Game-Based Learning in Universities: A Life Learning Experience

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Bio: Souad Slyman is an experienced educator, who has a long-established record of teaching. She has a multidisciplinary background, starting with scientific studies in mathematics and computing (BSc), continued with master of arts in education (MA), and currently conducting doctoral research in computer science at Goldsmiths, University of London. Souad's research interests are in games design development, business leadership, and management and social change. Souad's research focuses on evaluating the impact of games that is purposefully designed to improve mathematical and computational learning in a range of academic areas (serious games, human computer interaction, 3D modeling, software engineering, information system, games for education, leadership, and management and social change).

Abstract: Game-based learning has become a significant entwined trend of research, investments, and development. Computer games are widely utilized mechanism for learning and entertainment in many fields such as in military and aircraft trainings, health care, marketing and education, and it is fascinatingly and relentlessly growing. Nevertheless, many researchers and the media, in particular, have depicted or concentrated on the negative impacts of gaming, where recognizably there are various impacts like violence, depression, and addiction. However, in this research, I argue that there should be a balance prospective, since the benefits of games, on the other hand, are huge because the nature of games have changed and become embedded in all aspects of our lives. A trivial, but tangible, anatomy of gaming research is significantly emerging and insinuating these benefits.

Keywords: Critical Thinking, Educational Games, Game-Based Learning, Higher Education, Problem-Solving, Serious Games, Simulation Role-Play, Strategic Thinking and Decision-Making Skills, Universities.

Introduction

As technology evolves over the years, so do learning styles. Many twenty-first-century "digital native" learners (Prensky 2005, 8; Jagger 2015) are choosing, adapting, and adopting games as a way of learning (Prensky 2005). This is because games have potentials of solving complex problems and teaching mastery in life skills like determination, concentration, focus, curiosity, and creativity. Computer games have become a norm form of entertainment and learning these days, since these have become embedded in all aspects of our lives from mobile phones, PCs, tablets, and videos, and they are the fastest growing field in the industry (Malaka 2014). Games are interactive, cumulative (display the current level of the player and assess his or her progress), challenging, motivating, and fun to play (Koster, 2005; Mayer 2014). Nevertheless, games also evoke mixed reactions between those who favor games as a pedagogical tool for learning and those who regard games as a tool for inciting violence and destruction (see Garris Ahlers, and Driskell 2002). This article presents an overview of game-based learning, focusing on the huge benefits of games, psychologically and pedagogically, moving on to highlight some key definitions on games and play. This article proposes rigorous implications for policy and practice and theoretical rationale to enthuse new areas of research on the unexplored pedagogical benefits of simulation games in universities, outlining it with some real-life scenarios from the gaming literature, and how it should be adopted in all higher education, thus providing undergraduates with a life learning experience.

Literature Review

A review of a list of publications on gaming literature revealed how games can be positively beneficial to health, education, military, and aircraft trainings because it suggests that games have many potentials, from solving real-world problems to increasing concentration and spatial attention skills to improving health and well-being (Koster 2005; McGonigal 2015; Schell 2015). Contrary to this, a few literature revealed how games can be destructively addictive, threatening, and a mechanism of inciting violence (see Granic, Lobel, and Engels 2014). On the other hand, some scholars emphasized that the influence of violent video games have small effects. Whilst, others agreed that the best measures of aggression and violence produced the weakest effects. Based upon a review of the gaming literature, and insights

gained by the researcher, a business educator and not-so-keen user of games before, this article sets out to investigate the multifaceted views of game-based learning, using gaming literature to explore factors that make games a motivating tool for learning or rather a mechanism for inciting violence and aggression. The questions are therefore, what are the impacts of game-based learning? What lessons can be learned? From a theoretical and psychological prospective, this article therefore draws the potential benefits of games, using multifaceted real-life examples of games from education, marketing, health, business, and military trainings. The article also sheds light on the unexplored pedagogical benefits of simulation games thus propose ideas for best practice based on research findings and suggests further future investigation.

