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DEVELOPMENT AND ASSESSMENT OF A TWO-DIMENSIONAL ROLE PLAYING COMPUTER GAME ON UNDERGRADUATE STUDENTS' INTENTION TO USE GAME-BASED LEARNING TOOLS

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master Science

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October 2017

Chair: Associate Prof. Ahmad Fauzi bin Mohd Ayub, PhD
Faculty: Educational Studies

A well-balanced serious game can engage, motivate and even influence learners to continuously use the application for its intended learning purposes. However, bridging both game design and instructional design is not an easy task. Users' response and perception are crucial to develop serious games that can engage and motivate them. Their acceptance towards the technology proposed plays an important part to determine the game adoption. Game-based learning incorporates game elements such as achievements, levels, points and rewards as means to keep users playing. Thus, this study opts to use game-based learning in the form of serious games to investigate its users' intention to use the game as an informal medium to practise their values and analytical skills. A 2D role-playing computer game prototype called SightHeart was developed and tested based on instructional design models and game theories. The study used a development methodology and survey as its research design, with descriptive and Pearson correlation for data analysis. Users' gamification preferences, motivation, engagement, perceived ease of use, perceived usefulness, perceived learning opportunities, attitude and behaviour intention were amongst the variables investigated. A purposive sampling consists of 97 undergraduate students from Universiti Putra Malaysia Serdang were chosen to test SightHeart. Data were collected using survey questionnaire and additional informal interview questions and metrics from the game. A four-point Likert scale was used for items in the questionnaire ranging from (1) "strongly disagree" to (4) "strongly agree". Results indicated that the game offers high learning opportunities (M=3.18, SD=.539). Respondents also perceived SightHeart to be useful to them

(M=3.00, SD=.532) and reported to have positive attitudes towards the game (M=3.04, SD=.595). Consequently, the variables have contributed to high behaviour intention among respondents (M=3.01, SD=.610). In other aspects however, SightHeart scored a fair value on engagement (M=2.88, SD=.577) and motivation (M=2.89, SD=.405). Perceived ease of use was the least scored variable (M=2.86, SD=.505) in the study. Meanwhile Pearson correlation test revealed that there is a positive significant relationship between user motivation [r (97) =0.69**, p = 0.01], engagement [r (97) = 0.47**, p = 0.01], perceived usefulness [r (97) = 0.61**, p =0.01], perceived ease of use [r (97) = 0.25*, p = 0.05], learning opportunities [r (97) = 0.69**, p = 0.01] and attitudes [r (97) = 0.72**, p = 0.01] with their behaviour intention to use SightHeart. An extension to the demographic section to identify respondents' gamified user types also revealed that majority of them falls under the philanthropist category (M=3.44, SD=.459) based on their motivation in playing and general preferences towards certain game elements. Philanthropist users are known for their tendency to engage in a gameplay that gives sense of purpose and altruism to them (Marczewski et al., 2015). Additionally, qualitative data gained from informal interview serves as credibility assurance to SightHeart's case study as they validate the quantitative data through triangulation. Ultimately, findings suggested valuable insights for interested designers and scholars in developing serious game applications that are better tailored towards a more effective personalized learning.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Master Sains

PEMBANGUNAN DAN PENILAIAN PERMAINAN KOMPUTER DUA DIMENSI JENIS MAIN PERANAN TERHADAP HASRAT PERLAKUAN PELAJAR PRA-SISWAZAH DALAM MENGGUNAKAN BAHAN PEMBELAJARAN JENIS PERMAINAN

Oleh

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Permainan pendidikan jenis serius yang baik bukan sahaja dapat melibatkan dan memotivasikan pelajar, malah dapat menggalakkan mereka untuk terus menggunakan aplikasi tersebut untuk kegunaan pembelajaran. Namun, untuk mengimbanginya dengan rekabentuk permainan dan rekabentuk instruksional bukanlah tugas yang mudah. Pandangan dan respon pengguna adalah penting untuk membangunkan permainan jenis serius yang mampu melibatkan dan memotivasikan mereka. Penerimaan mereka terhadap sesuatu teknologi dilihat sebagai penentu penggunaan mereka terhadap permainan tersebut. Pembelajaran berasaskan permainan melibatkan elemen permainan seperti pencapaian, tahap, poin dan juga ganjaran sebagai salah satu cara untuk menggalakkan pengguna untuk terus bermain. Oleh itu, kajian ini bertujuan untuk menggunakan pembelajaran berasaskan permainan melalui permainan serius untuk menyiasat hasrat perlakuan pengguna untuk menggunakan permainan tersebut sebagai medium yang informal bagi melatih nilai dan kemahiran analisis mereka. Sebuah prototaip permainan komputer dua dimensi jenis main peranan yang dipanggil SightHeart telah dibangunkan dan diuji berdasarkan model dan teori rekabentuk permainan dan juga instruksional. Kajian ini telah menggunakan kaedah pembangunan dan tinjauan sebagai rekabentuk kajian, dan menggunakan deskriptif dan korelasi Pearson untuk analisis data. Motivasi, penglibatan, kecenderungan gamifikasi, kebergunaan, kemudahgunaan, peluang pembelajaran, sikap dan hasrat perlakuan pengguna adalah antara pembolehubah yang disiasat. Persampelan secara bertujuan yang terdiri daripada 97 orang pelajar Universiti Putra Malaysia Serdang telah dipilih

untuk menguji 'SightHeart'. Dapatan kajian dikumpul menggunakan instrumen kaji selidik, temubual informal dan metriks dari prototaip tersebut. 4-poin skala Likert telah digunakan untuk item di dalam kaji selidik tersebut, dengan nilai bermula dari (1) "sangat tidak bersetuju" kepada (4) "sangat bersetuju". Keputusan menunjukkan bahawa permainan tersebut memberikan peluang pembelajaran yang tinggi (M=3.18, SD=.539). Responden juga menganggap SightHeart berguna kepada mereka (M=3.00, SD=.532) dan melaporkan mempunyai sikap yang positif terhadap permainan tersebut (Mean=3.04, SD=.595). Secara langsung, kebanyakan pembolehubah telah menyumbang kepada hasrat perlakuan yang tinggi dikalangan responden (M=3.01, SD=.610). Bagaimanapun, dalam aspek lain, SightHeart telah mendapat skor yang sederhana dari segi penglibatan (M=2.88, SD=.577) dan motivasi pengguna (M=2.89, SD=.405). Kemudahgunaan merupakan pembolehubah yang mendapat skor terendah (M=2.86, SD=.505) di dalam kajian ini. Manakala ujian korelasi Pearson menunjukkan terdapat hubungan positif yang signifikan antara motivasi pengguna [r (97) =0.69**, p = 0.01], penglibatan [r (97) = 0.47**, p = 0.01], kebergunaan [r (97) = 0.61**, p =0.01], kemudahgunaan [r (97) = 0.25*, p = 0.05], peluang pembelajaran [r (97) = 0.69**, p = 0.01] dan sikap [r (97) = 0.72**, p = 0.01] dengan hasrat perlakuan pengguna untuk menggunakan SightHeart. Lanjutan dari bahagian demografi yang bertujuan untuk mengenalpasti jenis pengguna gamifikasi juga telah mengkategorikan majoriti responden sebagai philanthropist (M=3.44, SD=.459) berdasarkan motivasi bermain dan kecenderungan umum mereka terhadap sesetengah elemen permainan. Pengguna jenis philanthropist dikenali melalui kecenderungan mereka terhadap corak permainan yang memberikan mereka tujuan dan membangkitkan rasa altruisme (Marczewski et al., 2015). Sebagai tambahan, dapatan kualitatif daripada temubual tidak rasmi dijadikan jaminan kredibiliti kepada pengesahan kes kajian SightHeart melalui teknik triangulasi dengan data yang diperolehi secara kuantitatif. Hasil kajian ini mencadangkan pandangan yang berguna pada pereka instruksional dalam membangunkan permainan yang lebih menjurus kepada pembelajaran peribadi yang lebih efektif.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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This is to confirm that:

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LIST OF ABBREVIATIONS

DGBL-ID	Instructional Design Game Based Model
TAM	Technology Acceptance Model
SDT	Self-Determination Theory
ID	Instructional Design
MEB	Malaysian Education Blueprint 2013-2025 for Higher Education
UPM	Universiti Putra Malaysia
SPSS	Statistical Package for Social Science Software
MOE	Ministry of Education
LOO	Gestalt's Laws of Organizations
PU	Perceived Useful
PEOU	Perceived Ease of Use
LO	Learning Opportunities
NPC	Non-player characters
BI	Behaviour Intention
MFT	Moral Foundations Theory
MFV	Moral Foundations Vignettes
MDA	Mechanics, Dynamics and Aesthetics of Game
ELT	Experiential Learning Theory

CHAPTER 1

INTRODUCTION

Playing computer games is considered a popular culture among today's learners (Mysirlaki & Paraskeva, 2010; Ulicsack & Cranmer, 2010). They can spend such significant amount of their time just by playing computer games. Local studies reported that 53% of social gamers in Malaysia played games in their computers and laptop, and approximately one in every graduate surveyed played computer games more than 17 hours per week (Hussein, Wahid & Saad, 2009; Wong, 2013). Given such fascination towards games, it is only natural that these digital natives expect such technology to be integrated into in their teaching and learning as well. As technology becomes an essential part of digital natives' lives (Gunnarsdottir, 2010), the demand to utilize them for their needs and purposes for 21st century learning continues to increase (Prensky, 2007). One of the recommendations is to manipulate computer games into a meaningful learning environment instead of just a tool for information transmission (Niederhauser & Lindstrom, 2006). Consequently, more serious games were developed to accommodate learners' needs to address their learning problems in a less rigid and familiar way.

The idea of creating serious games that can be intrinsically meaningful for users has been an ongoing interest among developers and educators throughout the millennia. However, to balance between games, fun, engagement and motivation is not an easy task as too much or too little of each component could disrupt the effectiveness of learning (Deterding, Dixon & O'Hara, 2011). Consequently, this has caused the value and acceptance towards such games to be negatively low. Dishearteningly, Reid and Petocz (2004) and also Kiili (2005) have argued that the game itself does not guarantee an enhanced motivation nor better engagement despite digital natives' familiarity towards the technology. Thus, research on a more an appropriate pedagogical strategy is needed to ensure the creation of serious games that are meaningful and can be well accepted by learners. Fortunately, there has also been an increase awareness lately to synergize learning theory and instructional design towards the development of games and simulation. As technologies for teaching and learning rapidly change over time, there is also a need to ensure whether they are well received by learners (Aris, 2008).

1.1 Background of the Study

Malaysian's Ministry of Education (MOE) have revealed an alarming issue regarding local graduates as indicated the Malaysian Education Blueprint 2013-2025 for Higher Education (MEB). Students today are still facing the lack of critical thinking skills and internalization of values, which resulted to them having less critical judgment, poor character, attitude and personality unfit in

the job world (Ismail, 2011; Malaysian The Star Online, 2012; Eldy & Sulaiman, 2013; Husain, Mokri, Hussain, Samad & Majid, 2013; Cheah, 2014, Othman & Rahman, 2014, Kalimoorthy, 2017). This means the educational goal to create graduates with redeemable qualities is still not met. Studies have argued that it takes practice to critically make judgments and internalize values (Hodhod, Cairns & Kudenko, 2010; Tirri, 2010). Despite conventional values are being taught in a hypothetical manner where learners know what they ought to do, they still experience trouble practicing it (Johnson, 2001). Therefore, they need a medium to safely exercise prosocial behaviours and also to reinforce what they believe to be socially and morally acceptable (Tangney, Stuewig & Mashek, 2007). Kebritchi and Hirumi (2008) suggested games as an effective learning tool for complex procedures. They reasoned that not only games can reinforce mastery skills, but the use of action instead of explanation provides unique interactive and critical decision making contexts. The rich environment of games can assist learners to develop their higher thinking abilities such as pattern recognition, deductive reasoning and hypothesis testing (Kurshan, 2016). Thus, games also help them to and understand themselves and their views better (Hemminger, 2009).

The breadth of serious games has open up new opportunities for education to improve various aspects of teaching and learning to accommodate students' needs as they were found to support the the effectiveness of game-based learning and were urged for future researches (Connolly, Boyle, MacArthur, Hainey & Boyle, 2012). Michael and Chen (2005) defined serious game as a game with education as its primary goal instead of entertainment. It is a learning opportunity to acquire knowledge or to develop life skills that can be valuable in both virtual and real world (Aldrich, 2005). Since games are known to be motivating and engaging to learners, they are used to address various learning problems (Mattheiss, Kickmeier-rust, Steiner & Albert, 2010). Therefore, in this study, it is hypothesized that by using a medium that is more familiar and receptive to contemporary students' culture such as serious games, the problems such as lack of practices in critical thinking and reflection of values can be addressed in a more effective and innovative way.

Nevertheless, local studies' efforts regarding the use of computer games in education are still novice in terms of understanding gamers' population (Nik Ruzyanei, Wan Salwina, Tuti Iryani, Rozhan, Shamsul, & Zasmani, 2009; Ibrahim, Yusoff, & Jaafar, 2008), utilizing available games (Ibrahim, Wahab, Yusoff, Khalil, Desaru, & Jaafar, 2011; Shariff, 2006) and developing game prototypes among experts (Sahrir, Yahaya, & Nasir, 2013). There has been even lesser studies on designing pedagogically sound educational games, as it can be intimidating even among experts (Jonassen & Grabowski, 2012; Klabbers, 2003). This is due to the challenges faced by designers to create a conducive environment that not only validates intended learning and resembles real world, but also without disrupting the game flow and enjoyment (Shute & Ke, 2012). It also requires experience and adequate knowledge to properly assess the effectiveness of these games, to address complexity in achieving learning objectives accurately as well as to consider the cost for such implementation (Stainton, Johnson & Borodzicz, 2010).

Even so, any attempt in finding a balance for both learning and game aspects is welcomed in order to avoid the game from turning into another drilling activity (Van Eck, 2007; Becker, Ifenthaler, Eseryel, Ge, Kolb, Kolb & Cooley, 2013). Designers must also be careful not to bombard the game with too much factual content just to claim it to be educational, which can result to low success compared to mainstream popular games (Haworth & Sedig, 2011). Thus, more congruent combination is needed between both sides to maintain the interest of users. Game-based learning can be a good approach in serious games to prevent it from becoming another tedious practice while still maintaining the motivation and engagement (Kapp, 2012). Due to the tendency of serious games to be heavily focused on the learning content and less on the playfulness, game-based learning can balance the games to be more motivating and engaging to users.

Consequently, users' acceptance through strong intention of use signifies the quality and usefulness of the proposed technology as perceived by them. It motivates them to engage and play with serious games (Wu & Tsang, 2008). Exploring game acceptance therefore can contribute to the studies on reasons why learners would want to engage in educational or serious games. The findings may also pose valuable data for instructional game designers to improve their system. To summarize, this study suggests a practice in developing educational or serious game by combining instructional design, psychology and motivation theories to address learners' needs for critical thinking and internalization of values practices. It also intends to identify its users' motivation, immersion, gamification preferences and perceived acceptance through their interaction with the game. Findings may contribute to a more rigorous and pedagogically-sounded serious game in the future, thus facilitating users to a more accepting behaviour towards the innovation.

1.2 Characteristics of Games

Understanding the characteristics of games can allow instructional game designers to develop a learning system that can positively impact and encourages further adoption as different users experience a game differently (Hiwiller, 2015). Due to this unique individual experience, Hunicke, Zubek and LeBlanc (2004) defined game as a system that possesses three characteristics which are mechanics, dynamics and aesthetics (MDA). Mechanics are elements of a game which create rules to play. Meanwhile dynamics are the behaviours emerged as a result of the rules from the game. Consequently, aesthetics are the emotional responses as a result to both the mechanics and dynamics of the game. In other words, a game can be defined as some form of play which has goals and structure (Maroney, 2001). Games differ according to their own goals, environment, format, and even playing requirements as intended by the developers. Because of its highly interactive form, people find games to be fun and engaging.

