constructs and thus is defined as the extent to which respondents believe the game was useful in acquiring and relating knowledge and practical ethical skills to business decisions.
Reward (Yusoff, 2010)	R	The feedback arrangement in the game to encourage participants and keep motivation high to complete.
Situated Learning (Yusoff, 2010)	SL	The provision of a gaming environment or world where the participants can relate their learning to their needs and interests in the outside world.
Transfer of Learnt Skills (Yusoff, 2010)	TS	Perception of use to relate learned knowledge and skill to business decisions.
Perceived Usefulness (TAM)	U	Participants' belief that using the game helps them in making better business ethical decisions.
* = new construct derived from factor analysis **Glossary of Constructs**		

APPENDIX B

(request from Authors)

APPENDIX C

Measurement Scale	Initial	Extraction
EOU1	.698	.447
EOU2	.843	.791
EOU3	.891	.839
EOU4	.907	.781
EOU5	.865	.730
U1	.899	.784
U2	.890	.843
U3	.887	.830
U4	.863	.744
TS1	.926	.848
TS2	.943	.840
TS3	.951	.771
TS4	.953	.805
R1	.823	.751
R2	.933	.869
R3	.926	.860
R4	.872	.773
SL1	.908	.837
SL2	.894	.868
SL3	.864	.881
SL4	.761	.595

Extraction Method: Maximum Likelihood.

Communality scores of scale items

APPENDIX D

Construct	Sample Question	Total % for each construct			
		Agree	Dis-agree	Neither	Un-answered
EOU	I find this game easy to use.	66	15	10	9
PP	This game makes completing a task fun and entertaining	70	12	9	9
R	I felt rewarded when I got points	71	6	16	7
SL	After playing this game, I feel that I have learned new skills which I can apply in different situations	69	7	10	14
TS	I feel that I have acquired new knowledge that is useful in day-to-day business decisions.	64	10	17	9
U	This game can help me make better ethical decisions	62	7	18	13

Sample questions by construct and results (n=103)

APPENDIX E

Research Question and Sub Questions	**Focus Group Questions** – Semi-structured - be flexible in terms of order of questions to promote discussion.
How and to what extent can an immersive interactive Business Ethics game contribute to the development of knowledge, skills and values of Business Ethics students?	
1.1 How effective it is in aiding students' development of ethical sensitivity? (skills)	1 What were the ethical concepts you experienced in the first level (the office)? 2 What were the ethical issues you experienced in the park? 3 What were the ethical issues you experienced in the party? 4 Were you able to identify the ethical issues or did you get help from a friend?
1.2 How does it contribute to the development of students' situated learning of ethics? (skills)	1 Did the game help you identify the ethical issues in each level? If so, in what way? 2 Do you think there are any benefits to the game approach to understanding ethics? – establish whether there was any personal involvement - If so, did this help you relate to the ethics in the situation? 3 If so what elements made you feel this way? 4 Does this prepare you for the work environment?
1.3 What impact does game progression have on deep learning of ethical constructs? (gamification)	1 Were you motivated to complete the game? If so, what made you carry on? If not, what stopped you? 2 How did your motivation impact on your learning? [was it negative or positive?] In what way? 3 Who chose to hack into the system? Ask why 4 Who chose to use Gilly's company instead? Ask why 5 Did the ending have an impact on your ethical insights/values? [make you think again about the issue]?
How does use of a computer game contribute to the learning experience?	
2.1 What are the benefits of using a computer game over more traditional methods?	1 Would you have preferred this exercise as a text document/case study? If so why or why not? 2 What extra benefit (if any) does the game provide? 3 Do you think the functionality could be improved and, if so, would this make it of more benefit? 4 What would you like to see changed?
2.2 How does it contribute to knowledge acquisition?	1 Do you remember anything from the game with regard to assessed knowledge? If so, ask them what. 2 Are there improvements you would recommend to improve your retention of knowledge? 3 Did you read the quiz feedback? 4 Was this useful or not? 5 Did you engage with the quiz or just click anything to get through? 6 [If clicked anything] – why do you think that was? 7 What would motivate you to actually do the quiz? 8 Do you think the quiz is important for learning?
2.3 What contribution can a computer game offer within the context of a blended learning course?	1 Do you think the game should be blended with classroom discussion or do you think it can stand on its own as a learning tool?
Focus Group Semi-Structured Question Sheet	

If citing from this article please cite the published version:

Jagger, Suzy, Siala, Haytham, & Sloan, Diane. (2015). It's All in the Game: A 3D Learning Model for Business Ethics. *Journal of Business Ethics*, 1-21. doi: 10.1007/s10551-015-2557-9

ITEMS FOR INSERTION (FIGURES)

Figure 1: Comic book page illustrating consequences of an action

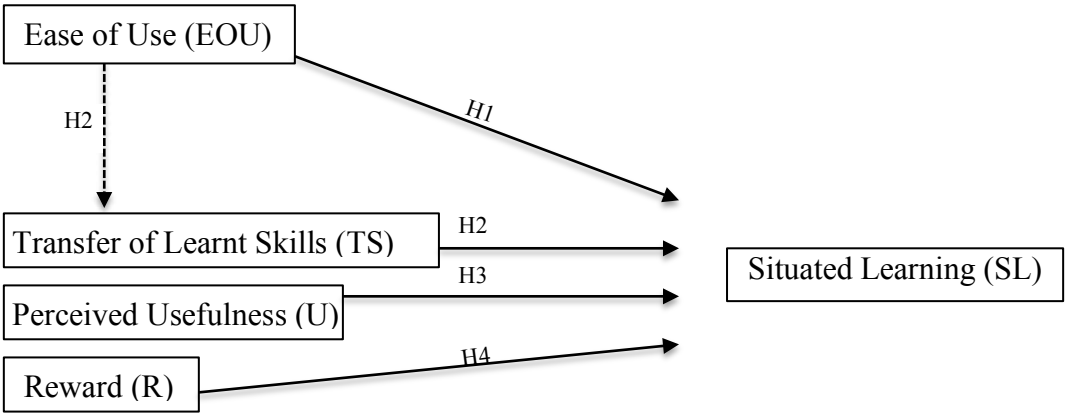

Figure 2: Proposed conceptual model for perceived augmented learning

Figure 3: Office Scene

Figure 4: Park Scene

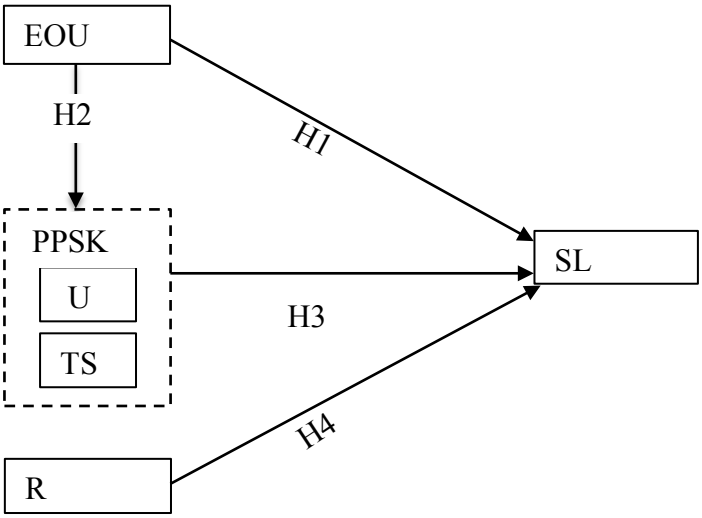

Figure 5: Revised conceptual model for perceived augmented learning

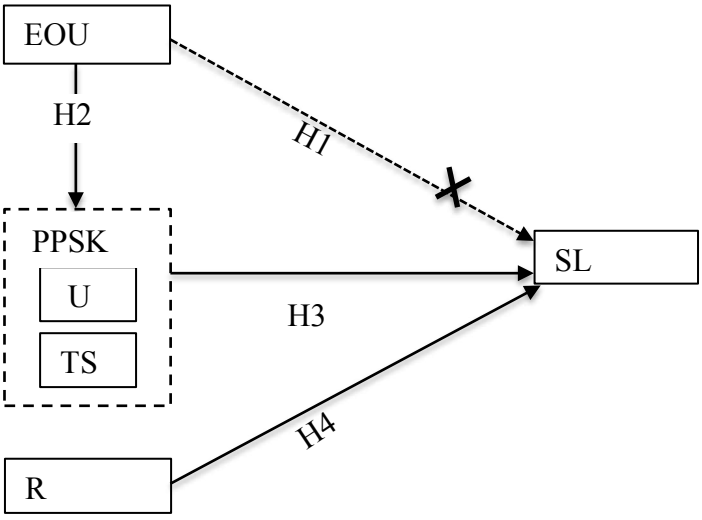

Figure 6: Conceptual model with results

ITEMS FOR INSERTION (TABLES)