Discussion

Games and the Element of Play

In explicitly seeking a constructive definition for games, it is rather complex and fuzzy to elicit because different researchers give different definitions. For instance, Koster (2005, 148) describes games as "well-crafted…art" while Garris, Ahlers, and Driskell (2002) and Kafai (2006) perceive play as a complex model that has the ability to solve real-world problems. Schell (2015), on the other hand, defines game as a fun play activity with surprises. But what is play? Play is a "free activity standing quite consciously outside life," not serious but systematic with preset rules and specific "boundaries of time and space" (Huizinga, 1938, cited in Caillios 2011 in Salen and Zimmerman 2011). In contrast, Koster (2005) perceives play as a life learning skill. Similarly, Schell (2015) observe game as a tool for engagement because it consists of game elements (learning objectives or storylines); game mechanics (the functionalities of the game, the core mechanics and how the game behaves); goals and objectives (what motivate players to achieve/gain from the game); game motives: challenge or competition (this is how the game is played; it could be against oneself as in Sukodo or against another player as in 8 ball pool); game risks and game interactions (players' interaction with the game and other players).

As aforementioned, games are about making choices and solving puzzles. It consists of specific rules: either win or lose. This is a luring motivator for game players because game players tend to avoid losing and so they perform to their best. On the other hand, Zyda (2005:25) connects games to "a mental

contest, played … according to certain rules for amusement, recreation, or winning a stake." In contrast, Schell (2015:40) adds to the element of play "manipulation," "curiosity," "secrecy," and "mystery." In other words, it is the "make-believe by nature" approach to play, a source of happiness and a fun activity within a limited time and a fixed set of rules (Caillios: 2011, 5). Historically, and from a theoretical learning prospective, the symbol of play has been researched and adduced for decays from Piaget to Vygotsky to Erikson. All these pioneers have discussed the elements of play and its significance on children's play as a means of social interaction, fun, and play. They go as far as to highlight the strong theoretical link between play and social cognition (Granic, Lobel, and Engels 2014).

Even though little research has been conducted on the benefits of games, computer games are diverse and have many genres, and a comprehensive taxonomy of contemporary games is exceedingly difficult (many have tried) (Granic, Lobel, and Engels 2014; Schell 2015).

In summary, a game is a cognitive and iterative learning process which has the ability to solve real-world problems. I propose that through playing games which involve many cognitive skills such as planning, making decisions, and choices, the players therefore interact with the game (as an interactive system that has mental challenges) thus the game player obtains feedback on a winning or losing state. In this case, the game as a motivating tool for learning provides the player with life learning skills, since the player goes through many psychological and socio-cognitive phases (planning, thinking, reasoning, playing to assessment… etc.) interacting with the game in a iterative cyclic process. The game player therefore experiences a mental transformation and a life learning experience as a learner.

In view of the above, a game is a playful, enjoyable activity that has potentials to solve real-world problems. Games can be paper-based (for instance naughts and crosses on paper), or digital-based (online or offline) in PCs, tablets, videos, or mobile phones (for example, a 3D bowling game), and it can be played against one player (oneself) or multiple players; they have various genres from role-play, action, simulations, adventure, sports, strategy to puzzle games. Games' names are interchangeable, from video games to digital games, serious games, computer or instructional games. In this article, I will concentrate on computer games, which include game-based learning, also known as serious games, educational or instructional games. The focus therefore is on game-based learning and the potential benefits of games. What lessons can be learned? This article proposes some rigorous evidence and

theoretical rationale to enthuse new areas of research on the unexplored pedagogical benefits of simulation games using real-life examples of serious games.