Different studies have different definitions regarding the characteristics of games. Charsky (2010) described games as being goal-driven, competitive, having rules, choices and challenges. Whitton (2010) defined game characteristics as an exploration, fantasy, interaction, outcomes, and safety. Though the definition of game characteristics may vary from one study to another, many agreed that engagement, rules and goals are important characteristics of games.

Due to its distinctive nature, goal and appeal to certain users, games can be classified to different perspectives, genres and platforms. The two-dimensional (2D) and three-dimensional (3D) are amongst the popular perspective or graphical interface used in games today. Compared to 3D, the 2D graphics lack the Z axis which gives the illusion of depths and realism to the environment (Thompson, Berbank-Green & Cusworth, 2007). Even so, they are still widely used in game designs due to its lightweight size, non-high end system requirement and also economic (Adams, 2009).

Games also can be classified into different genres. Action, puzzle, strategy and role-playing are amongst popular genres for games. Role-playing games (RPG) however stands unique as it combines simulation and adventure in its gameplay. It can be a powerful genre as it blends real-world simulations (Frasca, 2003) with overcoming obstacles to reach goal (Hung & Van Eck, 2010) while players identified themselves with the character in the game and control the story. Due to this unique RPG element, Yannuzzi and Behrenhausen (2010) highly suggested exploration of this game genre for further significant instructional implications. Hung and Van Eck (2010) further supported this notion by stating that RPG games are able to facilitate advanced learning impact such as attitude change, higher-order thinking skills and even towards shifting one's belief system.

Finally, games can be played in various platforms. Video consoles, handheld devices and computer games are among the potential platforms opened for a development of learning games. Though every platform has its own advantages and effects on learners, this study is interested in investigating further on how computer games can be used to support learning.

1.3 The Potential of Computer Games for Education

Studies related to using computer games for education have been expanding immensely due to its significant part of younger generation's pop culture (Mysirlaki & Paraskeva, 2010; Ulicsack & Cranmer, 2010). Despite having mixed empirical evidences on its learning benefits (Charsky, 2010; Gibson & Bell, 2013; Mazeyanti, Oxley & Sulaiman, 2014), researchers acknowledged its motivational intensity and the new generation's accepting behavior towards it (Rajaravivarma, 2005; Chang & Chou, 2008). Subsequently, several studies proclaimed digital games can support learning in universities regardless of contexts and formality (Connolly et. al, 2007; Ebner & Holzinger, 2007; Whitton

& Hollins, 2008). This is due to games' possibility to open up exciting opportunities to customize and personalized students' learning experience according to contemporary demands (Chen & Li, 2010; Ertzberger, 2009).

Combining games, motivation and learning can make education seem effortless and fun especially for today's learners. Traditional learning environment requires meeting certain criteria in order for large amount of knowledge to be transferred effectively. Games however make learning more enjoyable that they are able to disguise such tremendous amount of learning needed for them to play successfully (Whitton, 2010). A game can be defined as some form of play which has goals and structure (Maroney, 2001). Games differ according to their own goals, environment, format, and even playing requirements as intended by the developers. Due to its highly interactive form, people find games to be fun and engaging. Games allow an ideal learning environment by being risk-free, imaginative and having some sense of control (Kapp, 2012). As learners become active agents of their own learning, they are co-creating the experiences through their actions and decisions as they brave through the world at their own preferences and pace (Despain, 2009; Hung & Van Eck, 2010). Whitton (2012) suggested that games can offer a variety of techniques with appropriate amount of stimulation that can facilitate effective learning experience by engaging players in a motivational medium that is formed from real consequences of reality. Game genres such as role-playing, adventure games and simulations utilize techniques such as problem-solving, enquiries and action choices that not only provide a contextualised experience, but also allow experiential learning to take place through practice, failure, reflection and repetition. Game also holds mechanisms such as scaffolding and intrinsic immediate feedback that are crucial for the learning curve.

Consequently, the educational potential of computer games as a valuable medium to address today learners' learning problems have caused it to receive more attention from researchers recently as more serious games are being developed and used in training, healthcare, business and even education itself (Susi, Johannesson & Backlund, 2007). Students today still face lack of practices in critical thinking skills and values regulation, which resulted to them having less critical judgment, poor character, attitude and personality unfit in the job world (Ismail, 2011; Malaysian The Star Online, 2012; Eldy & Sulaiman, 2013; Cheah, 2014, Othman & Rahman, 2014). The Education Ministry also reported 24% of graduates are still unemployed even after a year of graduation, mainly due to lack of vital soft skills include communication, critical thinking, problem solving and mediocre English language. It is also become a daunting challenge to engage millennial learners as they can easily become uninterested and disengaged with learning methods presented to them (ChongHui, 2017). To address these issues, studies have argued that it takes practice to critically make judgments and regulate values (Hodhod, Cairns & Kudenko, 2010; Tirri, 2010) that relying on conventional methods solely are not enough. The students need a more innovative medium beyond classroom constraints to safely exercise prosocial behaviours and to reinforce what they believe to be socially morally acceptable (Tangney, Stuewig & Mashek, 2007). Therefore this study proposed the use of a serious game called SightHeart as

an alternative medium for students to reflect on their personal values and to practice their critical thinking skills. The game enables students to engage in their own pattern of thinking and practise weighting judgment based on their values before taking actions and making important decisions in a roleplay-like moral dilemmas.

1.4 Serious Games

Serious games are different from entertaining games in terms of its goal, purpose of play and communication complexities (Johnson, Vilhjalmsson, & Marsella, 2005). Rather than for entertainment purpose, serious games opt for its users to understand or learn specific concept without misconceptions (Stefan & Moldeveanue, 2015). Due to serious games being more focused on the actual learning of something and problem solving rather than pleasure, less emphasis are given on the aesthetic graphics and immersive gameplay unlike entertaining games (Johnson et al., 2005). Since the goals are heavily intended on transmission of important knowledge and skills as well as addressing serious messages to its users, serious games tend to suffer from lack of entertaining and motivating factors (Shen et al., 2009; Moldoveanu et al., 2016), despite being called a 'game'. This has caused serious games to become another frustrating routine due to its heavy learning content (Van Eck, 2007; Becker et al., 2013). due to serious games aimed to educate users rather than to entertain them, it tends to be devoid of entertainment value (Shen, Ritterfeld, Wang, Nocera & Wong, 2009; Moldoveanue, Balan, Moldoveanu, & Morar, 2016). Thus, more considerations are needed to be placed onto the design and development of serious games with entertainment values in order to prevent it from becoming just another drilling activity.

It is important to combine proper game methods, motivation and learning theories to create a serious game that not only can educate users, but also as a source of fulfilling enjoyment to them. The success of serious games therefore depends on its methodology design that enables immersive, entertaining and motivating user experience. Combining ADDIE model with game-based framework such as the ID-GBL model can be a good reference in designing educational or serious games. Related studies on serious games also have their own fair share of learning principles of good learning game design (Malone & Lepper, 1987; Gee, 2007; Whitton, 2012; Johnson et al., 2005; Zidik, 2014). Consequently, applying gamification principles can help in synergizing the instructional part in serious games while maintaining the motivation and engagement of its users. Apart from using models and approaches to develop serious games, one particular design aspects of games is enabling user's pattern recognition. Pattern recognition allows for more ease and organized information interpretation in games (Chang & Wei, 2016). Therefore it is advised for the information to be presented in games in which the users find it easier to understand. Employing perceptual organization principles such as Gestalt's Laws of Organizations can help users to better understand the information presented in the way it is intended by the creators. The principles are useful in illustrating how people perceive visual components as organized patterns or wholes, instead of many different parts (Kohler, 1947).

Some of Gestalt's laws of organizations principles that are relevant to the study include proximity, similarity, closure, and good continuation.

Users' interaction with the developed application can serve as useful data to improve its usability. Data analytics in the form of game metrics can be used in games to understand players' reaction and behaviour towards the developed system. Drachen, El-Nasr and Canossa (2013) defined game metrics as quantitative measures to any aspects of the game. Therefore, a metric that can be measured while player is playing is called game metrics, the direct recorded numerical data as a result of player interaction with the game environment (Thompson, 2007; Fry, 2008). Game metrics assists developers by diminishing their potential biasness, content and play familiarity, while simultaneously helps them to identify bugs and crashes that can inhibit the overall quality of players' learning experience. Examples of common metrics used include navigation as function of time, player interaction, narrative and interface metrics (Tychsen & Canossa, 2008). Nevertheless, despite various methods of gathering a game's data, the metrics are valuable only if they are aligned to each game's unique intended learning objectives. It is a common consensus among educational practitioners and game designers that the closer the assessment results are to its intended learning objectives, the more effective the serious game is perceived to be. Relevant pedagogical strategy is needed to balance the learning content and also enjoyment in serious games to encourage elements such as active learning, intrinsic motivation, reflection, experimentation, sense of control, achievement, interest and also entertainment (Moldoveanu et al., 2016). It is the ultimate goal of serious games design and development to be able to combine traditional learning objectives successfully while maintaining the elements of entertainment, play and fun (Amoia, Brétaudiere, Denis, Gardent, & Perez-Beltrachini, 2012). Additionally, understanding the effect of motivation and engagement on users can further inform instructional game designers to design serious game that is well accepted by them.

1.5 Motivation in Playing

Identifying users' motivation through their technology usage can inform the quality of the design and also influence their intention to use the system. Different types of motivation can drive users into certain behaviours as they interacted with the technology. Motivation generally is divided into external motivation and internal motivation (Ryan & Deci, 2000; Lafrenière, Verner-Filion, & Vallerand, 2012). Ryan and Deci (2000) explained external motivation as the behavioural drive based on social environment and external rewards. Conversely, they described internal motivation as a superior drive, due to its connection with self-satisfaction, pleasure and positive impact towards users. Sheldon (2012) illustrated internally motivated students as those who take responsibility of their studies to better themselves. These students want to learn based on their free will instead of relying on rewards and external force. Due to this internal motivation, learning has become more enjoyable and meaningful rather than a chore to them. Sheldon (2012) therefore urged for additional learning activities that can foster internal motivation in learners.

Game mechanics can be a good approach to boost users' motivation (Nicholson, 2012). For example, the levelling up mechanic can be used not only to inform the player the status of their progression within the context (Bruder, 2015; Reeves & Read, 2009; Werbach & Hunter, 2012), but also as a form of motivation by rewarding players for completing missions, achieving targets and proceed to the next level (Deterding, Dixon & O'Hara, 2011). However, Nicholson (2012) expressed a concern due to the tendency of gamification to encourage external motivation with its excessive rewards such as badges and points. He reasoned that it can be troublesome as players might lose interest in the game once the rewards are taken away. Therefore he suggested that gamification should be used sparingly just to promote internal motivation as it keeps players engaged even without the external motivators. Suitable theories and models are needed to properly design, identify and measure users' motivation in games. Studies on human motivation have considered self-determination theory (SDT) as a widely used framework to assess the level and type of human motivation (Abduljalil & Zainuddin, 2015). It operates under fulfilling human's basic psychological needs towards autonomy, competence, and relatedness, as means to explain human behaviour (Ryan & Deci, 2000). Consequently, a gaming motivation scale (GAMS) by Lafrenière, Verner-Filion, and Vallerand (2012) was developed based on SDT for a more appropriate measure of users' motivation towards games.

Interestingly, Reiss (2005) was against neither the general intrinsic nor extrinsic motivation as means to explain human behaviour. He believed that it is individual differences that drive certain motivation to do something. Therefore he suggested that personality and preferences can be important indicators that drive users to play a game. Following this suggestion, Marczewski (2013) developed the Hexad user types framework to classify users according to their gamification preferences. His study revealed that by categorizing users' preferences towards certain game mechanics, it can help to identify their motivation in playing and thus contribute to better instructional game designs that is more appealing and intrinsically motivating to users. As a summary, designing games that are intrinsically motivating to users rather than externally motivating should be a goal to every instructional game designers (Johnson et al., 2005; Paras & Bizzocchi, 2005; Chang & Wei, 2016). It is crucial to use appropriate approach and framework to ensure the developed serious game is intrinsically motivating and thus leading to deeper engagement of its users.

1.5.1 Gamified User Types

It is agreed upon many designers to find elements that can encourage intrinsic motivation in their learning applications. Motivation is effectively activated in video games due to its relationship with fun which is a source of intrinsic motivation (Denis & Jouvelot, 2005; Klimmt, 2003; Koster, 2004). Fun becomes a highly motivated factor for learning in games, due to the combination of various other factors such as pleasure, desire and ludic tension (Denis & Jouvelot, 2005). The pleasure factor derives from game elements such as fantasy and control. The desire factor comes from the sense of fulfilling challenges, curiosity, problem solving and even escapism. Lastly, the ludic

tension factor involves discovery, conflict, learning and even the element of surprise. Taking the intrinsic motivation factor into the design, this study has adapted Marczewski et al's (2016) Hexad framework by classifying users into types according to their underlying motivation and gamification preferences. Despite the existence of other similar model related to user types which is Bartle's Taxonomy of Player Types, the model is more focused on identifying users' personality in online multiplayer games (Kyatric, 2013) instead of single player games as proposed in this study. Conversely, the Hexad User Types Model has more general approach and is suitable for different types of games (Marczewski et al. (2016). This study therefore believed that by adopting the Hexad Model to identifying respondents' game preferences, it can better design games that can be intrinsically motivating and more engaging to users.

Different user personalities and preferences towards certain game elements can influence users' motivation for game interactions and how users perceived the system (Marczewski et al., 2015). The Hexad Gamified User Type Model attempts to understand how different motivations towards certain game elements can affect and engage different types of users (Marczewski et al., 2015, Marzewski, Tondello, Wehbe, Diamond, Busch & Nacke, 2016). Despite the model being inconclusive, it serves as a guideline for designing experiences that can encourage intrinsic motivations and meaningful self-enrichment to various types of users. By identifying users' preferences, the game could be designed in such a way it can be accepted by larger audience.

Marczewski et al. (2016) have listed six variations of the gamified user types which are philanthropist, free spirit, disruptor, achiever, socializer and player. Each category possesses its own special traits of the user's underlying motivation while playing a game:

1) Philanthropists type of user are motivated by purpose and meaning. They are also altruistic, filled with desire to enhance other people's lives without expecting anything in return. Some of the examples of gamified elements they are drawn to include collection and sharing.
2) Free spirits are motivated by autonomy. They want the freedom to create, to express themselves and to explore. Their preferred gamified elements are exploratory tasks and easter eggs.
3) Disruptors are motivated by change. They would either disrupt the game system to bring about positive or negative change. Gamified elements that they need include voting mechanisms and developmental tools.
4) Achievers strive for mastery. They hunger for knowledge and challenges to improve themselves. Gamified elements that may concern them are challenges and quests.
5) Socializers are driven by relatedness. They value interaction and would want to have social connection with others. Gamified elements that might interest them include social discovery and working in guilds or teams.

6) Players are motivated by rewards. They would do anything to receive rewards that can benefit themselves. Examples of gamified elements they would look forward to are prizes and achievement badges.

Despite the range of proposed user types, Marczewski et al. (2016) suggested that the design elements should focus on instilling intrinsic motivation to users, mainly the free spirit, philanthropist and achiever types. The characteristics of these three user types are the most fitting to the core of intrinsic motivation in self-determination theory (SDT), which are relatedness, autonomy and competence. Their studies believed that the more the gamified system matches their users' personalities and preferences, the better its intended outcomes would be. Consequently, users would also experience flow and deeper engagement, as a result to a motivating gameplay (Hiwiller, 2015). Game-based learning can be used as a mean to keep users engaged to the learning system. Appropriate use of game mechanics enables users to experience immersion and encourage intrinsic motivation in the activity. Align game-based learning with users' values and preferences can inform better instructional game designs that are more engaging to wider group of audiences.

1.6 Engagement in Playing

Engagement can be a good predictor for a well-accepted serious game. Engagement is related to the concept of 'flow', a form of intrinsic motivation which resulted users experiencing goals being achieved effortlessly while losing track of time (Csikszentmihalyi, 1989; Nakamura & Csíkszentmihályi, 2002). Free flowing in games facilitates deeper engagement, due to the sensation of learning in an instructional game without discovering the instructional part (Mattheiss, Kickmeier-rust, Steiner & Albert, 2010). People who experienced flow are described as being absorbed in their activity inclusive of narrowed focus to the said activity, lose self-consciousness and sense of control over the environment, also known as immersion. Immersion in this study refers to one's partial presence in the game environment (Wirth, Hartmann, Böcking, Vorderer, Klimmt, Schramm & Biocca, 2007). It is hypothesized that players will experience certain degree of immersion in games that they are playing (Brockmyer, Fox, Curtiss, Mcbroom, Burkhart & Pidruzny, 2009; Fu, Su & Yu, 2009). Due to its effect on users' deeper engagement, flow is concentrated in entertainment-based designs (Hsu & Lu, 2004).