Demographic		% (N=100)
Gender	Male	39%
	Female	56%
	Unknown	5%
Age	18 to 25	95%
	26 to 34	4%
	35 to 54	1%
Ethnicity	White	38%
	Black	17%
	Asian	32%
	Other	13%
Employed	Yes	63%
	No	37%
Work Experience	Less than 2 years	44.4%
	2 to 5 years	41.3%
	>5 years	14.3%
Frequency of playing video and online games	Never	36%
	Seldom	20%
	Occasionally	25%
	Often	14%
	All of the Time	5%

Table 1: Demographics and characteristics of sample

Measurement Scale	Cronbach Alpha
EOU	.931 (N=4)
PPSK	.962 (N=8)
R	.916(N=4)
SL	.907 (N=4)

N= Number of items

Table 2: Cronbach Alpha for Measurement Scales

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Variable	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	.540	.352		1.535	.128		
EOU	.055	.063	.067	.876	.383	.580	1.724
R	.427	.113	.397	3.780	.000	.309	3.237
PPSK	.399	.108	.414	3.704	.000	.273	3.657
R^2	0.673**						
Adjusted R^2	0.662						
F statistic	65.720**						

Dependent Variable: SL (N=100) , * = significant at $p < 0.05$, ** = significant at $p < 0.001$

Table 3: Regression Results for SL as a dependent variable

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Variable	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	2.069	.355		5.825	.000		
EOU	.545	.066	.643	8.301	.000	1.000	1.000
R^2	0.413**						
Adjusted R^2	0.407						
F statistic	68.915**						

Dependent Variable: PPSK (N=100), * = significant at $p < 0.05$, ** = significant at $p < 0.001$

Table 4: Regression Results for PPSK as a dependent variable

Bibliography

Afari, E., Aldridge, J., Fraser, B., & Khine, M. (2013). Students perceptions of the learning environment and attitudes in game-based mathematics classrooms. *Learning Environments Research, 16*(1), 131-150. doi: 10.1007/s10984-012-9122-6

Agarwal, R., & Karahanna, E. (2000). Time Flies When You're Having Fun: Cognitive Absorption and Beliefs about Information Technology Usage. *MIS Quarterly, 24*(4), 665-694. doi: 10.2307/3250951

Ajzen, I. (1988). *Attitudes, personality and behavior*. Milton Keynes: Open University Press.

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

Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology, 32*, 665-683.

Anastasi, A. (1988). *Psychological Testing* (6th ed.). New York: Macmillan.

Anderson, P. H., & Lawton, L. (2009). Business Simulations and Cognitive Learning: Developments, Desires, and Future Directions. *Simulation & Gaming, 40*(2), 193-216. doi: 10.1177/1046878108321624

Annetta, L. A., Meng‐Tzu Cheng, & Holmes, S. (2010). Assessing twenty‐first century skills through a teacher created video game for high school biology students. *Research in Science & Technological Education, 28*(2), 101-114.

Arbaugh, J. B. (2002). Managing the on-line classroom: A study of technological and behavioral characteristics of web-based MBA courses. *The Journal of High Technology Management Research, 13*(2), 203-223. doi: http://dx.doi.org/10.1016/S1047-8310(02)00049-4

Babyak, M. A. (2004). What you see may not be what you get: a brief, nontechnical introduction to overfitting in regression-type models. *Psychosom Med, 66*(3), 411-421.

Bajaj, A., & Nidumolu, S. (1998). A feedback model to understand information system usage. *Information and Management, 33*(4), 213-224.

Beck, L., & Ajzen, I. (1991). Predicting dishonest actions using the theory of planned behavior. *Journal of Research in Personality, 25*(3), 285-301. doi: http://dx.doi.org/10.1016/0092-6566(91)90021-H

Benowitz, M. L., & Busse, T. V. (1970). Material incentives and the learning of spelling words in a typical school situation. *Journal of Educational Psychology, 61*(1), 24-26. doi: 10.1037/h0028822

Benowitz, M. L., & Busse, T. V. (1976). Effects of material incentives on classroom learning over a four-week period. *Journal of Educational Psychology, 68*(1), 57-62. doi: 10.1037/0022-0663.68.1.57

Berlyne, D. E. (1965). *Structure and direction in thinking.* New York: Wiley.