Educational Games

Educational games are games that are designed with a learning purpose in mind other than just entertainment. It is a combination of fun, play, and learning (Malaka 2014). It can be played on PCs, tablets, webs, handheld devices, and mobile phones, online and offline, with one player or multiplayers (Schell 2015). Serious games are a type of computer games that have specific rules, entertainment, strategy, and educational (pedagogic) learning outcomes. It (serious game) is also a "story, [an] art and [a] software" (Zyda 2005, 26). Games require various skills from problem-solving, strategic thinking skills to hypotheses testing besides rewards, feedback, learning objectives, storytelling, and entertainment. Nevertheless, when entertainment fails, the learning experience suffers too (Moreno-Ger et al. 2008; Malaka 2014). Mayo (2009) suggests that educational games are more beneficial to students than traditional classroom teaching because it gives learners control, immediate feedback, and support, and it can be adapted to suit individuals' pace of learning. However, there is little evidence to suggest whether educational games are more beneficial and therefore more longitudinal studies are required before generalizing games to the education system. Nevertheless, one of the games' educational benefits on learning is that it can increase spatial attention and concentration skills, determination, and speed (Mayer 2014). Contrary to this, many people consider playing games a waste of time (Malaka 2014) while others would argue it is not. According to McGonigal (2015), games can be a source of power and for building up emotional, physical, and social resilience yet when it comes to the length of time individuals should spend playing games, she advises players to have a balance and a purpose in mind of why they are playing the game. I suppose this is a type of learning objective because when game players try to challenge themselves emotionally, physically, or socially, or just simply play, they are attempting to meet some learning outcomes, and therefore learn.

In summary, educational games are aimed at enhancing learning and making it enjoyable and fun. Educational games are intended for more than just entertainment. They require various skills from strategic techniques, problem-solving skills to hypotheses testing, and it can be adapted to suit

individuals' pace of learning. However, there is little evidence to suggest that educational games are more beneficial over traditional teaching and therefore longitudinal studies are required before generalizing them to the education system. This leads to the following question: what are the positive impacts of games?

The Positive Impacts of Games: Psychological Benefits

A review of the gaming literature has demonstrated that playing games has several psychological, physical, and health benefits—from improving students' learning skills, such as employability, communication, leadership, interpersonal skills, and problem solving (Faria 2001), to controlling attention and brain cell activity, to offering full engagement and immersion (McGonigal 2015). In addition to spatial skills, scholars have also speculated that games have potentials for enhancing problem-solving skills (Granic, Lobel, and Engels 2014; McGonigal 2015). I suppose problem solving as a genre has been embedded in many games, from puzzle games such as Sudoku to finding the fastest route to reaching a destination. Most game designers give little instructions about how to solve puzzles or games in general, leaving players/ core game players to find it from a range of possible answers on their own using experience and instincts. Nevertheless, more research is required to tackle the extent to what games can really teach problem-solving and whether these skills can generalize to real-world context (Granic, Lobel, and Engels 2014). On the other hand, new evidence is emerging that playing games improve children's creative abilities. For example, "among a sample of 500 12-year-old students, video game playing was positively associated with creativity" (Jackson et al. 2012). However, this study's cross-sectional design made it unclear whether playing video games develop creative skills or creative people prefer video games (or both) (Granic, Lobel, and Engels 2014).

According to McGonigal (2015, 29-42), games have potentials to improve health, respiration and heart rate; release stress; and block anxiety. This is because in a scientific research paper by Snow World Inventors Doctors, Dr. Hoffman and Dr. Patterson, stated that games can heal patients better in what psychologists diagnose as "post-traumatic growth" (McGonigal 2015). This implies, I suggest, that the psychological benefits of games to people's health, emotion, and intellectual well-being are massive since games can promote optimism, creativity, courage, determination, curiosity, openness, and

resilience pertinent to real-life situations. For instance, some fast-paced action games such as Call of Duty, Forza, and Grand Theft Auto are cognitively beneficial to the brain as they can enhance individual's intelligence and visual attention, decision making, and more efficient multitasking and neural processing (McGonigal 2015). Nevertheless, more research is required to test whether these games have real effects on patients and under what conditions, for instance Call of Duty as a shooting game, is regarded as tool for inciting violence and I agree, since as an educator and a parent I could see the games' effects on my son while he is playing it. However, it also made him more curious and creative. On the other hand, mathematics puzzle games such as Sudoku or Tetris are conducive for improving memory skills. Tetris is a puzzle game that consists of falling blocks and it is widely used by nearly half a billion players (McGonigal 2015).

In psychology, the game Tetris is famously recognized for supporting patients with post-traumatic stress disorder to recover from flashbacks and undesirable haunting memories that trigger unpleasant cognitive conditions (McGonigal 2015). Medical research significantly demonstrates that playing Tetris regularly may help occupy patients' brain from thinking about chronic pain or annoying flashbacks. This effectively may assist patients' recovery (McGonigal 2015). However, there is a small evidence to suggest this. Therefore, there is a need for rigorous sensitive designs (such as observation and diary studies) to more thoroughly assess whether youth and adults in negative moods play games when they want to stop negative thoughts and bad feelings (Granic, Lobel, and Engels 2014).