Even so, Chen (2007) emphasized the importance for game designers to find the right balance to combine all the elements of flow to negate user's boredom and anxiety. Less challenge can result to user losing interest in the game, yet too complex the user might also become unmotivated as he could not overcome it. Thus it is advised that the game should keep player's experience within the Flow zone, which resulted it to continuously being intriguing to the player. A good game continuously engages its users by motivating them to continue while remain in a psychological state of flow (Prensky, 2003; Johnson et al., 2005). Study by Sweetser and Wyeth (2005) proposed a variant concept

of flow called gameflow theory which incorporates eight important elements of games which are challenge, skills, clear goals, control, immersion, feedback, concentration and social interaction. The GameFlow scale was recommended as a valuable literature to evaluate recent games in history (Sweetser & Wyeth, 2005; Fu et al., 2009). It measures many dimensions of user experience including the immersion and enjoyment of games. The scale was developed as means to create better designs for serious games (Fu et al., 2009). To summarize, it is relevant for serious game designers to maintain the flow state of immersion to keep their users interested to continuously engage with the game. The interface should also be designed in such a way that can reinforce positive attitude and perceived as easy to use (Hsu & Lu, 2004). Assessing user experience such as engagement in games can help facilitating improvement in terms of game application and design (Sweetser & Wyeth, 2005). Combined with an appropriate pedagogy that balances engagement with best elements of learning and play, it inspires users for a greater prolonged use of the system.

1.7 Context of Serious Games

The context of serious game provides a medium in which a user can interact with and for designers to elicit certain user behaviours regarding their design (Hiwiller, 2015). Users' behaviour that leads to their acceptance of the game can inform instructional game designers to continuously improve their designs to benefit a larger audience. Games can offer interesting behavioural study with its capability of providing choices which can branch to different types of stories and effects to the player (Sutrop, 2014). Since games require some consideration before deciding on an action, it provides a sensible outlet for morality as players deliberately make their decisions as they proceed with the game's story. Games therefore can be seen as a way to gain insight on how values are translated into moral behaviours.

For users, the rich environment of games enables them to develop higher thinking abilities such as pattern recognition, deductive reasoning and hypothesis testing (Kurshan, 2016; Isaacs, 2015). A roleplaying context in games allows the possibility to explore conflicts and reflect on moral values in a playful way, given the prospect of allowing player's identification to the character they are playing (Hemminger, 2009). The story branching capabilities of RPG games allow a suitable setup for different dilemmas with different conflicting values. Players' control in terms of choosing which course of action would affect the storyline as well as mastering the game rules can give them some experience of competence. Due to these rich elements, he believed that RPG players experience more immersion with its rich story-driven interaction and actual creative self-realization seen through their avatar.

Undergraduate students today still experience lack of critical thinking skills and poor character that affected their employability (Ismail, 2011; Malaysian The Star Online, 2012; Eldy & Sulaiman, 2013; Cheah, 2014, Othman & Rahman, 2014, Kalimoorthy, 2017). A study reported that one of the causes of low

critical thinking and poor judgement due to students' tendency to use memorization and rote learning as easy way to attain their degree, get a job and solve problems easily (Husain et al., 2013). Critical thinking refers to active and organized effort to improve and understand the environment by examining own thinking as well as consideration towards others (Leicester, 2010). Critical thinking also involves formulating hypotheses, solving problems and making decisions (Cottrell, 2011). Conventional method used to address both issues have caused students to become disinterested and disengaged with the learning materials which demands for newer approaches familiar to them (ChongHui, 2017).

Since this study aimed to address undergraduates' needs for unconventional practices in critical thinking skills and reflection of values, a role-playing serious game with moral dilemmas was proposed as a training ground for them. Five moral dilemmas were purposely chosen as recommended by Clifford et al., (2015) in their study on Moral Vignettes Foundation (MFV). Their study proposed that adapting their recommended moral dilemmas can address people's perceived violations and urged them to behave in such a way that would not contradict their values. Each of the dilemmas focuses on eliciting users' decisional responses on basic moral principles such as care, loyalty, fair, authority and sanctity as suggested by Haidt (2001) in Moral Foundations Theory (MFT). The dilemmas were chosen based on their sensitivity issues and relevance to Malaysian culture, as well as their feasibility to be incorporated as part of narrative in the serious game.

Not only games are safe context for moral experimentations, it also facilitates some form of reflection of the learning process to the player (Dixon, 2015). The scenarios in games pose challenges that can be immersive, as players identify themselves with the character they played and emulate patterns of behaviour in real life based on their values. Even when players chose an action deemed to be universally accepted as 'evil', Dixon (2015) classified their actions as conscious and deliberate. His study however emphasized the importance of having contemporary social values, in order for the reactions presented by players to be relevant. This calls for more increasing recommendation to explore the use of digital computer game and its effect to player's complex processes such as moral decision making. In a game environment which requires players to make a decision, it can be a valuable data to see what aspects of their understanding and moral principles that can influence their decision gameplay.

In a moral dilemma situation, generally a person's moral principles would inform the basis of all their moral decisions as they are shaped by strong internalized values (Tirri, 2010). Moral dilemmas help learners to identify their own values and even to some extent infer their behaviour. A common moral dilemma situation includes a value conflict with a choice of possible solutions. One has to decide on the most suitable option, justify the choice, reflect and see different views and consequences made by that action (Sutrop, 2014). He also stressed the importance of reflecting self-values in other ways not only

transmitted through moral content subjects. His study added that it helps raise self-awareness and empathy to non-absolute right or wrong solutions as well as aids one to critically practise forming and defending personal position. Thus, he believed that using games can support one's reflection by clarifying their way of thinking and values that are personally important to them.

In a game world, players are required to make decisions that they deemed appropriate in order to proceed and reach the goal. Sutrop (2014) defined decision as the degree of one's judgment, character, experience and values they hold onto. Different situations rely on the decisions and actions taken by players in distinguishing and evaluating different values. Personal values control the extent of one's consideration and acknowledgement about an issue in their decision making. Together, both values performed an integrated conceptual framework of an individual's personal ethics or moral philosophy, which is an important factor in guiding moral judgments and actions in an ethical dilemma (Caswell & Gould, 2008). The context of this study however addresses morality at the very basic as the beliefs of differences between 'right' and 'wrong' in individuals. It only illuminates on the aspect of how serious games can influence their moral choice decisions in-game. Therefore this study limits the moral content to only universally accepted values, as also to prevent biasness towards any religions or ideology. It is also important to note that the research does not intend to show what constitute good or bad decision, but rather on the possible considerations and motivations that can contribute to the process of decision making in the game. These data serve as relevant keys for the research on how users would respond to the prototype.

Thus, this study did not adopt any values theories as the main focus is on the development of a computer game prototype that can reflect its player's assessed values through the decisions that they made in the game. There is no absolute value as the player has to weight different values that they have and decide on their action based on their own judgment of the situation. Not only has the game reflected their moral principles, but also their abstract principles in a concrete situation. In other words, the focus of the study was not on identifying insensitivity or improving moral values, but to increase awareness of certain actions provide consequences that may or may not been anticipated by players. It also suggested the possibility of a computer game as a tool for self-reflection and studying their behaviour in the game. It is hypothesized that the serious game can provide a base for users' understanding of their thinking in such environment, and for them to reflect upon what constitutes as morally right decisions and acceptable behaviours as suggested by Weaver and Lewis, (2012). By handling problems reflecting real life issues, actions taken by the character can also cause significant development in real life (Hemminger, 2009). The extent of this significant usefulness on users however; will be highly influenced by their acceptance towards the game.

1.8 User Acceptance through their Intention to Use

Users' acceptance through strong intention of use can signify the quality and usefulness of the proposed technology as perceived by them (Davis, 1993). It gives them a reason wanting to engage or play with them (Wu et al., 2008). Exploring game acceptance therefore can contribute to the studies of why learners would want to engage in an educational or serious game. It has been the most used variable in most game acceptance studies (Hsu & Lu, 2004; Ha, Yoon & Choi, 2007).

An individual's acceptance towards a learning system can be related the user's experience of interacting with the system. McNamara and Kirakowski (2006) defined user experience as an investigation of individual personal experience on using the product. Since user experience involves solitary individuals, it may be different from one user to another. This explains why two individuals who played the same game might propose different opinions on the experience of playing. As an example, one player might find the game challenging while the other might find it highly entertaining. Therefore, Halvorsen (2013) urged developers to ensure users receive good user experience when developing a learning application. Good user experience suggests that the game is meaningful, fun and even useful for learning. It also denotes that the users are positive, motivated and enjoyed learning through the application. Zidik (2014) therefore supported and suggested a good user game design experience by having clear learning objectives and also a tangible assessment metrics.

Research in data analytics in the form of game metrics are increasingly used as a unique way to identify certain patterns that can infer player behaviour and inform game design and testing (Tychsen & Canossa, 2008). Unlike qualitative and survey-based data that depends on information recalls and potential biasness (Swain, 2008), game metrics record precise evidence of player actions. Though predicting human behaviour on the sole base of game metrics is impossible, it nevertheless offers valuable insights to the overall state of the game, which can be useful for game designers to improve their games (Lovato, 2015). Thus, using game metrics to record user experience can be valuable to the instructional game design as well.

Ultimately, there are many theories and models developed to study users' acceptance towards a technology. Until now, the Technology Acceptance Model (TAM) has been overtly used to study system acceptance (Davis, 1993). User's perceived usefulness (PU) and perceived ease of use (PEOU) are amongst the strong determinants that can predict user's attitude and intention to use a technology. Other than that, extensive TAM studies also introduced learning opportunities (LO) as another predictor to examine the technology's learning outcomes (Bourgonjon,Valcke, Soetaert & Schellens, 2010). These predictors have significant effect in studies that relate TAM to learning games through empirical practical use of computer game system on the basis of users' attitudes and intentions to use the the system (Davis, 1993; Venkatesh & Bala, 2008). Consequently, TAM became a strong foundation to examine variables

related to beliefs, attitudes and users' intentions. To summarize, a user's acceptance towards a technology can be heightened based on their perceived experience while interacting with the system. Variables such as perceived ease of use (PEOU), perceived usefulness (PU) and perceived learning opportunities (LO) can influence users' attitudes and behaviour intention towards the product. Nevertheless, the variables offered by TAM may not fit every learning system. Users' acceptance may also vary as according to the system used as well as their needs and capabilities (Giannakos, 2013). Thus, mapping the system into a context may address other extra variables that can contribute to the effects being studied.

1.9 Problem Statement

Highlighting the issues stated by The Ministry of Education (MOE) in Malaysian's Blueprint for Higher Education 2015-2025, students of higher learning still lack critical thinking skills and possess poor character which might affect their future employability (Ismail, 2011; Malaysian The Star Online, 2012; Eldy & Sulaiman, 2013; Cheah, 2014, Leo, 2016, Kalimoorthy, 2017). Other local studies has also reported that students were still unable to apply critical thinking in a real world situation even after they have long finished school (Rosnani and Suhailah, 2003; Konting et al., 2007) and were below the expected proficiency level even in higher learning (Nagappan, 2010). Despite educators' endless efforts for novel instructional approaches in order to fit these demands, concerns also arises along the dimensions of learner's motivation and engagement (Lee & Hammer, 2011). Extrinsically motivated students tend to possess worrisome characteristics such as being less cooperative, poor self-efficacy, minimal effort and even stop learning once their goals are achieved (Lei, 2010). They can also easily disengage if they find the learning to be a daunting task for them. These issues have become a constant concern in education and MOE has urged for more intervention to secure students' critical thinking skills and solid moral foundation.

Several studies also reported that university students today still suffer from stagnant didactic traditional learning methods (Lei, 2010) despite their needs for technology utilization in education (Rhonda, Derryberry, & Jackson, 2012). Conventional methods of role-play and hypothetical scenarios have undermined learners' diverse personalities and their ability to see the consequences from both sides of the decision, good and bad (McBrien and Brandt, 1997; Eiriksson, 1997). Despite learners being aware that human behaviour has direct consequences to the welfare of others, they are expected to perform as according to what the environment is required of them. Therefore Hodhod et al. (2010) stressed the importance of extensive practice until learners are able to internalize the moral values, and by showing the consequences of their actions on themselves and others, only then they could assimilate the concepts of rights, principles and values. Apart from that, students' ability to quickly access information within their fingertips has caused them to not only become impatience but also lose attention over conventional method of learning (Lei, 2010). This has caused today's learners to lose motivation and engagement in the learning activity easily (Lei, 2010; Lee &

Hammer, 2011). Their motivation in learning also has become extrinsically-oriented, mainly focusing on passing grades and employment, rather than intrinsically seek pleasure and satisfaction in their learning (Lei, 2010).

This creates unmet demands from millennial learners to experience learning in a less structured and pleasurable way, free from classroom constraints (Chopra, 2016). Given their prominent culture and fascination towards computer games, new learning possibilities can be offered to engage these learners. Game-based learning in the form of serious games were said not only to effectively engage (Rankin & Vargas, 2008) but also effective in knowledge transmissions and practicing skills valuable in virtual and real life (Engler, 2012). More studies were focused on using and modifying commercially available games to address learning problems (Muntean, 2011; Renaud & Wagner, 2011; Engler, 2012). Even so, scholars reported to the lack of 'high quality' that can be used to in didactic approaches (Dondi & Moretti, 2007; Prensky, 2001; Virou & Katsionis, 2008). Thus, any effort in developing qualified games is critical.

There also has been an issue of bridging the gap between play and instruction in serious games. Since serious games' main objective is to educate rather than to entertain, it can be too content-structured filled with repetitive tasks which resulted to users still becoming demotivated and finding it to be non-immersive (Shen et al., 2009; Moldoveanu et al., 2016). Studies from both local and international also reported that there have not been significant findings, and that the assessment of game-based learning effectiveness as learning and training tool still remains unclear (Gibson et. al, 2013; Mazeyanti et. al, 2014). Several studies supported this notion, stating that game-based learning studies still lack empirical evidence on its effectiveness in supporting learning and training (Hainey et al, 2010; Sotomayor & Proctor, 2009). This simultaneously can affect their acceptance and behaviour intention to use serious games for learning.

Therefore, Banfield and Wilkerson (2014) proposed that a perfect balance between game elements and learning theories should be considered to properly engage and motivate users. The balance should be an appropriate approach that can encourage learners to keep playing while fulfilling the learning objectives in an enjoyable way. As a conclusion, more research are needed to find suitable pedagogy to align learning and play while at the same time maintain learners' interest and motivation towards the learning goal (Van Eck, 2007; Becker et al., 2013). To fill in the gap suggested by previous local studies such as the lack of Malaysian serious games (Shariff, 2006; Ibrahim et al., 2011; Hwang & Wu, 2011; Osman & Aini, 2012), greater emphasis in development of students' critical thinking skills in future programs (Chong & Abdul, 2016), provide an avenue for further investigation on undergraduates' game acceptance (Roslina, Yusoff, Khalil, & Jaafar, 2011) and more evaluative research on self-developed serious games instead of commercial games (Fu et al., 2009), this study therefore attempted to use game-based learning to design, develop a serious game called SightHeart as means to determine and

improve users' engagement, motivation and overall acceptance of serious games. The data gained from this study were hypothesized to not only contribute to better instructional game designs, but also to accelerate future adoption of serious games as innovative practices in higher learning.

1.10 Objectives of the Study

The objectives for this study are to;

1. Develop a serious game named as SightHeart for training analytical skills and values reflection.
2. Identify users' gamified user types through their general preferences towards certain game elements.
3. Identify user's motivation towards SightHeart.
4. Identify user's engagement towards SightHeart.
5. Identify user's acceptance in terms of perceived usefulness, perceived ease of use, perceived learning opportunities, user's attitudes and user's behaviour intention towards SightHeart.
6. Identify the relationship between motivation, engagement, perceived usefulness, perceived ease of use, perceived learning opportunities, and attitudes with user's intention to use SightHeart.
7. Investigate users' experience using SightHeart to improve the game design and content.