Bisett, B. M., & Rieber, M. (1966). The effects of age and incentive value on discrimination learning. *Journal of Experimental Child Psychology, 3*(2), 199-206. doi: 10.1016/0022-0965(66)90094-4

Bruner, J. S. (1965). *Toward a theory of Instruction*. Cambridge, Mass: Belknap Press of Harvard University Press.

Buck, W. (2014). Theory of Business Ethics Simulation Games. *Journal of Business Ethics Education, 11*.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and Discriminant Validation by the Multitrait-multimethod Matrix. *Psychological bulletin, 56*(2), 81-105.

Carrington, M., Neville, B., & Whitwell, G. (2010). Why Ethical Consumers Don't Walk Their Talk: Towards a Framework for Understanding the Gap Between the Ethical Purchase Intentions and Actual Buying Behaviour of Ethically Minded Consumers. *Journal of Business Ethics, 97*(1), 139-158. doi: 10.1007/s10551-010-0501-6

Cartwright, C. A. (1970). Efficacy of preferential incentives with elementary school children. *Journal of Educational Psychology, 61*(2), 152-158. doi: 10.1037/h0028904

Churchill, G. A. J. (1979). A Paradigm for Developing Better Measures of Marketing Constructs. *Journal of Marketing Research, 16*(1), 64-73.

Comrey, A. L., & Lee, H. B. (1992). *A First Course in Factor Analysis* (Second ed.). Hillsdale, NJ: Erlbaum.

Cooley, D. R. (2004). The Moral Paradigm Test. *Journal of Business Ethics, 50*(3), 289-294. doi: 10.1023/B:BUSI.0000024661.94386.47

Crossan, M., Mazutis, D., & Seijts, G. (2013). In Search of Virtue: The Role of Virtues, Values and Character Strengths in Ethical Decision Making. *Journal of Business Ethics, 113*(4), 567-581. doi: 10.1007/s10551-013-1680-8

Csikszentmihalyi, M. (1979). Intrinsic rewards and emergent motivation. In M. R. Lepper & D. Greene (Eds.), *The hidden costs of reward*. Morristown, N.J: Lawrence Erlbaum Associates.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13*(3), 319-340. doi: 10.2307/249008

Davis, F. D. (1993). User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *International Journal of Man-Machine Studies, 38*(3), 475-487. doi: http://dx.doi.org/10.1006/imms.1993.1022

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer-Technology - a Comparison of 2 Theoretical-Models. *Management Science, 35*(8), 982-1003.

Dede, C. (2005). Planning for Neomillennial Learning Styles. *Educause Quarterly, 1*.

Edmunds, R., Thorpe, M., & Conole, G. (2012). Student attitudes towards and use of ICT in course study, work and social activity: A technology acceptance model approach. *British Journal of Educational Technology, 43*(1), 71-84. doi: 10.1111/j.1467-8535.2010.01142.x

Facteau, J. D., Dobbins, G. H., Russell, J. E., Ladd, R. T., & Kudisch, J. D. (1995). The influence of general perceptions of the training environment on pretraining motivation and perceived training transfer. *Journal of Management, 21*(1), 1-25.

Falkenberg, L., & Woiceshyn, J. (2008). Enhancing Business Ethics: Using Cases to Teach Moral Reasoning. *Journal of Business Ethics, 79*(3), 213-217. doi: 10.1007/s10551-007-9381-9

Felton, E. L., & Sims, R. R. (2005). Teaching Business Ethics: Targeted Outputs. *Journal of Business Ethics, 60*, 377-391.

Figlio, D. N., & Kenny, L. W. (2007). Individual teacher incentives and student performance. *Journal of Public Economics, 91*(5-6), 901-914. doi: 10.1016/j.jpubeco.2006.10.001

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior : an introduction to theory and research*. London: Addison-Wesley.

Gee, J. P. (2003). *What Video Games Have to Teach Us About Learning and Literacy*. New York: Palgrave Macmillan.

George, D., & Mallery, P. (2010). *SPSS for Windows step by step : a simple guide and reference, 17.0 update* (10th ed.). Boston: Allyn & Bacon.

Gibson, A., & Frakes, A. (1997). Truth or Consequences: A Study of Critical Issues and Decision Making in Accounting. *Journal of Business Ethics, 16*(2), 161-171. doi: 10.1023/A:1017914713375

Gioia, D. A., & Brass, D. J. (1986). Teaching the TV Generation: The Case for Observational Learning. *Organizational Behavior Teaching Review, 10*, 11-18.