In contrast to this, and in scientific research, some researchers suggest that regular game play improves memory, concentration, determination, motivation, focus, and learning, since in experiments conducted by 25 scientists, it has been found that frequent games players, who played at least 9 hours a week, have "more gray matter in left ventral striatum" of the brain (see McGonigal 2015). According to Green and Bavelier (2006), this implies that neural reorganization of the brain have rewired due to frequent video game play that led the brain to increase its ability for concentration, decision making, and more efficient learning. This also demonstrates that the more effort game players put into the activity, the more resilient the brain becomes to facing any new challenges and the faster decision maker it becomes (see Joja, 2002, cited in McGonigal 2015, 89). Furthermore, strategic games such as StarCraft, Mass Effect,

and Final Fantasy are beneficial for improving problem-solving skills and learning more strategic techniques. Nevertheless, more research is required to tackle the causal question of whether and to what extent games teach problem-solving and whether these skills can generalize to real-world context (Granic, Lobel, and Engels 2014).

University Life Game-Based Learning Experience

In a world where there is an ever-increasing urge to solve real-world problems, from global warming to recession to unemployment, many US higher education institutions are integrating simulation games as a pedagogical tool to teach undergraduates vital employable skills such as analytical and critical skills, strategic thinking, problem solving, and decision making. Games such as League of Legends, flight and military simulators Full Warrior Spectrum, World of Warcraft, Civilization, Europa, and SimCity are perhaps exceptional examples of how these skills can be learned, played, and applied to real-life scenarios.

In the United States, for instance, some higher education universities had utilized simulation games for over 34 years (Wellington and Faria 1995, cited in Tao, Cheng, and Sun. 2012). Theoretically, simulation games could be a facilitating tool for assisting learning (Tao, Cheng, and Sun 2012; Li, Cheng, and Liu 2013). For instance, the game Age of Computers or the Leaping Frogs game, with its problem or solution scenarios, encourage students' problem-solving and decision-making strategies to develop (Sindre, Natvig, and Jahre 2009).

Research illustrates how simulation games can bring pedagogical benefits and help engage learners (Kolb and Kolb 2008). Simulations allow students to experiment with real-life complex scenarios suited to work–life situations of intense market, global competition, and rapidly evolving technology, where students make crucial decisions and are allowed to make mistakes, and learn from their experience in a safe environment (Vos 2014) without involving any financial costs or damage to their organization (Russ and Drury-Grogan 2013). These can include flight and military simulators.

Flight simulators are types of educational games that teach novice pilots essential flying skills without running the risk of endangering themselves or others, whereas in military these game simulators teach the army numerous strategic military techniques from ground combat, first aid, to handling weapons.

For example, League of Legends is a multiplayer strategic game where players play against other team in battles and win some league points.

On the other hand, I suggest, game-like learning systems such as the popular strategic game SimCity, where players are required to plan, build, expand, and manage a city within the computer simulation, is a good example of where students can use their analytical and thinking skills to strategically decide each time how to approach tasks and build a city, considering all long-term and short-term effects on the city.

Similarly, in a study conducted by Li, Cheng, and Liu (2013), where they construct a railway simulation model to teach first-year computer science undergraduates basic programming and object-oriented skills, based on constructionism principles they found that simulation has positive influence on students' perceptions and motivation skills (see Li , Cheng, and Liu 2013).

Rise of the Nations is yet an example of strategic game where players are required to consider the ramifications of their action against other players. Gee (2003, 2005) has extensively written about his experiences of learning to play this game and his curiosity, as an educator, to research and embrace the challenge of learning about strategic games. Other examples include World of Warcraft, a multiplayer strategic game, where players must master their own specialty. They are on missions and need to think strategically of how to defeat enemy and win battles.

Full Warrior Spectrum is a US military training simulation game aimed at teaching soldiers critical thinking and decision-making skills as well as some of the strategic techniques required in real-life battle situations such as firing weapons and dealing with complex problems (Korris 2004).