1.11 Research Questions

The research questions for this study would be;

1. How to develop a serious game prototype that can be used to train user's analytical skills and support their values reflection?
2. Which category of gamified user types does the majority of respondents fall into?
3. What type of motivation drives the users while playing *SightHeart*?
4. What is the level of students' engagement in *SightHeart*?
5. What is the level of students' perceived usefulness towards playing *SightHeart*?
6. What is the level of students' perceived ease of use towards playing *SightHeart*?
7. What is the level of students' perceived learning opportunities towards playing *SightHeart*?
8. What are users' attitudes towards *SightHeart*?
9. What are users' behaviour intentions towards *SightHeart*?
10. How can the users describe their experiences using *SightHeart* to further improve the prototype?

1.12 Research Hypotheses

H_1: There is a significant relationship between motivation with user's behaviour intention of using *SightHeart*.

H_2: There is a significant relationship between engagement with user's behaviour intention of using *SightHeart*.

H_3: There is a significant relationship between perceived ease of use with user's behaviour intention of using *SightHeart*.

H_4: There is a significant relationship between perceived usefulness with user's behaviour intention of using *SightHeart*.

H_5: There is a significant relationship between learning opportunities with user's behaviour intention of using *SightHeart*.

H_6: There is a significant relationship between attitudes with user's behaviour intention of using *SightHeart*.

1.13 Significance of Study

This study proposed a game-based learning approach as a medium to practice critical thinking skills and values reflection using moral dilemmas in serious games. It also aims to examine the relationship between user's motivation, engagement and overall acceptance with behaviour intention towards the game. Through SightHeart, this study offers a practice rooted in game, psychology and motivation theory. It is hypothesized that it can be useful for designing serious games. Directly or indirectly, the game models real instances of how an individual would make choices based on the situations in the game that can inform users' responses towards the game design. It is also an attempt to test the game's practicality and impose relevant methods to improve instruction. It is hoped that the game can add up to quantity and improve quality of self-developed serious games researches and better responsive learning. Result from this study will add to the body of literature on innovative practices in higher education, as well as open up new ideas for further exploration with serious games in Malaysia.

This study also poses some significance to figures involved in higher education, mainly students, academicians, Ministry of Education and departments in relation to using technologies for education. The game developed can illustrate some effects on users' psychology and behaviour that can be useful to create educational materials that suit users' needs. It is hoped that SightHeart is able to encourage students to enjoy and be more actively involved in practising their analytical skills and values internalization. Not only the game simulates real life problems, but also it can be a potentially safe medium for players to explore, experiment and exercise what they truly believes in a real-like situations. Most importantly, the game provides an opportunity for the users to reflect on how they should approach the decisions in the future. For educators, this study can assist the planning of using game applications for student development purposes. The data gained can give insights on understanding users' behaviour that can contribute to better acceptance towards the educational materials developed. Simultaneously, this study can benefit Ministry of Education's policy makers in aiding the planning of

appropriate intervention by using games as part of innovative practices in higher learning. The strength and weaknesses of the game developed can serve as a reference to ensure larger and better adoption in universities.

To conclude, this study attempt to combine game-based learning, psychology and motivation theory for a more engaging and well received serious games. Findings would contribute to the growing body of effective educational game designs as well as understanding of users' behaviour towards the proposed technology. Evidences can further be used to develop a more engaging and motivating game that can address its intended learning goals, or even as a valid data metrics. The data not only contributed to the behavioural game acceptance but also can affect the teaching, designing and measuring of game outcomes as a pedagogical strategy in facilitating the needs for autonomy, self-fulfilling and self-development purposes.

1.14 Limitations of the Study

There are several limitations to the current study that should be noted. Instead of making several modifications or modding on commercial games, the study decided to develop the prototype from scratch to fit the learning context. Therefore, the findings may only suggest practical guidelines to research practitioners who are interested in developing their own games for research and learning purposes, and less on those who seek more information on tweaking commercial games into serious games.

Also, it is important to note that SightHeart was created in RPGMaker VX Ace which has several limitations. It is accessible only to Windows platform, and is unable to run on other operating systems such as MAC or Linux. Thus it could not reach all computer users. It also has limited branching menu lines and lack of character animation, which explain why the game heavily relies on narratives to describe the situations. These limitations however were disputed on much newer version of the software called RPGMaker MV which just came out late last year. Regardless, the older program was easy to operate even to novice and inexperience users, and also posed endless potential for learning while still able to serve a convincing storyline and gameplay sufficient to the objectives of the study.

Secondly, this study is not subjected to specifically research on moral decision making, but rather illuminates on the aspect of how serious games can influence their moral choice decisions in-game. The research does not intend to show what constitute good or bad decision, but rather on the possible considerations and motivations that can contribute to the process of decision making in the game. These data serve as relevant keys for the research on how users would respond to the prototype. Not only has the game reflected their moral principles, but also their abstract principles in a concrete situation. In other words, the focus of the study was not on identifying insensitivity or

improving moral values, but the possibility of a computer game as a tool for self-reflection and studying their behaviour in the game.

Thirdly, since this study involves a case study on a small sample of undergraduate students from a university in Malaysia. Therefore, broader sample may suggest different findings and much richer perspectives and experience with the prototype. Consequently, it is also imperative to address that researcher might have her own unexpected shortcomings and uncontrollable biasness while conducting the study.

1.15 Definition of Terms

This study developed a serious game prototype and examined the relationship between variables related to engagement, motivation and acceptance with users' behaviour intention towards the game. Important key concepts used are explained in the following subsections.

1.15.1 Game

A game can be defined as a system where users deal with abstract challenge confined by rules, interactivity and feedback that can elicit emotional reaction and measurable outcomes (Kapp, 2012). Maroney (2001) explained game as a form of play with its own goals and structure. Games can be a useful pedagogical device as it makes learning livelier and is effective for teaching problem solving and key concepts (Boyle, 2011). In this study, game is referred as a two-dimensional single role-playing computer application for Windows platform, characterized by a protagonist who moves around to complete the narrative game goals within an x and y axis interface.

1.15.2 Game Genre

Game genre refers to a game that is categorized based on its type of gameplay challenges (Baptista, Coelho & Carvalho, 2016). Understanding game genres enable designers to match new problems with a standard solution (Adams, 2009) as the similarity in type of interaction related to game mechanics, objects and player actions as well as repeated challenges defines what a game genre is (Pinelle, Wong & Stach, 2008). For example, despite a car racing game and a motorcycle racing game being two different entities, both share similar genre of gameplay which is racing. Some of other known game genres include first-person shooter, adventure, role-playing, action, sports, and strategy. In this study, roleplaying (RPG) was chosen as SightHeart's type of gameplay. This is due to game genre such as roleplaying (RPG) allows richer interaction by facilitating feedback of actions and reinforcement of hypothesis formulation and testing by taking a role of a character in a story (Mei, Chun-Ming, Huang, Hwang, & Yueh-Chiao, 2011). The study reasoned that the chosen genre can better suit the context which is conducive to the complexities of analytical thinking and support values reflection.

1.15.3 Game-based Learning

Game-based learning (GBL) refers to the use of computer games that possess educational value for learning and education purposes (Tang, Hanneghan & El-Rhalibi, 2009). Plass, Perlin, and Nordlinger (2010) defined game-based learning as the design process of balancing a game with both defined learning outcomes and also prioritizing gameplay. In this study, game-based learning theory called Games ED model is used as a guide to design and develop a well-balanced serious game. It is also used as an approach to improve motivation, engagement and a boost for intention to use serious games.

1.15.4 Serious Games

Serious game refers to a learning opportunity to acquire knowledge or develop life skills that can be valuable to both virtual and real world (Aldrich, 2005; Chatham, 2007; Mayo, 2007). Djoaoti, Alvarez and Jessel (2011) defined serious games as any software that contains a non-entertaining purpose (thus serious) with video game structure (game elements). Some criteria that warrant a game to be considered as a serious game depends on the cognitive skills related to the instructional design that it supports (O'Neil, Wainess & Baker, 2005) and also the seriousness of the content which may well be used solely as a teaching material (Djoaoti et al., 2011). In this study, serious game refers to the SightHeart game prototype. SightHeart is classified as a serious game due to the seriousness of its content related to users' reflection and analytical skills as a resolution resolution to moral dilemmas. Despite the heaviness of the content presented, SightHeart was incorporated with elements of gameplay such as mini-quests and rewards, which qualifies the prototype as a serious game.

1.15.5 Moral Dilemma

Moral dilemma refers to a hypothetical short story describing a situation where two conflicting moral reasons are involved (Christensen, Flexas, Calabrese, Gut & Gomila, 2014). It can also be defined as a conflict in which an individual must choose between two or more actions and has moral justification for choosing each action (Yolanda, 2015). Inducing respondents to make a forced choice between two reasons allow some investigation on which reason is prioritized for that particular situation. In this study, moral dilemma is used as a context to SightHeart's narrative. In the game, users undergo five different moral dilemmas that are related to their basic moral principles. Each dilemma or scenario requires the users to analyze and make decisions based on what they think and feel (hence Sight and Heart) suitable in those situations in order to proceed with the game. The dilemmas chosen were based on Moral Foundations Vignettes (MFV) suggested by Clifford, Iyengar, Cabeza and Armstrong, 2015).

1.15.6 Moral Principles

Moral principles can be defined as the difference in human reasoning based on the innate, modular foundations (Haidt, 2001, Graham, Nosek, Haidt, Iyer, Koleva & Ditto, 2012). Sherman (2010) described moral principles as any rule or consideration contributed to the decision making as ways to interpret and respond to a situation. In this study, moral principles refer to user's moral beliefs that explain their reasoning and decision behaviour in SightHeart. The principles or moral foundations focused were related to Harm/Care, Authority/Respect, Fairness/Reciprocity, In-group/Loyalty and Purity/Sanctity (Haidt, 2001). The five moral dilemmas in SightHeart were presented based on these moral principles.

1.15.7 Motivation

Motivation is defined as a form of motive that encourages a person to act in a situation (Shanks, 2007). Ryan and Deci (2000) explained motivation through their self-determination theory where self-determined behaviours such as user's own choice to act in a game is based on the satisfaction of their innate psychological needs for autonomy, competence and relatedness. These needs are met when users find what they are interacting with to be interesting (Ryan & Deci, 2000). In this study, motivation refers to the type of motivation that the users have while playing the game SightHeart. It is one of the variables to determine users' acceptance towards SightHeart through their behaviour intention to use the game. Their preferences towards certain gamification mechanics are also investigated to identify their underlying motivation towards the game. Motivation is investigated based on the instrument adapted from Lafreniere et al. (2012) and Marczewski et al. (2006).

1.15.8 Engagement

Engagement can be defined as a quality of user's experience related to positive aspects of interaction, particularly one's immersion towards a technology (Lalmas, O'Brien & Yom-Tov, 2014). Csikszentmihalyi (1989) explained engagement as flow which is the total involvement due to holistic experience people feel as they participate in an activity. In this study, engagement refers to the level of users' immersion as they engage with the game SightHeart. It is one of the variables used to gauge users' behaviour intention thus acceptance towards SightHeart. Several items from Fu et al. (2009) were adapted as instrument for engagement.

1.15.9 Perceived Usefulness

Perceived usefulness is the extent of an individual's belief towards the capability of a system to increase his or her work performance (Davis, 1989). Davis, Bagozzi, and Warshaw (1992) referred perceived usefulness as users' perception on the extent of how a system can be used advantageously as an outcome to an experience. In this study, perceived usefulness refers to the

extent of users' tendency to use the game SightHeart as a useful tool to practise their analytical and reflection skills. It is considered one of the determiners to users' behaviour intention to use the serious game. Some of the items from Davis (1989) were adapted as an instrument for perceived usefulness.

1.15.10 Perceived Ease of Use

Perceived ease of use is the extent of an individual's own belief towards his or her ability to use a system effortlessly (Davis, 1989). Bugembe (2010) defined perceived ease of use as user's perception on the amount of effortlessness required from a system. In this study, perceived ease of use refers to the extent to which users feel that the game SightHeart is easy to use and easily accepted among undergraduate students. The variable is predicted to be able to influence users' behaviour intention towards the game. The instrument for perceived ease of use was constructed based on several items adapted from Davis (1989) as well.

1.15.11 Perceived Learning Opportunities

Perceived learning opportunities can be defined as the extent of an individual's belief that a system can offer his or her opportunities for learning (Bourgonjon et al., 2010). Roslina, Khalil and Jaafar (2011) similarly defined learning opportunities as one's degree of belief that using an educational game can offer opportunities for learning. In this study, perceived learning opportunities refers to the extent to which users feel that the game SightHeart can offer learning opportunities to them. This variable is expected to also influence users' behaviour intention to use the serious game. Instrument for perceived learning opportunities was constructed based on the items by Bourgonjon et al. (2010).

1.15.12 Attitudes

Attitude can be defined as behaviour, feeling, individual's experience and also activity towards an objective or situation (Morse, Gullekson, Morris & Popovich, 2011). Thurstone and Chave (1928) defined attitude as one's fondness and subjective opinion to either favour or reject an object or state that they experience. In this study, attitude refers to users' inclination towards SightHeart which will influence their perception and behaviour intention of using the game. Positive attitudes towards SightHeart suggested that the serious game is well accepted by its users. The instrument for attitudes was developed based on items adapted by Morse et al. (2011).

1.15.13 Behaviour Intention

Davis (1989) defined behaviour intention as the likeliness of an individual to adopt an application based on self-report on their actual usage and frequency of use. Ajzen (1991) explained it as a predictor of behaviour based on intention whereby users have control over what they want. In this study, behaviour intention refers to the actions and willingness of undergraduate students to use the game SightHeart as a tool for practice and learning. This variable is the strongest indicator to users' overall acceptance and continual usage of the serious game in the future. The instrument for behaviour intention is a combination of items based on Yusoff et al. (2010) and Liaw and Huang (2003).

1.16 Summary

The discussion in this chapter had focused on the phenomena of interest related to addressing undergraduate students problems in lacking practices in critical thinking and reflecting their own personal values. The use of conventional methods in addressing the issues have caused students to become disinterested and even disengaged with the learning materials. Game-based learning in the form of serious game was introduced as an approach to boost their motivation and engagement towards learning. The proposed self-developed prototype was further evaluated on its acceptance among undergraduate students based on their motivation, engagement, gamification preferences, perceived usefulness, ease of use, learning opportunities and attitudes and intention to use the prototype. This chapter also has discussed on problem statement, objectives of the study, research questions, research significance as well as its limitations. The chapter ends with several terms and operational definitions which were important to the study.

REFERENCES

Abduljalil, K., & Zainuddin, Y. (2015). Intrinsic and Extrinsic Motivation as Attitude Factors towards Adoption of Accounting Information System (AIS) In Libyan SMEs. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, *5*(1), 161-170.

Adams, E. (2009). *Fundamentals of game design*. Berkeley, CA: New Riders.

Ahearn, L. (2001). *3D Game Art f/x and Design*. Coriolis Group Books.

Ahmad, I., & Jaafar, A. (2012). Computer games: implementation into teaching and learning. *Procedia-Social and Behavioral Sciences*, *59*, 515-519.

Aldrich, C. (2005). *Learning by doing*. San Francisco. CA. Pfeiffer.

Alexander, L. (2012). GDC 2012: Sid Meier on how to see games as sets of interesting decisions. *Gamasutra*. Retrieved from the Gamasutra website: http://www.gamasutra.com/view/news/164869/GDC_2012_Sid_Meier_on_how_to_see_games_as_sets_of_interesting_decisions.php

Ajzen, I. (1991). *The Theory of Planned Behavior, Organizational Behavior and Human Decision Processes*, *50*(2), 179-211.

Ambinder, M. (2009). Valve's approach to playtesting: The application of empiricism. *In Game Developers Conference*, SRC.