Gu, J., & Neesham, C. (2014). Moral Identity as Leverage Point in Teaching Business Ethics. *Journal of Business Ethics*, 1-10. doi: 10.1007/s10551-013-2028-0

Guadagnoli, E., & Velicer, W. F. (1988). Relation to sample size to the stability of component patterns. *Psychological bulletin, 103*(2), 265.

Hair, J. F. (2006). *Multivariate data analysis* (6th edition. ed.). Upper Saddle River, N.J.,: Pearson-Prentice Hall.

Hardy, M. A. (1993). Regression with dummy variables *Quantitative applications in the social sciences 07-093* (pp. 1 online resource (vi, 90 p.)). Retrieved from http://SRMO.sagepub.com/view/regression-with-dummy-variables/SAGE.xml

Hassan, L., Shiu, E., & Shaw, D. (2014). Who Says There is an Intention–Behaviour Gap? Assessing the Empirical Evidence of an Intention–Behaviour Gap in Ethical Consumption. *Journal of Business Ethics*, 1-18. doi: 10.1007/s10551-014-2440-0

Hsu, C.-L., & Lu, H.-P. (2004). Why do people play on-line games? An extended TAM with social influences and flow experience. *Information & Management, 41*(7), 853-868. doi: http://dx.doi.org/10.1016/j.im.2003.08.014

Huang, J.-H., Lin, Y.-R., & Chuang, S.-T. (2007). Elucidating user behavior of mobile learning: A perspective of the extended technology acceptance model. *Electronic Library, The, 25*(5), 585-598.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher, 33*(7), 14-26. doi: 10.3102/0013189x033007014

Jondle, D., Ardichvili, A., & Mitchell, J. (2014). Modeling Ethical Business Culture: Development of the Ethical Business Culture Survey and Its Use to Validate the CEBC Model of Ethical Business Culture. *Journal of Business Ethics, 119*(1), 29-43. doi: 10.1007/s10551-012-1601-2

Kachigan, S. K. (1991). *Multivariate Statistical Analysis: A Conceptual Introduction* (Second ed.). New York: Radius Press.

Kennedy, W. A., & Willcutt, H. C. (1964). Praise and blame as incentives. *Psychological bulletin, 62*(5), 323-332. doi: 10.1037/h0042917

Kidwell, L. (2001). Student Honor Codes as a Tool for Teaching Professional Ethics. *Journal of Business Ethics, 29*(1-2), 45-49. doi: 10.1023/A:1006442925586

Kim, S. S., & Malhotra, N. K. (2005). A longitudinal model of continued IS use: An integrative view of four mechanisms underlying postadoption phenomena. *Management Science, 51*(5), 741-755. doi: 10.1287/mnsc.1040.0326

Klopfer, E., Osterweil, S., & Salen, K. (2009). Moving Learning Games Forward: Obstacles, Opportunities and Openness. *The Education Arcade, Massachusetts Institute of Technology, Creative Commons*.

Knowles, J. B. (1963). Acquiescence Response Set and the Questionnaire Measurement of Personality. *British Journal of Social and Clinical Psychology, 2*(2), 131-137. doi: 10.1111/j.2044-8260.1963.tb00385.x

Kolb, A. Y., Kolb, D. A., Passarelli, A., & Sharma, G. (2014). On Becoming an Experiential Educator: The Educator Role Profile. *Simulation & Gaming, 45*(2), 204-234. doi: 10.1177/1046878114534383

Koufaris, M. (2002). Applying the technology acceptance model and flow theory to on-line consumer behavior, Information System Research *Information System Research 13*(2), 205–223.

Kuss, D. J., Griffiths, M. D., & Binder, J. F. (2013). Internet addiction in students: Prevalence and risk factors. *Computers in Human Behaviour, 29*, 959-966.

Laditka, S., & Houck, M. (2006). 'Student-Developed Case Studies: An Experiential Approach for Teaching Ethics in Management'. *Journal of Business Ethics, 64*(2), 157-167. doi: 10.1007/s10551-005-0276-3

Landry, B. J. L., Griffeth, R., & Hartman, S. (2006). Measuring Student Perceptions of Blackboard Using the Technology Acceptance Model. *Decision Sciences Journal of Innovative Education, 4*(1), 87-99. doi: 10.1111/j.1540-4609.2006.00103.x

Lawrence, K. E., & Reed, K. L. (2011). Experiencing and Measuring the Unteachable: Achieving AACSB Learning Assurance Requirements in Business Ethics. *Journal of Education for Business, 86*, 92-99.