Civilization and Europa are strategic games. “Civilization” is a historical game that requires the player to be a leader of the tribe, taking control of the empire, building cities, improving business, technology, training military, providing resources, and making strategic and diplomatic decisions (Moreno-Ger et al. 2008).

Moreno-Ger et al. (2008, 2532) consider SimCity and Civilization games as educational games despite being designed as commercial ones since the contents and the design are “so rich and detailed.” I suppose simulation games are thus widely used in business marketing and education as an effective pedagogical tool, especially in business management, strategy, policy, and international business (Faria

and Wellington 2004; Vos 2014), since in the United States, for instance, about 64.1 percent of 1,085 university members were utilizing marketing simulation games (Faria and Wellington 2004; Jagger 2015).

In view of the above, simulation games are real-world models that consist of game features where players can make real changes, manipulate things, and see what happens, and these (games) could be a facilitating tool for assisting learning and engaging students in a real-life experimental experience where they can use decision-making and problem-solving skills to resolve real-world problems in a safe environment. Furthermore, adventure games with its storylines, animation, and characters could facilitate solving puzzles, quizzes, and decision making. Maths games such as MineCraft on the other hand can teach learners how to widen their strategic and creativity skills using mathematical concepts such as cubes and probability. Consequently, students can develop good time management skills, and the ability to interpret numerical and financial data, thus obtaining a better understanding of how complex data is measured.

Thus I urge all UK business universities to follow suit and lead a good example as its counterparts in the United States, and integrate more business simulation games as a pedagogical tool into higher education to enhance teaching and learning; thus facilitate the grasp of complex advanced modules. This is because business simulation games, as aforementioned, allow students to engage in a real-life experimental experience and use decision-making skills to resolve real-world problems in a safe environment. In return, students can develop good time management skills, and the ability to interpret numerical and financial data thus obtaining a better understanding of how problems are resolved.

Conclusion and Future Research

Within research and gaming literature, this article has presented an overview of game-based learning in HE, focusing on the huge benefits of games, drawing on excellent real-life examples of gaming from education, marketing, business, health, to military and flight trainings. This is because games have potentials of solving complex problems and teaching how to master life learning skills such as analytical and critical skills, strategic thinking, problem solving, decision making, determination, concentration, focus, curiosity, and creativity. Nevertheless, as aforementioned, not all games are beneficial. This is

because unbalancing games' exploitation can lead to games' misuse, which can subsequently lead to negative effects on individuals, such as addiction, violence, and aggression. A balance is therefore required when playing computer games since potential benefits are huge (for instance, game-based learning). Furthermore, this article sheds light on some excellent examples of real-life scenarios of simulation games utilized in US higher education and how integrating simulation games in business higher education, following United States' example as a good role model and as a pedagogical tool, could benefit teaching and learning in HE at both undergraduate and postgraduate level. This is because simulation games have potential of teaching undergraduates, as discussed earlier, vital employable skills such as analytical and critical skills to strategic thinking, problem solving and decision making in a safe environment; thus providing undergraduates with a real-life game-based learning experience. In addition, this article also highlights the psychological, physiological, socio-cognitive, and pedagogical benefits of games and how it can be applied to real-world problems when playing games-based learning. This, if applied frequently and systematically, can improve problem-solving skills, strategic thinking, and concentration. The game as a cognitive interactive activity, if played in a cyclic iterative process, can enhance students' life learning experiences. To conclude, this article proposes some rigorous evidence and theoretical rationale to enthuse new areas of research on the unexplored pedagogical benefits of simulation games in business universities outlining it with some real-life scenarios from the gaming literature and how UK business universities in higher education should follow suit as its counterparts in the United States, and integrate simulation games into business higher education in order to enhance teaching and learning thus facilitate undergraduates' learning experiences, which will have great impacts on student retention and success.

For further research, a close analysis of what specific games can or cannot accomplish is required to illustrate whether certain types are more beneficial and valuable than others and under what conditions or circumstances. Furthermore, rigorous sensitive designs such as observation, longitudinal, and diary studies are required to assess the long-term benefits of computer games in other fields before generalizing it to all disciplines.

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