Amit, E., & Greene, J. D. (2012). You see, the ends don't justify the means visual imagery and moral judgment. *Psychological Science, 23(*8*),* 861-868*.*

Amoia, M., Brétaudiere, T., Denis, A., Gardent, C., & Perez-Beltrachini, L. (2012). A serious game for second language acquisition in a virtual environment. *Journal on Systemics, Cybernetics and Informatics (JSCI)*, *10*(1), 24-34.

Antin, J., & Churchill, E. F. (2011, May). Badges in social media: A social psychological perspective. *Gamification Workshop Proceedings*. Canada: VCI.

Ariffin, M. M., Ahmad, W. F. W., & Sulaiman, S. (2017). Exploring the Educational Effectiveness of Culturally-enhanced Serious Game in Education. *In SHS Web of Conferences*, 33, EDP Sciences.

Aris, Baharuddin. (2008). The techniques in developing effective multimedia-based materials for the teaching and learning processes. *National Seminar on Instructional Design & Multimedia Development in Teaching and Learning*. Kuala Lumpur: Universiti Teknologi Malaysia.

Ary, D., Jacobs, L, C., & Sorensen, C. K. (2010). *Introduction to Research in Education* (8th ed.). Montreal, CA: Nelson Education.

Banfield, J., & Wilkerson, B. (2014). Increasing student intrinsic motivation and self-efficacy through gamification pedagogy. *Contemporary Issues in Education Research*, *7*(4), 291.

Baños, R. M., Botella, C., Alcañiz, M., Liaño, V., Guerrero, B., & Rey, B. (2004). Immersion and emotion: their impact on the sense of presence. *CyberPsychology & Behavior*, *7*(6), 734-741.

Baptista, R., Coelho, A., & de Carvalho, C. V. (2016). Relation Between Game Genres and Competences for In-Game Certification, *International Conference on Serious Games, Interaction, and Simulation,* 28-35.

Barrett, R. (2014). *The Six Modes of Decision-Making*. Retrieved from: http://www. valuescentre. com/uploads/2010-07-06/SixModesofDecisionMaking.pdf

Bartlett, J.E., Kotrlik, J.W., Higgins, C.C. (2001). Determining Appropriate Sample Size in Survey Research. *Information Technology, Learning, and Performance Journal*, *19*(1), 43-50.

Becker, K. (2005). Games and learning styles. *Special Session on Computer Games for Learning.* Retrieved from http://www.actapress.com/abstract.aspx?paperid=21259

Becker, K. (2007). Digital game-based learning once removed: Teaching teachers. *British Journal of Educational Technology*, *38*(3), 478-488.

Becker, K., Ifenthaler, D., Eseryel, D., Ge, X., Kolb, A. Y., Kolb, D. & Cooley, B. (2013). Game Analytics. *Recent Advances in Educational Technologies*, *3*(9), 543–583.

Benson, P., & Chik, A. (2011). Towards a more naturalistic CALL: Video gaming and language learning.

Bethesda. (2008). *Fallout 3*: Bethesda Softworks.

Bethke, E. (2003).Game Development and Production. Retrieved from https://goo.gl/XufwQJ

Betts, T. (2009). Pattern recognition: Gameplay as negotiating procedural form. In Think Design Play: *The fifth international conference of the Digital Research Association, DiGRA.*Utrecht School of the Arts.

BioWare (Publisher), Hudson, C. (Director). (November 20, 2007). *Mass effect* [Video game]. United States: BioWare.

Black, W. C., Hair, J. F., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis* (7th ed.). New Jersey: Prentice Hall.

Blaxter, L. (2010). *How to research*. United Kingdom: McGraw-Hill Education.

Borzak, L. (1981). *Field study: A sourcebook for experiential learning*. Sage Publications, Inc.

Bowman, N., Grizzard, M., & Boyan, A. (2015). A massively moral game? Mass Effect as a case study to understand the influence of players' moral intuitions on adherence to hero or antihero play styles. *Journal of Gaming & Virtual Worlds*, *7*(1), 41-57.

Bourgonjon, J., Valcke, M., Soetaert, R., & Schellens, T. (2010). Students' perceptions about the use of video games in the classroom. *Computers & Education*, *54*(4), 1145-1156.

Boyle, S. (2011). Teaching Toolkit: *An Introduction to Games based learning*. UCD Dublin, Ireland: UCD Teaching and Learning/Resources. Retrieved from https://www.ucd.ie/t4cms/UCDTLT0044.pdf

Bradette, J. (2013). *Learning through Serious Games and "Gamification": Try it yourself!* Retrieved from https://goo.gl/pp6NUR

Brand, J. E., Borchard, J., & Holmes, K. (2009). Case study: Australia's computer games audience and restrictive ratings system. *Communications & Strategies*, *73*, 67-79.

Braun, V., Clarke, V. (2006). Using Thematic Analysis in Psychology. *Qualitative Research in Psychology*, *3*(2),83.

Brockmyer, J. H., Fox, C. M., Curtiss, K. A., Mcbroom, E., Burkhart, K. M., & Pidruzny, J. N. (2009). The development of the Game Engagement Questionnaire : A measure of engagement in video game-playing. *Journal of Experimental Social Psychology*, *45*(4), 624–634.

Brooks, S., & Byles, B. (2014). *Moral Dilemma Sixth 6th Grade English Language Arts Standards*. Retrieved from http://www.internet4classrooms.com/grade_level_help/literature_moral_dilemma_language_arts_sixth_6th_grade.htm

Brookfield, S.D., (2011). *Teaching for critical thinking: Tools and techniques to help students question their assumptions*. Jossey-Bass.

Bruder, P. (2015). GAME ON: Gamification in the classroom. *The Education Digest*, *80*(7), 56-60.

Bugembe, J. (2010). *Perceived usefulness, perceived ease of use, attitude and actual usage of anew financial management system: A case of Uganda National Examinations Board* (Doctoral dissertation, Makerere University).

Canossa, A. (2009). *Play-Persona: Modeling Player Behavior in Computer Games*. Denmark: Danmarks Designskole.

Canossa, A., Drachen, A., (2009, September). Towards gameplay analysis via gameplay metrics. *Proceedings from the 13th international MindTrek conference: Everyday life in the ubiquitous era*. ACM, 202-209.

Caruso, E. M., & Gino, F. (2011). Blind ethics: Closing one's eyes polarizes moral judgments and discourages dishonest behavior. *Cognition*, *118*, 280–285.

Caswell, S. V., & Gould, T. E. (2008). Individual moral philosophies and ethical decision making of undergraduate athletic training a students and educators. *Journal of Athletic Training*, *43*(2), 205–214.

Chang, W., & Chou, Y. (2008). Introductory C Programming Language Learning with Game-Based Digital Learning. *Advances in Web Based Learning - ICWL 2008 Lecture Notes in Computer Science,* 221-231.

Chang, J., & Wei, H. (2016). Exploring Engaging Gamification Mechanics in Massive Online Open Courses. *Educational Technology Society*, *19*, 177–203.

Charsky, D. (2010). From Edutainment to Serious Games: A Change in the Use of Game Characteristics. *Games and Culture*, *5*(2), 177–198.

Chatham, R. E. (2007). Games for training. *Communications of the ACM*, *50* (7), 36 – 43.

Cheah, C. (2014). *Graduates lack critical thinking skills, says CEO*. Retrieved from The Star website: http://www.thestar.com.my/news/nation/2014/11/17/graduates-lack-critical-thinking-skills-says-ceo/

Cheong, C., Filippou, J., & Cheong, F. (2014). Towards the gamification of learning: Investigating student perceptions of game elements. *Journal of Information Systems Education*, *25*(3), 233-245.

Chen, J. (2007). Flow in games (and everything else). *Communications of the ACM*, *50* (4), 31–34.

Chen, C. M., & Li, Y. L. (2010). Personalised context-aware ubiquitous learning system for supporting effective English vocabulary learning. *Interactive Learning Environments*, *18*(4), 341-364.

Chickering, A. W., McDowell, J., & Campagna, D. (1969). Institutional differences and student development. *Journal of Educational Psychology*, *60*(4), 315-321.

Chickering, A. W. and Reisser, L. (1993). *Education and identity*. (2nd Ed.) San Francisco: Jossey-Bass.

Christensen, J. F., Flexas, A., Calabrese, M., Gut, N. K., & Gomila, A. (2014). Moral judgment reloaded: a moral dilemma validation study. *Frontiers in Psychology*, 5, 607.

Chong, Y. W., & Abdul, S. N. B. (2016). Meeting the Challenges of Personal Development and Character Building in University Students. *International Review of Management and Marketing*, 6(8).

ChongHui, L.(2017). *Are you game for it?* Retrieved from The Star website: http://www.thestar.com.my/news/education/2017/08/06/are-you-game-for-it/#lYz5f48PrjVrrTei.99

Chopra, P. (2016). *Give Them What They Want*. Retrieved from https://www.td.org/Publications/Magazines/TD/TD-Archive/2016/05/Give-Them-What-They-Want

Chua, Y. P. (2008). *Asas Statistik Penyelidikan*. Kuala Lumpur: Mc Graw-Hill.

Clark-Carter, D. (2005). *Quantitative Psychological Research: A Student Handbook*. New York: Taylor & Francis e-Library.

Clark, R. C., & Mayer, R. E. (2011). *e-Learning and the science of instruction*. New York, NY:Wiley-Blackwell.

Clifford, S., Iyengar, V., Cabeza, R., & Sinnott-Armstrong, W. (2015). Moral foundations vignettes: A standardized stimulus database of scenarios based on moral foundations theory. *Behav Res Behavior Research Methods, 47*(4), 1178-1198.

Cochran, W. G. (1977). *Sampling Techniques* (3rd ed.). New York: John Willey & Sons.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Hillslide, NJ: Lawrence Erlbaum Associates.

Connolly, T. M., Stansfield, M., & Hainey, T. (2007). An application of games-based learning within software engineering. *British Journal of Educational Technology, 38*(3), 416-428.

Connolly, T. M., Stansfield, M., & Hainey, T. (2012). An alternate reality game for language learning: ARGuing for multilingual motivation. *Computers & Education*, *57*(1), 1389-1415.

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

Cooley, B. (2015). *Detecting Learning Styles in Video Games* (Master's Thesis). doi:10.15368/theses.2015.23

Cordova, D. I., & Lepper, M. R. (1996). Intrinsic motivation and the process of learning: Beneficial effects of contextualization, personalization, and choice. *Journal of Educational Psychology*, *88*(4), 715.

Cottrell, S., (2011). *Critical thinking skills: Developing effective analysis and argument*. Srella Cottrell and Mackmilan Publishers.

Crawford, V. P., Costa-Gomes, M., & Broseta, B. (2001). Cognition and behavior in normal-form games: An experimental study. *Econometrica*, *69*(5), 1193-1235.

Creswell, J. W. (2012). *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research* (4th ed.). Boston, MA: Pearson Education, Inc.

Csikszentmihalyi, M. (1989). Optimal experience in work and leisure. *Journal of Personality and Social Psychology, 56*(5), 815-822

Csikszentmihalyi, M. (1991). *Flow: The Psychology of Optimal Experience*. New York: Harper & Row.

Csikszentmihalyi, M. (1997). *Finding flow in everyday life*. Alabama,US: Basic Books.

Daly, W., (1998). Critical thinking as an outcome of nurse education. What is it? Why is it important to nursing practice? *Journal of Advanced Nursing*, *28*(2), 323-331.

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

Davis, F. D. (1993). User Acceptance of Information Technology: System Characteristics, User Perceptions and Behavioral Impacts. *International of Man Machine Studies*, *38*, 475-487.

Davis, S. H. (2008). *Research and Practice in Education. The Search for Common Ground*. United States: Rowman and Littlefield Education.

Davis F., Bagozzi R., & Warshaw P.(1992): Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology*, *22*, 1111-1132.

Deci, E. L. (1975). *Intrinsic motivation*. New York: Plenum.

Deci, E. L., Lens, W., & Vansteenkiste, M. (2006). Intrinsic versus extrinsic goal contents in self-determination theory: Another look at the quality of academic motivation. *Educational Psychologist*, 41(1), 19-31.

Dede, C. (2009). Immersive interfaces for engagement and learning. *Science*, 323(5910), 66-69.

Deen, M. M. (2015). *GAME, Games autonomy motivation & education: how autonomy-supportive game design may improve motivation to learn* (Doctoral dissertation, Technische Universiteit Eindhoven).

Deen, M., & Schouten, B. A. (2011). Games that motivate to learn: Design serious games by identified regulations. *Handbook of Research on Improving Learning and Motivation through Educational Games:Multidisciplinary Approaches*, 330-351.

Denis, G., & Jouvelot, P. (2005). Motivation-driven educational game design: applying best practices to music education. *Proceedings from the 2005 ACM SIGCHI International Conference on Advances in computer entertainment technology* (pp. 462-465). ACM.

Denscombe, M. (2010). *The Good Research Guide for Small-scale Social Research Projects* (4th ed.). New York: The McGraw-Hill Companies.

DeRosa, P. (2007). *Tracking player feedback to improve game design*. Retrieved from Gamasutra website: https://goo.gl/YBVdZh

Derryberry, A.(2010). *Serious games: online games for learning*. Retrieved from https://www.adobe.com/resources/elearning/pdfs/serious_games_wp.pdf

Despain, W. (2009). *Writing for video game genres: From FPS to RPG*. Wellesley, MA: A K Peters, Ltd.

Deterding, S., Dixon, D., O'Hara, K. (2011). *Gamification : Using Game Design Elements in Non-Gaming Contexts*, pp.2425–2428.

Devellis, R.F. (2011). *Scale development: Theory and applications* (3rd ed.). United State: SAGE Publications, Inc.

Dhavale, G. (2016). *A Detailed Analysis of Common Moral Dilemmas for Students*. Retrieved from http://www.buzzle.com/articles/moral-dilemmas-for-students.html

Dickey, M. (2000). 3D Virtual Worlds and Learning: An Analysis of the Impact of Design Affordances and Limitations of Active Worlds, Blaxxun Interactive, and OnLive! Traveler. *Study of the Implementation of Active Worlds for Formal and Informal Education.* Columbus, OH: The Ohio State University.

Dillon, A., & Morris, M. (1996). User Acceptance of New Information Technology: Theories and Models. In M. Williams (Ed.). *Annual Review of Information Science and Technology*, *31*, 3-32. Medford NJ: Information Today.

Dixon, N. (2015). Internalism and external moral evaluation of violent sport, *Journal of the Philosophy of Sport*, *43*(1), 101-113.

Djaouti, D., Alvarez, J., & Jessel, J. P. (2011). Classifying serious games: the G/P/S model. *Handbook of research on improving learning and motivation through educational games: Multidisciplinary approaches*. 118-136. IGI Global.

Dondi, C., & Moretti, M. (2007). A methodological proposal for learning games selection and quality assessment. *British Journal of Educational Technology*, *38*(3), 502-512.

Drachen, A., El-Nasr, M. S., & Canossa, A. (2013). *Game analytics: Maximizing the value of player data*. New York: Springer Science & Business Media.

Durkin, K., & Barber, B. (2002). Not so doomed: Computer game play and positive adolescent development. *Journal of applied developmental psychology*, *23*(4), 373-392.

Duron, R., Limbach, B., & Waugh, W. (2006). Critical thinking framework for any discipline. *International Journal of Teaching and Learning in Higher Education*, 17(2), 160-166.

Eastwood, J. and Sadler, T. (2013). Teacher's implementation of game-based biotechnology curriculum. *Computers & Education*. 66(7), 11-24.

Ebner, M., & Holzinger, A. (2007). Successful implementation of user-centered game based learning in higher education: An example from civil engineering. *Computers & Education*, *49*, 873–890.

Eiriksson, S. (1997). Preservice Teachers' Perceived Constraints of Teaching Science in the Elementary Classroom. *Journal of Elementary Science Education*, *5*, 18-27.

Elaklouk, A. M., Zin, N. A. M., & Shapii, A. (2015). Investigating therapists' intention to use serious games for acquired brain injury cognitive rehabilitation. *Journal of King Saud University-Computer and Information Sciences*, 27(2), 160-169.