Lepper, M. R. (1988). Motivational considerations in the study of instruction. *Cognition and instruction, 5*(4), 289-309.

Liao, C., Lin, H., & Liu, Y. (2010). Predicting the Use of Pirated Software: A Contingency Model Integrating Perceived Risk with the Theory of Planned Behavior. *Journal of Business Ethics, 91*(2), 237-252. doi: 10.1007/s10551-009-0081-5

Lin, J., & Lu, H. (2000). Toward an understanding of the behavioural intention to use a web site. *International Journal of Information Management 20*, 197-208.

Litwin, M. S., & Fink, A. (1995). *How to Measure Survey Reliability and Validity*. London: Sage.

Lloyd, P., & Van De Poel, I. (2008). Designing games to teach ethics. *Science & Engineering Ethics, 14*(3), 433-447.

MacCallum, R. C., Widaman, K. F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological methods, 4*(1), 84.

Macchiarella, P. (2012). Trends in Digital Gaming: Free-to-Play, Social, and Mobile Games. Dallas, Texas.

Malhotra, N. K. (2010). *Marketing Research : An Applied Orientation* (6th ed. ed.). London: Prentice Hall.

Malhotra, N. K., Kim, S. S., & Patil, A. (2006). Common method variance in IS research: A comparison of alternative approaches and a reanalysis of past research. *Management Science, 52*(12), 1865-1883. doi: 10.1287/mnsc.1060.0597

Malone. (1981). Toward a Theory of Intrinsically Motivating Instruction. *Cognitive Science, 4*, 333-369.

May, D., Luth, M., & Schwoerer, C. (2013). The Influence of Business Ethics Education on Moral Efficacy, Moral Meaningfulness, and Moral Courage: A Quasi-experimental Study. *Journal of Business Ethics*, 1-14. doi: 10.1007/s10551-013-1860-6

McWilliams, V., & Nahavandi, A. (2006). Using Live Cases to Teach Ethics. *Journal of Business Ethics, 67*(4), 421-433. doi: 10.1007/s10551-006-9035-3

Moon, Y.-L. (1986). A Review of Cross-Cultural Studies on Moral Judgment Development Using the Defining Issues Test. *Cross-Cultural Research, 20*(1-4), 147-177. doi: 10.1177/106939718602000107

Moore, O. K., & Anderson, A. R. (1969). Some principles for the design of clarifying educational environments. In D. Goslin (Ed.), *Handbook of Socialization Theory and Research.* New York: Rand McNally.

Morgan, D. L. (1996). Focus Groups. *Annual Review of Sociology, 22*, 129-152.

Novak, T. P., Hoffman, D. L., & Duhachek, A. (2003). The Influence of Goal-Directed and Experiential Activities on Online Flow Experiences. *Journal of Consumer Psychology, 13*(1–2), 3-16. doi: http://dx.doi.org/10.1207/S15327663JCP13-1&2_01

Nunnally, J. C. (1978). *Psychometric Theory* (2nd ed.). New York ; London: McGraw-Hill.

Nyberg, D. (2008). *The morality of everyday activities: not the right, but the good thing to do*.

Piaget, J. (1951). *Play, dreams, and imitation in childhood.* New York: Norton.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of applied psychology, 88*(5), 879.

Princeton University. (2007). Working With Dummy Variables Retrieved 04/04/2014, 2014, from http://dss.princeton.edu/online_help/analysis/dummy_variables.htm

Proserpio, L., & Gioia, D. A. (2007). Teaching the Virtual Generation. *Academy of Management Learning & Education, 6*(1), 69-90.

Reynolds, J., & Santos, A. (1999). Cronbach's Alpha: A Tool for Assessing the Reliability of Scales. *Journal of Extension, 37*(2).

Ricci, P., & Markulis, P. M. (1990). Can ethics be taught? A Simulation tests a traditional ethics pedagogy. *Developments In Business Simulation & Experiential Learning, 17*, 141-145.