Eldy, E. F., & Sulaiman, F. (2013). Integrated PBL Approach: Preliminary Findings towards Physics Students' Critical Thinking and Creative-Critical Thinking. *International Journal of Humanities and Social Science Invention*, *2*(3), 18-25.

Ellington, H., & Aris, B. (2000). *A practical guide to instructional design*. Universiti Teknologi Malaysia.

Elliott AC, Woodward WA. (2007). *Statistical analysis quick reference guidebook with SPSS examples*. London, UK: Sage Publications.

Engler, R. (2012). *Serious Games–Gamification of Education*.Amsterdam: Vrije University.

Enterbrain. (2015). *Make Your Own Game with RPG Maker*. Retrieved from http://www.rpgmakerweb.com/

Ertzberger, J. (2009). An Exploration of Factors Affecting Teachers' Use of Video Games as Instructional Tools. *Proceedings from I. Gibson et al. (Eds.) Society for Information Technology & Teacher Education International Conference 2009* (pp.1825-1831). Chesapeake, VA: AACE.

Evans, N. J. (1987, December). A Framework for Assisting Student Affairs Staff in Fostering Moral Development. *Journal of Counseling and Development*, 66.

Facer K., Sutherland, R., Furlong, R., Furlong, J. (2003). *Screen Play: Children and Computers in the Home*. London: Routledge Falmer.

Felten, P., Gardner, J. N., Schroeder, C.C., Leo M. Lambert, Betsy O. Barefoot. (2016).*The Undergraduate Experience: Focusing Institutions on What Matters Most*. Jossey-Bass.

Fenouillet, F.(2003). *La motivation Translation*. Les Topos, FR: Dunod.

Field, A. (2009). *Discovering Statistics Using SPSS* (3rd Ed.). London: SAGE Publications.

Fishbein, M., & Ajzen, I. (1975). *Understanding Attitudes and Predicting Social Behavior*. New Jersey: Prentice-Hall.

Floyd, D., & Portnow, J. (2010). *Video Games and Moral Choices* [Video]. Retrieved from: www.youtube.com/watch?v=6_KU3lUx3u0

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012). *How to Design and Evaluate Research in Education* (8th ed.). New York, NY: The McGraw-Hill.

Frasca, G. (2003). Simulation versus narrative: Introduction to ludology. In M. J. P. Wolf & B. Perron (Eds.),*The video game theory reader*. New York, US: Routledge.

Fry, B. (2008). *Visualising Data*. Wincousin, US: O´Reilly Media, Inc.

Fu, F. L., Su, R. C., & Yu, S. C. (2009). EGameFlow: A scale to measure learners' enjoyment of e-learning games. *Computers & Education*, *52*(1), 101-112.

Fullerton, T., Swain, C., & Hoffman, S. (2008). *Game Design Workshop*. Burlington, UK: Elsevier.

Gagne, R.M., Wager, W.W., Golas, K.G. & Keller, J.M. (2005). *Principles of instructional design*. Toronto, ON: Thomson Wadsworth.

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

Gåsland, M. M. (2011). *Game mechanic based e-learning: A case study* (Masters dissertation). Retrieved from http://ntnu.diva-portal.org/smash/search.jsf?dswid=-1810

Gass, S., & Selinker, L. (2001). Second Language Acquisition: An Introductory Course. Taylor & Francis.

Gay, L. R., & Airasian, P. W. (2003). *Educational research: Competencies for analysis and applications*. Upper Saddle River, N.J: Merrill Prentice Hall.

Gee, J. P. (2003). *What video games have to teach us about learning and literacy* . New York, US: Palgrave-Macmillan.

Gee, J. P. (2007). Games and learning: Issues, perils, and potentials. In J. P. Gee (Ed.), *Proceedings of Good video games and good learning: Collected essays on video games, learning, and literacy* (pp. 129–174). New York, US: Palgrave MacMillan.

Ghadi, I., Alwi, N. H., Bakar, K. A., & Talib, O. (2013). Construct Validity Examination of Critical Thinking Dispositions for Undergraduate Students in University Putra Malaysia. *Higher Education Studies*, *2*(2), 138-145.

Ghasemi A. & Zahediasl S. (2012). Normality Tests for Statistical Analysis: A Guide for Non-Statisticians. *International Journal of Endocrinol Metab*, *10*(2), 486-9.

Giannakos, M. N. (2013). Enjoy and learn with educational games: Examining factors affecting learning performance. *Computers & Education*, *68*, 429-439.

Gibson, B., & Bell, T. (2013, November). Evaluation of games for teaching computer science. *In Proceedings of the 8th Workshop in Primary and Secondary Computing Education* (pp. 51-60). ACM.

Graham, J., Nosek, B. A., Haidt, J., Iyer, R., Koleva, S., & Ditto, P. H. (2012). Mapping the Moral Domain. *Journal of Personality and Social Psychology*, *101*, 366-385.

Gredler, M. E. (2004). Games and simulations and their relationship to learning. In D. Jonassen (Ed.), *Proceedings of The handbook of research on educational communications and technology* (2nd ed., pp. 571–581). Bloomington, IN: AECT.

Grevelink, J. (2015). *Serious games for cybersecurity* (Doctoral dissertation, Tilburg University). http://arno.uvt.nl/show.cgi?fid=136774

Gros, B. (2007). Digital games in education: The design of games-based learning environments. *Journal of Research on Technology in Education*, *40*(1), 23-38.

Gulsecen, S. and Kubat, A., (2006). Teaching ICT to teacher candidates using PBL: A qualitative and quantitative evaluation. *Educational Technology & Society*, 9 (2), 96-106.

Gunnarsdottir, K. (2010). The convergence of the physical, mental and virtual. *Studies in Ethics, Law, and Technology*, *4*(3), 345-358.

Gunter, M. A., Estes, T. H., & Schwab, J. A. (2003). *Instruction: A models approach* (3rd ed.). Boston: Allyn & Bacon.

Gunter, G. A., Kenny, R. F. & Vick, E. H. (2008). Taking educational games seriously: using the RETAIN model to design endogenous fantasy into standalone educational games. *Education Technology Research Development*, *56*, 511 – 537.

Gutiérrez, R., & López, J. M. (2016). Game-based learning and gamification in initial teacher training in the social sciences: an experiment with MinecraftEdu. *International Journal of Educational Technology in Higher Education*, *13*(1), 1-15.

Ha, I., Yoon, Y., & Choi, M. (2007). Determinants of adoption of mobile games under mobile broadband wireless access environment. *Information & Management*, *44*(3),276–286.

Ha, E. Y., Rowe, J. P., Mott, B. W., & Lester, J. C. (2014). Recognizing Player Goals in Open-Ended Digital Games with Markov Logic Networks. *Plan, Activity, and Intent Recognition,* 289-311.

Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review*, *108*(4), 814–834.

Haidt, J., & Joseph, C. (2004). Intuitive ethics: How innately prepared intuitions generate culturally variable virtues. *Daedalus*, 55–66.

Haidt, J., Graham, J., & Joseph, C. (2009). Above and below left–right: Ideological narratives and moral foundations. *Psychological Inquiry*, *20*(2-3), 110-119.

Hainey, T., Connolly, T., & Boyle, L. (2010, October). A Refined Evaluation Framework for Games-Based Learning. In *Proceedings of the 4th European Conference on Games Based Learning. The danish School of Education Aarhus University, Copenhagen, Denmark* (pp. 97-105).Denmark.

Hainey, Thomas, Connolly, Thomas M, Stansfield, Mark, & Boyle, Elizabeth A. (2011). Evaluation of a game to teach requirements collection and analysis in software engineering at tertiary education level. *Computers & Education*, *56*(1), 21-35.

Halff, H. M. (2005). Adventure games for science education: Generative methods in exploratory environments. Proc. *Educational Games as Intelligent Learning Environments*, 12-20.

Halvorsen, A. (2005). Incorporating critical thinking skills development into ESL/ EFL courses. *The Internet TESL Journal*, *11*(3), 1-5.

Halvorsen, S. M., & Raaen, K. (2013, August). Games for Research: A Comparative Study of Open Source Game Projects. *In European Conference on Parallel Processing* (pp. 353-362). Springer Berlin Heidelberg.

Hardre, P.L., & Reeve, J. (2003). A motivational model of rural students' intentions to persist in, versus drop out of, high school. *Journal of Educational Psychology*, *95*(2), 347.

Haworth, R., & Sedig, K. (2011). The importance of design for educational games. *Education in a technological world: Communicating current and emerging research and technological efforts*, 518-522.

Hemminger, E. (2009). *The Mergence of Spaces. Experiences of Reality in Digital Role-Playing Games*. Berlin: Edition Sigma.

Hiwiller, Z. (2015). *Players Making Decisions: Game Design Essentials and the Art of Understanding Your Players*. Illinois, US: New Riders.

Hodhod, R., Cairns, P. & Kudenko, D., (2010). *Designing Games for Ethics: Models, Techniques & Frameworks* (1st ed). New York, US: Hershey.

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.

Hsu, S. H., Wen, M. H., & Wu, M. C. (2009). Exploring user experiences as predictors of MMORPG addiction. *Computers & Education*, *53*(3), 990-999.

Hung, W., & Van Eck, R. (2010). Aligning problem solving and gameplay: A model for future research and design. *Interdisciplinary models and tools for serious games: Emerging concepts and future directions*, 227-263.

Hunicke, R., LeBlanc, M., & Zubek, R. (2004, July). MDA: A Formal Approach to Game Design and Game Research. *In Proceedings of the AAAI Workshop on Challenges in Game AI* (pp. 04-04).

Husain, H., Mokri, S. S., Hussain, A., Samad, S. A., & Majid, R. A. (2012). The level of critical and analytical thinking skills among electrical and electronics engineering students, UKM. *Asian Social Science*, *8*(16), 80.

Hussein, Z., Wahid, N. A., & Saad, N. (2009). Behavioral study on Malaysian game player experiences: how the embedded information inside a computer game affect players' behaviour. *In Proceedings of the 9th Global conference on business and economics.* UK: Cambridge University.

Hwang, G., & Wu, P. (2011). Advancements and trends in digital game-based learning research: A review of publications in selected journals from 2001 to 2010. *British Journal of Educational Technology, 43*(1),135-142.

Hwang, G. J., Yang, L. H., & Wang, S. Y. (2013). A concept map-embedded educational computer game for improving students' learning performance in natural science courses. *Computers & Education*, *69*(2), 121-130.

Ibrahim, R., Yusoff, R. C. M., & Jaafar, A. (2008). Computer Games Playing Activities: Habits of Universiti Teknologi Malaysia Student. In *International Conference on IT and Multimedia (ICIMU)*,447-451.

Ibrahim, R., Wahab, S., Yusoff, R. C. M., Khalil, K., Desaru, & Jaafar, A. (2011). Student perceptions of educational games in higher education: An empirical study. *Issues in Information Systems*, *12*(1), 120-133.

Isaacs, S. (2015). The Difference between Gamification and Game-Based Learning. *ASCD Inservice*. Retrieved from http://inservice.ascd.org/the-difference-between-gamification-and-game-based-learning/

Ismail, N. A. (2011). Graduates' characteristics and unemployment: A study among Malaysian graduates. *International Journal of Business and Social Science*, *2*(16), 30-39.

Järvelä, S., Ekman, I., Kivikangas, J. M., & Ravaja, N. (2014). Digital games as experiment stimulus. *In proceedings of DiGRA Nordic 2012*, *3*,6-8.

Johnson, D. G. (2001). *Computer Ethics* (3 ed.). Upper Saddle River, New Jersey: Prentice Hall.

Johnson, W. L., Vilhjalmsson, H., Marsella, S. (2005). Serious Games for Language Learning. How Much Game, How Much AI?. *Center for Advanced Research in Technology for Education*. USC: Information Sciences Institute.

Jonassen, D. H., & Grabowski, B. L. (2012). *Handbook of individual differences, learning, and instruction*. Routledge.

Jong, M. S., Shang, J., Lee, F. L., & Lee, J. H. (2008). Harnessing computer games in education. *International Journal of Distance Education Technologies*, *6*(1), 1-18.

Jungermann, H., & Fischer, K. (2005). Using expertise and experience for giving and taking advice. *The Routines of Decision Making*, 157-173.

Kaliyamoorthy,S. (2017). *Good planning could get you your dream job*. Retrived at http://www.thestar.com.my/opinion/letters/2017/09/11/good-planning-could-get-you-your-dream-job/#pykpsF4P4SwuY4ct.99

Kapp, K. M. (2012) *The Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education*. San Franscisco: John Wiley & Sons.

Kardan, K. (2006). Computer role-playing games as a vehicle for teaching history, culture, and language. *In Proceedings of the 2006 ACM SIGGRAPH symposium on Videogames*,91-93. ACM.

Kidder, R. M., & Bracy, M. (2001). *Moral Courage: A white paper. Camden, Maine: Institute for Global Ethics*. Retrieved at http://www.moral-courage.org/pdfs/moral_courage_11-03-2001.pdf

Kiili, K. (2005). Content creation challenges and flow experience in educational games: The IT-emperor case. *The Internet and Higher Education*, *8*(3), 183–198.

Kim, B. (2015). Gamification in Education and Libraries. *Library Technology Reports*, *51*(2), 20-28.

Kirkley, S. E., Tomblin, S., & Kirkley, J. (2005). Instructional design authoring support for the development of serious games and mixed reality training. *In Interservice/Industry Training, Simulation and Education Conference (I/ITSEC)*.Orlando: FL.

Ke, F., & Grabowski, B. (2007). Gameplaying for maths learning: cooperative or not?. *British Journal of Educational Technology*, *38*(2), 249-259.

Kebritchi, M., Hirumi, A., & Bai, H. (2008). The effects of modern math computer games on learners' math achievement and math course motivation in a public high school setting. *British Journal of Educational Technology*, *38*(2), 49-259.

Kellogg, W.A., Ellis, J. & Thomas, J.C. (2007). Towards Supple Enterprises: Learning from N64's Super Mario 64, Wii Bowling, and a Corporate Second Life. *In proceedings of CHI 2007 Workshop Supple Interfaces: Designing and evaluating for richer human connections and experiences*. Presented at the Conference on Human Factors in Computing Systems, San Jose.

Klabbers, J. H. (2003). Gaming and simulation: Principles of a science of design. *Simulation & Gaming*, *34*(4), 569-591.

Klawe, M. M. (1998). Designing game-based interactive multimedia mathematics learning activities. *In proceedings of the 4th UCSMP International Conference on Mathand Education*. Retrieved from: http://taz.cs.ubc.ca/egems/reports.html.

Klimmt, C. (2003). 'Dimensions and determinants of the enjoyment of playing digital games: a three-level model', in M. Copier and J. Raessens (eds.) *Level Up: Digital Games Research Conference*. Utrecht: Utrecht University.

Kohler, Wolfgang (1947): *Gestalt Psychology*. New York, US: Liveright.

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

Konting, M.M., Norfaryanti, Kamaruddin, Nor Azirawani, Adam, A.& Abdullah, S.N. (2007). Preliminary assessment of soft skills among students. *In Proceedings of Conference on Learning and Teaching in Education*.

Koster, R. (2004). *A Theory of Fun for Game Design*. Washington: Paraglyph Press.

Kothari, C. R. (2004). *Research Methodology Methods and Techniques* (2nd ed.). New Dehli: New Age International.

Kurshan, B. (2016). *The Intersection of Learning and Fun: Gamification in Education*. Retrieved from website: http://www.forbes.com/sites/barbarakurshan/2016/02/11/the-intersection-of-learning-and-fun-gamification-in-education/#75524fa51d36

Kyatric, K. (2013). Bartle's Taxonomy of Player Types (And Why It Doesn't Apply to Everything). Retrieved from website: https://gamedevelopment.tutsplus.com/articles/bartles-taxonomy-of-player-types-and-why-it-doesnt-apply-to-everything--gamedev-4173

Ladley, P. (2010). Games based situated learning: Games-ED whole class games and learning outcomes. London, England: The Pixel Foundation Ltd. Retrieved fromhttp://www. pixelfountain. co. uk/download/Games-Based-Situated-Learning-v1.pdf

Lafrenière, M. A. K., Verner-Filion, J., & Vallerand, R. J. (2012). Development and validation of the Gaming Motivation Scale (GAMS). *Personality and Individual Differences*, *53*(7), 827-831.

Lalmas, M., O'Brien, H., & Yom-Tov, E. (2014). Measuring user engagement. *Synthesis Lectures on Information Concepts, Retrieval, and Services*, *6*(4), 1-132.

Laurel, B. (1993). *Computers as Theater*. New York: Addison-Wesley.

Latif, R. A. (2007, September). Understanding Malaysian students as gamers: Experience. *In Proceedings of the 2nd International conference on Digital interactive media in entertainment and arts* (pp. 137-141). ACM.

Laws, S., Harper, C., & Marcus, R. (2003). *Research of Development. A Practical Guide*. London: SAGE Publication.

Lee, M. K., Cheung, C. M., & Chen, Z. (2005). Acceptance of Internet-based learning medium: The role of extrinsic and intrinsic motivation. *Information and Management*, *42*(8), 1095–1104.

Lee, J. J. & Hammer, J. (2011). Gamification in education: What, how, why bother?. *Academic Exchange Quarterly*, 15 (2). Retrieved from website: http://www.gamifyingeducation.org/fi les/Lee-Hammer-AEQ-2011.pdf

Lee, J. H. M., Lee, F. L., & Lau, T. S. (2006). Folklore-based learning on the web—pedagogy,case study, and evaluation. *Journal of Educational Computing Research*, *34*(1), 1-27.

Lei, S. A. (2010). Intrinsic and extrinsic motivation: Evaluating benefits and drawbacks from college instructors' perspectives. *Journal of Instructional Psychology*, *37*(2), 87-98.

Leicester, M., (2010). *Teaching critical thinking skills (ideas in action)*. London, UK: Continuum.

Leo, M. (2016). What You Didn't Know About Fresh Graduate Unemployment in Malaysia. Retrieved at: https://www.eduadvisor.my/articles/whatdidnt-know-fresh-graduate-unemployment-malaysia-infographic

Liao, C-H, & Huang, W-L. (2009). Community Adaptability, Computer and Internet Self-efficacy and Intention of Blended e-learning. *International Journal Society Systems Science*, *1*(3), 209-226.

Liaw, S-S, & Huang, H-M. (2003). An Investigation of User Attitudes Toward Search Engines as an Information Retrieval Tool. *Computers in Human Behavior*, *19*, 751-765.

Liaw, M. (2007). Content-based Reading and Writing for Critical Thinking Skills in an EFL Context. *English Teaching and Learning*, *31*(2), 45-87.

Liddell, D. L., Cooper, D. L., Healy, M. A., & Stewart, D. L. (2010). *Ethical Elders Campus Role Models for Moral Development*. US: American College Personal Association.

Lim, M. Y., Leichtenstern, K., Kriegel, M., Enz, S., Aylett, R., Vannini, N. & Rizzo, P. (2011). Technology-enhanced role-play for social and emotional learning context–Intercultural empathy. *Entertainment Computing*, *2*(4), 223-231.

Lim, E.L. (2010). *Game based framework for history learning : using constructionism approach*. Unpublished master's theses. University of Malaya.

Lin, X., Hmelo, C., Kinzer, C. K., & Secules, T. J. (1999). Designing technology to support reflection. *Educational Technology Research and Development*, *47*(3), 43-62.

Lipsey, M. W., & Wilson, D. B. (1993). The efficacy of psychological, educational, and behavioral treatment: confirmation from meta-analysis. *American Psychologist*, *48*(12), 1181-1199.

Liu, C. C., Cheng, Y. B., & Huang, C. W. (2011). The effect of simulation games on the learning of computational problem solving. *Computers and Education*, *57*(3), 1907–1918.

Longstreet, C. S. & Cooper, K. (2012). A meta-model for developing simulation games in higher education and professional development training. *Paper presented at the 17th International Conference on Computer Games (CGAMES)* (pp. 39,44). Louisville: KY.

Lovato, N. (2015). *Game Analytics From A Game Designer's Perspective - GameAnalytics.* Retrieved from http://blog.gameanalytics.com/blog/game-analytics-game-designers-perspective.html

Low, R., Jin, P., & Sweller, J. (2010). Learners' cognitive load when using educational technology. *Gaming and cognition: Theories and practice from the learning sciences*, 169-188.

Luban, P. (2009). The silent revolution of playtests. *Gamasutra*. Retrieved from http://www.gamasutra.com/view/feature/132355/the_silent_revolution_of_.php

Macdonald, C., & Ph, D. (2002). *A Guide to Moral Decision Making*. Retrieved from http://www.ethicsweb.ca/guide/

Makar, J. (2010). *ActionScript for multiplayer games and virtual worlds*. Berkeley, CA: New Riders.

Malaysian, (2012, March 4). *Education system not producing thinking graduates, says experts*. Retrieved from The Star website: http://thestar.com.my/news/story.asp?file=/2012/3/4/nation/20120304123742&sec=nation

Malone, T. W. (1981). Toward a theory of intrinsically motivating instruction. *Cognitive science*, *5*(4), 333-369.

Malone, T. W., & Lepper, M. R. (1987). Making learning fun: A taxonomy of intrinsic motivations for learning. *Aptitude, Learning, and Instruction*, *3*, 223–253.

Maragos, K., & Grigoriadou, M. (2005). Towards the design of intelligent educational gaming systems. *In proceedings of AIED05 WORKSHOP5: Educational Games as Intelligent Learning Environments*, 35-38.

Marczewski, A. (2013). *Gamification—A simple introduction. Tips, advice and thoughts on gamification.* Amazon (kindle edition). Retrieved from http://blog.makeyourlifeagame.com/gamification-resources/gamification-books/

Marczewski, A. (2015). *User Types. In Even Ninja Monkeys Like to Play: Gamification, Game Thinking and Motivational Design* (1st ed., pp. 65-80). US: CreateSpace Independent Publishing Platform.

Marczewski, A., Busch, M., Mattheiss, E., Orji, R., Hochleitner, W., Lankes, M., & Tscheligi, M. (2015). Personalization in serious and persuasive games and gamified interactions. *In Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play* (pp. 811-816). ACM.

Marczewski, A.,Tondello, G. F., Wehbe, R. R., Diamond, L., Busch, M., & Nacke, L. E. (2016). The Gamification User Types Hexad Scale. In *Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play* (pp. 229-243). ACM.

Mardikyan, S., Besiroglu, B., & Uzmaya, G. (2012). Behavioral intention towards the use of 3G technology. *Communications of the IBIMA*, 1-23.

Maroney, K. (2001). *My Entire Waking Life. The Games Journal*. Retrieved from: http://www.thegamesjournal.com/articles/MyEntireWakingLife.shtml

Marquis, J.(2011). *What does game-based learning offer higher education*?.Retrieved from OnlineUniversities.com website: http://www.onlineuniversities.com/blog/2011/10/what-does-game-based-learningoffer-higher-education/

Maslow, A. H., & Frager, R. (1987). *Motivation and personality*. New York, US: HarperCollins.

Mattheiss, E., Kickmeier-Rust, M. D., Steiner, C. M., & Albert, D. (2010). Motivation in game-based learning: it's more than 'flow'. In A. Schwill, & N. Apostolopoulos (Eds.), *proceedings of DeLFI2009,* 77–84.

Mayo, M. J. (2007). Games for science and engineering education. *Communications of the ACM*, *50*(7), 30 – 35.

Mazeyanti, M A.., Oxley, A., & Sulaiman, S. (2014). Evaluating game-based learning effectiveness in higher education. *Procedia-Social and Behavioral Sciences*, *123*, 20-27.

McBrien, J. L., & Brandt, R. S. (1997). *The Language of Learning: A Guide to Education Terms*. US: Association for Supervision & Curriculum Development.

McCalmont, J. (2009). The mechanics of morality: why moral choices in video games are no longer fun. Retrieved from http://futurismic.com/2009/11/11/the-mechanics-of-morality-why-moral-choices-invideo-games-are-no-longer-fun/

McClarty, K.L., Orr, A., Frey, P.M., Dolan, R.P., Vassileva, V., & McVay, A. (2012, June). A literature review of gaming in education. *Gaming in education*. Retrieved from website: http://www.pearsonassessments.com/hai/Images/tmrs/Lit_Review_of_Gaming_in_ Education.pdf

McNamara, N., & Kirakowski, J. (2006). Functionality, usability, and user experience: three areas of concern. *Interactions*, *13*(6), 26-28.

MDEC. (2016). *The Malaysia Digital Economy Corporation*. Retrieved from Malaysia Digital Economy Corporation (MDEC) website: http://mdec.my

Medeni, T., Elwell, M., Cook, S. and Ikeda, M. (2006). "Acquisition of "Soft" Skills in a Computer Game Environment". *In proceedings of ICCE 2006, Workshop on the Pedagogical Design of Educational Games.* China.

Mei, Y., Chun-Ming, Hung, Hwang, G. J., & Yueh-Chiao, L. (2011). A game-based learning approach to improving students' learning achievements in a nutrition course. *TOJET: The Turkish Online Journal of Educational Technology*, *10*(2), 67-75.

Merriam, S. B. (1998). *Qualitative Research and Case Study Applications in Education. Revised and Expanded from Case Study Research in Education*. San Francisco, CA: Jossey-Bass Publishers.

Michael, D. R., & Chen, S. L. (2005). *Serious games: Games that educate, train, and inform*. US: Muska & Lipman/Premier-Trade.

Miles, J. M. (2011). Reflections of Student Government Association Leaders: Implications for Advisors. *College Student Journal*, *45*(2), 112-122.

Miller, C.,Hokanson, B., & Hooper, S. (2008). A Contemporary Perspective for Innovation in Instructional Design. *TechTrends*, *52*(6), 37-46.

MOE.(2015).Executive Summary Malaysia Education Blueprint 2013-2025 (Preschool to Post-Secondary Education). *Ministry of Education*. Retrieved from Malaysia Ministry of Education website: http://www.moe.gov.my/cms/upload_files/articlefile/2013/articlefile_file_003114.pdf

Mohammed, P., & Mohan, P. (2011).Integrating culture into digital learning environments: studies using cultural educational games. *The Caribbean Teaching Scholar*, 1(1), 21–33. Retrieved from website: http://libraries.sta.uwi.edu/journals/ojs/index.php/cts/article/view/3

Mohd Majid Konting. (2009). *Kaedah Penyelidikan Pendidikan*. Kuala Lumpur, MY: Dewan Bahasa dan Pustaka.

Mok, S. S. (2008). *Educational psychology & pedagogy: Learner and learning environment*. Penerbitan Multimedia.

Moldoveanu, A., Balan, O., Moldoveanu, F., & Morar, A. (2016, January). From game design to gamification and serious gaming-how game design principles apply to educational gaming. In *The International Scientific Conference eLearning and Software for Education* (Vol. 1, p. 334). " Carol I" National Defence University.

Morse, B. J., Gullekson, N. L., Morris, S. A., & Popovich, P. M. (2011). The Development of An Internet Attitudes Scale. *Computers in Human Behavior*, *27*(1), 480-489.

Muntean, C. I. (2011, October). Raising engagement in e-learning through gamification. *In Proc. 6th International Conference on Virtual Learning ICVL* (pp. 323-329).

Murray, M., Smolowe, A., Butler, S.(1999). *Adventure in Business: An IMMERSION approach to training and consulting*. Pearson Custom Pub.

Mysirlaki, S., & Paraskeva, F. (2010). Online Games for the Next Generation of Workers. *International Journal of Advanced Corporate Learning (iJAC),3*(4), 88-96.

Nagappan, R. (2000). Teaching higher-order thinking skills in classrooms: Learning from the experiences of Malaysia. In *Proceedings of Thinking Qualities Initiative conference*, Hong Kong.

Nagappan, R. (2010). Teaching thinking skills at institutions of higher learning: Lessons learned. *Pertanika Journal of Social Science and Humanities*, *18*, 1-14.

Nakamura, J., Csikszentmihalyi, M. (2002) The Concept of Flow. *Handbook of Positive Psychology*, 89-105.

Newby, T.J. et al. (2006). *Educational technology for teaching and learning* (3rd ed). Pearson Merrill Prentice Hall.

Nicholson, S. (2012). A User-Centered Theoretical Framework for Meaningful Gamification.*Paper Presented at Games+Learning+Society 8.0.* Madison, WI.

Niederhauser, D. S., & Lindstrom, D. L. (2006). Addressing the NETS for students through constructivist technology use in K-12 classrooms. *Journal of Educational Computing Research*, *34*(1), 91-128.

Nik Ruzyanei, N. J., Wan Salwina, W. I., Tuti Iryani, M. D., Rozhan, M. R., Shamsul, A. S., & Zasmani, S. (2009). *Psychosocial factors influencing truancy in high risk secondary schools in Kuala Lumpur*. KL: MJP Online Early.

Noddlings, N. (2006). *Critical lessons. What our schools might teach but do not*. New York, US: Cambridge.

Noraini Idris. (2010). *Penyeldidikan dalam Pendidikan.* Kuala Lumpur, MY: Mc Graw-Hill (M) Sdn. Bhd.

Normoyle, A., Jörg, S., & Safonova, A. (2012, August). How responsiveness affects players' perception in digital games. In *Proceedings of the ACM Symposium on Applied Perception*,33-38. ACM.

Novak, T.P., & Hoffman, D.L. (1997). *Measuring the flow experience among web users*. Retrieved from http://elab.vanderbilt.edu/.

Oblinger, D. G. (2006). Games and learning :Digital games have the potential to bring play back to the learning experience. *Educause quarterly, 3*, 5-7.

O'Flaherty, J., & Doyle, E. (2014). Making the case for moral development education. *Journal of Further and Higher Education*, *38*(2), 147-162.

Okuneva, M., & Potapov, D. (2014). Consumer Behavior In Online Games. *National Research University Higher School of Economics*, *25*, 44-52.

O'Neil, H., & Wainess R., & Baker E. (2005). Classification of learning outcomes: evidence from the computer games literature. *The Curriculum Journal*, *16*(4), 455–474.

Osman, K., & Aini B, N. (2012). Educational Computer Games for Malaysian Classrooms: Issues and Challenges. *Asian Social Science*, *8*(11), 75–84.

Othman, Z., & Rahman, R. A. (2014). Attributes of ethical leadership in leading good governance. *International Journal of Business and Society*, *15*(2), 359.

Owens, T. J. (2011). Social videogame creation: lessons from RPG Maker. *On the Horizon*, *19* (1), 52 – 61.

Oztuna D, Elhan AH, Tuccar E. (2006). Investigation of four different normality tests in terms of type 1 error rate and power under different distributions. *Turkish Journal of Medical Sciences*, *36* (3), 171–6.

Paisley, V. (2013). Gamification of tertiary courses: An exploratory study of learning and engagement. *In proceedings of the 30th ascilite Conference: Electric Dreams*, 671-675.

Pallant J. (2007).*SPSS survival manual, a step by step guide to data analysis using SPSS for windows* (3rd ed.). Sydney, AU: McGraw Hill.

Papastergiou, M. (2009). Digital game-based learning in high school computer education: Impact on educational effectiveness and student motivation. *Computers & Education*. *52*(1), 1-12.

Paras, B., Bizzocchi, J. (2005). Games, Motivation, and Effective Learning: An Integrated Model for Educational Game Design. *In proceedings of DiGRA 2005 Conference: Changing Views – Worlds in Play* (pp.246-253).

Park, S. Y., Nam, M.- W. & Cha, S.- B. (2011). "University Students' Behavioral Intention to Use Mobile Learning: Evaluating the Technology Acceptance Model," *British Journal of Educational Technology*.

Passarelli M. A., & Kolb, D. A. (2012). *Using experiential learning theory to promote student learning and development in programs of education abroad*. Sterling, VA: Stylus Publishing.

Peat J., Barton B. (2005). *Medical Statistics: A guide to data analysis and critical appraisal*. Blackwell Publishing.

Pinelle, D., Wong, N., & Stach, T. (2008). Using genres to customize usability evaluations of video games. *In Proceedings of the 2008 conference on future play: Research, play, share*, 129-136.

Plass, J.L., Perlin, K., & Nordlinger, J. (2010). *The Games for Learning Institute: Research on Design Patterns for Effective Educational Games*. Paper presented at the Game Developers Conference, San Francisco.