Roca, E. (2008). Introducing Practical Wisdom in Business Schools. *Journal of Business Ethics, 82*(3), 607-620. doi: 10.1007/s10551-007-9580-4

Roca, J. C., Chiu, C., & Martínez, F. J. (2006). Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. *International Journal of Human-Computer Studies, 64*(8), 683-696. doi: http://dx.doi.org/10.1016/j.ijhcs.2006.01.003

Sauve, L., Renaud, L., Kaufman, D., & Marquis, J. S. (2007). Distinguishing between games and simulation: A systematic review,. *Education Technology & Society, 10*(3), 247-256.

Sicart, M. (2009). *The Ethics of Computer Games*: MIT.

Steinkuehler, C., & Duncan, S. (2008). Scientific Habits of Mind in Virtual Worlds. *Journal of Science Education and Technology, 17*(6), 530-543. doi: 10.1007/s10956-008-9120-8

Stern, L. (2010). *A visual approach to SPSS for Windows : a guide to SPSS 17.0* (2nd ed.). Boston: Allyn & Bacon.

Stevens, J. M., Kevin Steensma, H., Harrison, D. A., & Cochran, P. L. (2005). Symbolic or substantive document? The influence of ethics codes on financial executives' decisions. *Strategic Management Journal, 26*(2), 181-195. doi: 10.1002/smj.440

Stevens, J. P. (1992). *Applied multivariate statistics for the social sciences* (second ed.). Hillsdale, N.J.: Erlbaum.

Szajna, B. (1994). Software evaluation and choice: predictive validation of the technology acceptance instrument. *MIS Quarterly, 18*(3), 319–324.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics* (5th ed.). London: Pearson/Allyn & Bacon.

The Ethics Game. (2014). Core Values Retrieved 15th August 2014, from http://www.ethicsgame.com/exec/site/core_values.html

Thorne LeClair, D., & Ferrell, L. (2000). Innovation in Experiential Business Ethics Training. *Journal of Business Ethics, 23*(3), 313-322. doi: 10.1023/A:1006266526120

Van Liedekerke, L., & Demuijnck, G. (2011). Business Ethics as a Field of Training, Teaching and Research in Europe. *Journal of Business Ethics,, Supplement 104*, 29-41.

Vos, L., & Brennan, R. (2010). Marketing simulation games: student and lecturer perspectives. *Marketing Intelligence & Planning, 28*(7), 882-897. doi: 10.1108/02634501011086472

Wallop, H. (2014, 31 July). Gen Z, Gen Y, baby boomers – a guide to the generations, *The Telegraph*. Retrieved from http://www.telegraph.co.uk/news/features/11002767/Gen-Z-Gen-Y-baby-boomers-a-guide-to-the-generations.html

Ware, J. E., Jr. (1978). Effects of Acquiescent Response Set on Patient Satisfaction Ratings. *Medical Care, 16*(4), 327-336. doi: 10.2307/3763452

Weber, J., & Gillespie, J. (1998). Differences in Ethical Beliefs, Intentions, and Behaviors: The Role of Beliefs and Intentions in Ethics Research Revisited. *Business & Society, 37*(4), 447-467. doi: 10.1177/000765039803700406

Webster, J., & Ho, H. (1997). Audience engagement in multimedia presentations. *SIGMIS Database, 28*(2), 63-77. doi: 10.1145/264701.264706

Webster, J., Trevino, L. K., & Ryan, L. (1993). The dimensionality and correlates of flow in human-computer interactions. *Computers in Human Behavior, 9*(4), 411-426. doi: http://dx.doi.org/10.1016/0747-5632(93)90032-N

Whitton, N. (2012). The place of game-based learning in an age of austerity. *Electronic Journal of e-Learning, 10*(2), 249-256.

Witryol, S. L., & Hayne, W. R. (1971). Incentives and Learning in Children *Advances in Child Development and Behavior* (Volume 6 ed., pp. 1-61): JAI.

Yi, M. Y., & Hwang, Y. (2003). Predicting the use of web-based information systems: self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model. *International Journal of Human-Computer Studies, 59*(4), 431-449. doi: http://dx.doi.org/10.1016/S1071-5819(03)00114-9

Yusoff, A., Crowder, R., & Gilbert, L. (2010). *Validation of Serious Games Attributes Using the Technology Acceptance Model*. Paper presented at the Proceedings of the 2010 Second International Conference on Games and Virtual Worlds for Serious Applications.

Zwick, W. R., & Velicer, W. F. (1982). Factors influencing four rules for determining the number of components to retain. *Multivariate behavioral research, 17*(2), 253-269.