Polito, M. (1997). How Gestalt theory can facilitate teaching and learning processes. *Society for Gestalt Theory and Its Applications*. Retrieved from http://gestalttheory.net/conv/polito.html

Prensky, M. (2001a). *Digital game-based learning*. New York, NY: McGraw-Hill.

Prensky, M. (2001b). *Digital Natives, Digital Immigrants*. Retrieved from http://www.marcprensky.com/writing/prensky

Prensky, M. (2002). The motivation of gameplay: The real twenty-first century learning revolution. *On the horizon*, *10*(1), 5-11.

Prensky, M. (2003)."Digital game-based learning." *Computers in Entertainment (CIE) 1*(1), 21-29.

Prensky, M. (2006). *Don't bother me mom - I'm learning!* St Paul, MN: Paragon House.

Prensky, M. (2007). How to teach with technology: Keeping both teachers and students comfortable in an era of exponential change. *Emerging technologies for learning*, *2*(4), 40-46.

Punnoose, A. C. (2012). Determinants of intention to use eLearning based on the technology acceptance model. *Journal of Information Technology Education: Research*, *11*(1), 301-337.

Purnamasari, V., & Si, M. (2014). Factor influencing of usage accounting game: study of learning by game and theory acceptance model. *International Journal of Business, Economics and Law*, *5*(1), 347-358.

Rankin, J. R. & Vargas, S. S. (2008). A review of serious games and other game categories for education. *In proceedings of the SimTecT Conference,Australia*, 305-311.

Rajaravivarma, R. (2005). A games-based approach for teaching the introductory programming course. *SIGCSE Bull. ACM SIGCSE Bulletin, 37*(4), 98.

Reeves, B., & Read, J. L. (2009). Total engagement. *Using Games and Virtual Worlds to change the way people work and businesses compete*, 132-133.

Reid, A. & Petocz, P. (2004). 'Learning Domains and the Process of Creativity'. *The Australian Educational Researcher*, *31*(2), 23-28.

Reiss, S. (2005). Extrinsic and intrinsic motivation at 30: Unresolved scientific issues*. The Behavior Analyst*, *28*(1), 1-24.

Renaud, C., & Wagner, B. (2011). The Gamification of Learning. *Principal Leadership*, *12*(1), 57-59.

Rhonda M. Epper, Anne Derryberry, and Sean Jackson (2012). "*Game-Based Learning: Developing an Institutional Strategy*" (Research Bulletin). Louisville, CO.

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

Richard-Amato, P. A. (1988). *Making It Happen: Interaction in the Second Language Classroom, From Theory to Practice*. Longman Inc., 95 Church St., White Plains, NY 10601-1505.

Robbins, S. (2006), "Image Slippage": Navigating the Dichotomies of an Academic Identity in a Non-academic Virtual World. *In Second Life Community Conference 2006*, *8*, 14-19.

Robson, K., Plangger, K., Kietzmann, J. H., McCarthy, I., & Pitt, L. (2016). Is it all a game? Understanding the principles of gamification. *Business Horizons*, *58*(4), 411-420.

Rogers, C., & Maslow, A. (2008). Carl Rogers. *Information Theory*, 214-218.

Rodrigo, M. M. T., & Baker, R. (2011). Comparing learners' affect while using an intelligent tutor and an educational game. *Research and Practice in Technology Enhanced Learning*, *6*(1), 43-66.

Roslina, I., Yusoff, R. C. M., Khalil, K., & Jaafar, A. (2011, November). Factors Affecting Undergraduates' Acceptance of Educational Game: An Application of Technology Acceptance Model (TAM). *In International Visual Informatics Conference* (pp. 135-146). Springer Berlin Heidelberg.

Rosnani & Suhailah, (2003). Finishing school. *Vocational Education*, *62*(5), 29-31.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 68–78.

Sahrir, M. S., Yahaya, M. F., & Nasir, M. S. (2013). EZ-Arabic for children: A virtual learning resource tool for Malaysian primary schools. *Procedia-Social and Behavioral Sciences*, *90*, 396-404.

Salen, K., & Zimmerman, E. (2004). *Rules of play: Game design fundamentals*. MIT press.

Sandford, R., Ulicsak, M., Facer, K., & Rudd, T. (2006). Teaching with games. *Computer education-stafford-computer education group*, *112*, 12-24.

Scattergood, M. & Feil, J. (2005). *Beginning game level design*. Thomson Course Technology.

Schulzke, M. (2009). Moral decision making in fallout. *Game Studies*, *9*(2), 87-95.

Scriven, M., & Paul, R. (2005). *The Critical Thinking Community*. Retrieved at http://www.criticalthinking.org/aboutCT/definingCT.shtml

Shaker, N., Yannakakis, G. N., & Togelius, J. (2010). Towards Automatic Personalized Content Generation for Platform Games. *In AIIDE Press*.

Shanks, N. H. (2007). Management and Motivation. *Introduction to health care management*. Burlington, MA: Jones & Bartlett Learning.

Shariff, S. N.(2006). *Real-time remote control car racing system* (pc version). Universiti Teknologi Malaysia, Johor Bahru.

Sharifi, A.; Zhao, R.; and Szafron, D. (2010). Learning companion behaviors using reinforcement learning in games. *In AIIDE Press*.

Sheldon, L. (2012). *The Multiplayer Classroom. Designing Coursework as a Game*. US: Cengage Learning.

Shen, C., Ritterfeld, U., Wang, H., Nocera, L., & Wong, W. L. (2009). Multimodality and interactivity: Connecting properties of serious games with educational outcomes. *Cyberpsychology & Behavior*, *12*(6), 691-697.

Sherman, J. (2010). *What are moral principles anyway and when are they useful*?. Retrieved at https://www.psychologytoday.com/blog/ambigamy/201008/what-are-moral-principles-anyway-and-when-are-they-useful

Shiratuddin, N., & Zaibon, S. B. (2009). Mobile game-based learning with local content and appealing characters. *International Journal of Mobile Learning and Organisation*, *4*(1), 55-82.

Shute, V. J., & Ke, F. (2012). Games, learning, and assessment. In D. Ifenthaler, D. Eseryel, & Ge, X. (Eds.), *Assessment in game-based learning: Foundations, innovations, and perspectives* (pp. 43-58). New York, US: Springer.

Sicart, M. (2008). Defining game mechanics. *Game Studies*, *8*(2), 1-14.

Siemens, G. (2002). *Instructional design in elearning*. Retrieved from http://www.elearnspace.org/Articles/InstructionalDesign.htm

Sillaots, M. (2014). Gamification of higher education by the example of course of research methods. *In International Conference on Web-Based Learning* (pp. 106-115). Springer International Publishing.

Simkins, D. W., & Steinkuehler, C. (2008). Critical ethical reasoning and role-play. *Games and Culture*, *3*(3-4), 333-355.

Smith, P.L., & Ragan, T. J. (1999). *Instructional design* (2nd ed.). Columbus, OH: Merrill/Prentice Hall.

Sotomayor, T. M., & Proctor, M.D. (2009). Assessing Combat Medic Knowledge and Transfer Effects Resulting from Alternative Training Treatments. *The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology*, *6*(3), 121-134.

Squire, Kurt D. (2008). "Video Game–based Learning: An Emerging Paradigm for Instruction."*Performance Improvement Quarterly, 21*(2), 7-36.

Suki, N. M. & Suki, N. M. (2011). "Exploring the Relationship Between Perceived Usefulness, Perceived Ease of Use, Perceived Enjoyment, Attitude and Subscribers' Intention Towards Using 3G Mobile Services". *Journal of Information Technology Management*, *12*(1), 1-7.

Sumak, B., Hericko, M., & Pusnik, M. (2011). A meta-analysis of e-learning technology acceptance: the role of user types and e-learning technology types. *Computers in Human Behavior*, *27*(6), 2067–2077.

Susi, T., Johannesson, M., Backlund, P (2007) Serious Games – An Overview. Technical Report. *School of Humanities and Informatics*. Sweden: University of Skvöde.

Sutrop, M. (2014). Using the Teachers' Values Game to facilitate teachers' reflection on their own values. *Teacher Education Advancement Network Journal (TEAN)*, *6*(1), 55-63.

Stainton, A. J., Johnson, J. E., & Borodzicz, E. P. (2010). Educational validity of business gaming simulation: A research methodology framework. *Simulation & Gaming*, *41*(5), 705-723.

Ştefan, L., & Moldoveanu, F. (2015). Gamified 3d virtual learning environment for improved students'motivation and learning evaluation. A case study on "3dupb" campus. *In Conference proceedings of eLearning and Software for Education* (eLSE) (pp. 94-101).

Swain, C. (2008). Master Metrics: The Science Behind the Art of Game Design. In Isbister, K. and Schaffer, N. (eds.), *Game Usability – Advancing the Player Experience, Morgan Kaufman*, 119-140.

Sweetser, P., & Wyeth, P. (2005). GameFlow: a model for evaluating player enjoyment in games. *Computers in Entertainment (CIE)*, *3*(3), 3-3.

Tan Wee Hoe, (2015). *Gamifikasi dalam penyelidikan: Pembelajaran Berasaskan Permainan*. Perak, MY: UPSI.

Tang, Hanneghan & El-Rhalibi. (2009). *Introduction to Games-Based Learning. Games-based Learning Advancement for Multisensory Human Computer Interfaces: Techniques and Effective Practices*. Idea-Group Publishing: Hershey.

Tangney, J. P., Stuewig, J., & Mashek, D. J. (2007). Moral emotions and moral behavior. *Annual Revolution Psychology*, *58*, 345-372.

Tastan, B., and Sukthankar, G. (2011). Learning policies for first person shooter games using inverse reinforcement learning. *In AIIDE*, 85–90.

Tirri, K. (2010). Teacher values underlying professional ethics. *In International research handbook on values education and student wellbeing* (pp. 153-161). Springer Netherlands.

Thanadsornsarn, S., & Kotrajaras, V. (2011). Gameflow and Playability as Models for Organizing Feedback from Remote Playtest. *In 4th Annual International Conferences on Computer Games, Multimedia and Allied Technology (CGAT 2011)*.

Thillainathan, N., & Leimeister, J. M. (2014). Serious game development for educators—A serious game logic and structure modeling language. In *Proceedings of the 6th International Conference on Education and New Learning Technologies* (pp. 1196-1206). Valencia, Spain: International Academy of Technology, Education and Development.

Thomas, T. (2011). Developing first year students' critical thinking skills. *Asian Social Science*, *7*(4), 26.

Thompson, J., Berbank-Green, B., & Cusworth, N. (2007). *Game design: principles, practice, and techniques - the ultimate guide for the aspiring game designer*. Hoboken, NJ: Quarto Publishing Inc.

Thurstone, L. L., & Chave, E. J. (1928). *The measurement of attitude*. Chicago, IL: University of Chicago Press.

Tsukamoto, M. (2000). Image-based pseudo-3D visualization of real space on WWW. *Digital Cities: Technologies, Experiences, and Future Perspectives*, *1765*, 288-302.

Turgut, Y., & Irgin, P. (2009). Young learners' language learning via computer games. *Procedia-Social and Behavioral Sciences*, *1*(1), 760-764.

Tychsen, A., & Canossa, A. (2008). Defining personas in games using metrics. *In Proceedings of the 2008 Conference on Future Play Research, Play, Share - Future Play '08*, 73–80.

Ulicsack, M., & Cranmer, S. (2010). *Gaming in Families*. Retrieved from http://www.nfer.ac.uk/nfer/publications/FUTL28/FUTL28.pdf

Van Eck, R. (2007). Building artificially intelligent learning games. *Games and simulations in online learning: Research and development frameworks*, 271-307.

Virou, M., & Katsionis, G. (2008). On the usability and likeability of virtual reality games for education: the case of VR-ENGANGE. *Computer & Education*, *50*(1), 154-178.

Wan Rozali, W. A., Hamid, X. H. A., & Sabri, M. I. M. (2007). Video Games: Issues and Problems Information and Communications Technology. *In ICICT ITI 5th International Conference* (pp. 217 – 222).

Wang, Y. S., Lin, H. H., & Liao, Y. W. (2010). Investigating the individual difference antecedents of perceived enjoyment in the acceptance of blogging. *World Academy of Science, Engineering and Technology*, 67-78.

Weaver, A. J., & Lewis, N. (2012). Mirrored morality: An exploration of moral choice in video games. *Cyberpsychology, Behavior, and Social Networking*, *15*(11), 610-614.

Werbach, K., & Hunter, D. (2012). *For the Win: How Game Thinking Can Revolutionize Your Business*. Wharton Digital Press.

Wertheimer, M. (1923). Laws of organization in perceptual forms. *A source book of Gestalt psychology.* London: Routledge & Kegan Paul.

Westera, Wim, Nadolski, R.J., Hummel, H.G.K., & Wopereis, I. (2008). Serious games for higher education: a framework for reducing design complexity. *Journal of Computer Assisted Learning*, *24*(5), 420-432.

Wheelwright, S. C., & Clark, K. B. (1992). *Creating project plans to focus product development*. Harvard Business School Pub.

Whitton, N., & Hollins, P. (2008). Collaborative virtual gaming worlds in higher education. *Research in Learning Technology, 16*(3), 34-41.

Whitton, N. (2010). *Learning with Digital Games: A Practical Guide to Engaging Students in Higher Education*. Routledge.

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

Wiersma, W. (2000). *Research Methods in Education: An Introduction* (7th ed.). Boston: Allyn and Bacon.

Wirth, W., Hartmann, T., Böcking, S., Vorderer, P., Klimmt, C., Schramm, H. & Biocca, F. (2007). A process model of the formation of spatial presence experiences. *Media psychology*, *9*(3), 493-525.

Wong, E. L. (2013). *Who are Malaysia's social gamers?* Retrieved from http://www.marketing-interactive.com/who-are-malaysias-social-gamers/

Wortley, D. (2015). *The Education Game: Using Gamification in the Classroom*. Retrieved at: http://www.slideshare.net/dwortley/the-education-game-paper

Wu, Z. (2013). *Gaming Perception & Decision*. Retrieved from http://sites.duke.edu/lit80s_02_f2013_augrealities/gaming-perception-decision.

Wu, J. J., & Tsang, A. S. (2008). Factors affecting members' trust belief and behaviour intention in virtual communities. *Behaviour & Information Technology*, *27*(2), 115-125.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, *27*(3), 425–478.

Yanikoski, R. (2004). Leadership Perspectives on the Role of Character Development in Higher Education. *New Directions for Institutional Research*.

Yannuzzi, T. J., & Behrenshausen, B. G. (2010). Serious Games for Transformative Learning. *Emerging Concepts and Future Directions Interdisciplinary Models and Tools for Serious Games,* 74-102.

Yin, R.K., (1984). *Case Study Research: Design and Methods*. Beverly Hills, Calif: Sage Publications.

Yolanda, W. (2015). Moral Dilemma: Definition & Examples. Retrieved at http://study.com/academy/lesson/moral-dilemma-definition-examples-quiz.html

Yoo, S. J., Han, S. H., & Huang, W. (2012). The roles of intrinsic motivators and extrinsic motivators in promoting e-learning in the workplace: A case from South Korea. *Computers in Human Behavior*, *28*(3), 942-950.

Yusoff, A., Crowder, R., Gilbert, L., & Wills, G. (2010). A conceptual framework for serious games. *In 2009 Ninth IEEE International Conference on Advanced Learning Technologies*, 21-23. IEEE.

Zainal, Z. (2007). Case study as a research method. *Jurnal Kemanusiaan*, *9*,22-29.

Zichermann, G., & Cunningham, C. (2011). *Gamification by design: Implementing game mechanics in web and mobile apps*. US: O'Reilly Media, Inc.

Zidik, Z. (2014). *Educational gaming design: Simple prototyping with metrics and events*. Retrieved from http://tlt.psu.edu/2014/06/03/educational-gaming-design-simple-prototyping-with-metrics-and-events/

Zin, Nor Azan Mat, Wong Seng Yue, & Azizah Jaafar. (2009). Digital game-based learning (DGBL) model and development methodology for teaching history. *WSEAS Transactions on Computers, 8*(2), 322-333.

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Paper published in proceedings

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