Learning with a strategic management simulation game: A case study

1. Introduction

The use of simulation games in learning and teaching has increased due to growing evidence of its effectiveness (Vogel et al., 2006). However, the use of simulations and games has not been as pervasive as it should be, and this may be due to the lack of insight to the use of simulation games in different contexts (Aldrich, 2003). This may have contributed to the scepticism about how well simulations games can be integrated with curricula, and how and why learning takes place in different contexts (Wu, Hsiao, Wu, Lin, & Huang, 2012). As mentioned, whilst there is an increasing body of evidence that indicates the effectiveness of simulation games (Laffey, Espinosa, Moore, & Lodree, 2003), this remains equivocal (Randel, Morris, Wetzel, & Whitehill, 1992) as some studies show that simulation games do not significantly add to learning (Costabile, De Angeli, Roselli, Lanzilotti, & Plantamura, 2003) and whilst other studies have been ambivalent (Rosas et al., 2003).
Gros (2007) asserts that in addition to linking enhanced learning with the use of simulations/games, research studies must also be more transparent and detailed about the context of the education and training programme using simulations. The context is critical as it helps situate the learning that occurs and deepens our understanding of the phenomenon. Gros (2007) recommends that research studies should describe when and how often the simulations/games is played, the type of exer- cises carried out pre and post game-playing, the type of interaction between participants and instructor, and the qualities of critical and reflective elements in the game itself. Whilst empirical evidence is necessary, it is insufficient. Research studies must integrate the evidence with theoretical underpinnings as Wu et al. (2012) found that a majority of these studies did not have any substantial learning theoretical basis. In addition, they found that research have so far failed to categorise the types of learning or use theories in explaining learning. Hence there is a need to understand the types of learning derived from simulations/games (Gros, 2007) such as the call from Zantow, Knowlton, and Sharp (2005) for more insight concerning generative learning that occurs during game playing.

The primary motivation of this study is to empirically explain how learning is enhanced in the use of simulations/games, how instructional design and the context of the study may play a role in enhancing learning and to integrate the empirical evidence with learning theories. This study's contribution to theory building is consistent with the appeals from extant literature (e.g. Aldrich, 2005; Proserpio & Gioia, 2007) in demonstrating how simulations/games can be integrated into a strategic management curriculum, providing empirical evidence in showing the link between the use of simulations/games and enhanced learning, and well as providing insight to how and why learning takes place. The contribution to practice involves informing and potentially validating programmes involving experiential learning in further enhancing its effec- tiveness. Such contribution will help guide education and training providers in designing their own programmes as Aldrich (2003) claims that business schools, for example, that are able to provide experiential learning via simulations will be in a more competitive position.

The following section reviews the extant literature concerning blended learning, simulations/games, and learning the- ories. The next section contains a discussion on the research methods adopted, including the justification of the case and simulation game. We then present the findings in addressing the research question. In the final section we discuss and conclude our study by synthesising the findings with learning theories.

2. Literature review

2.1 Blended learning pedagogy

There are few, if any, learning and teaching curricula wholly dependent on technology. Whilst learning and teaching without technology may be considered uninteresting, the use of technology without proper guidance from an instructor may be ineffective. Thus, adopting a blended learning pedagogic approach enables instructors to obtain the best of both traditional and digital domains. Blended learning is mostly associated with the amalgamation of traditional and virtual environments (commonly known as e-learning) in the delivery of a curriculum (Bonk & Graham, 2006).

The most common approach to blended learning involves the supplementation of traditional learning and teaching methods with technology such as using web-based systems as a repository for learning materials for students to access (Arbaugh, 2008). The blended learning approach has enabled the delivery of curriculum to be made more flexible, allowing learning and education to become more accessible to prospective learners that have very different lifestyles, goals and learning experiences.

The robustness of blended learning helps educators to fit curricula within a variety of contexts such as the choice and blend of synchronous and asynchronous interactivity between instructor and students, and students with one another including accommodating a range of class sizes (Graham, Henrie, & Gibbons, 2013). Blended learning also enhances learning through the use of other methods e.g. e-learning tools to enhance traditional face-to-face lessons and vice versa (Garrison & Vaughan, 2008). The flexibility of blended learning can also be observed from research by Lean, Moizer, and Newbery (2014) who adopted the perspective of students in investigating the effectiveness of a blended learning approach utilising a simulation game and reflective learning. Their research employed the critical incidents technique to prompt students to think about their experience whilst game playing to facilitate reflective learning.

2.2 Simulations and games

'Simulations' are a model (or simplification) of reality or some natural systems. A simulated model is valuable if it is characterised by omomorphism, which is the degree of authenticity of the simulation in reflecting reality (Proserpio & Gioia, 2007), that is, the number of key traits in reality that have been reflected in the simulation. The balance in maintaining authenticity whilst minimising complexity is a challenge as simplification tends to degenerate the face validity of the simulation (Vogel et al., 2006). Students learn with simulations by experimenting with changing the input values, parameters and constraints of the process, and consequently observing the change in the output. Pure simulation programmes have no specific goals or competitive element that learners have to consider (Leemkuil & De Jong, 2012).

Games, in contrast, involve competition (or cooperation) against (or with) the programmeme or other players to attain a goal within the rules and constraints of the game setting (Galva~o, Martins, & Gomes, 2000). Vogel et al. (2006) state that computer games have goals, are interactive and provide feedback as it involves players making and implementing choices between alternatives and subsequently receiving feedback. Games have become increasingly complex and open-ended, allowing for multiple strategies to take place, and hence, are more cognitively demanding.

There is a growing hybrid of simulation and games that are essentially decision-making systems that require players to make a series of decisions in a contrived environment but with realistic

scenarios. This environment enables players to experience the consequences of their decisions by providing them with real-time feedback through a number of mechanisms that may vary amongst programmes (Siemer & Angelides, 1995). Hybrid simulation games have an advantage over pure simulations and games as they can enhance the learning experience by providing an immersive, augmented and challenging reality environment that necessitates a high level of activity from the player to search for solutions and reach their goal (Prensky, 2001). The interactivity aspect is the real attraction of simulation games. The availability of adaptive advice also helps players in the discovery and learning process. Adaptive advice occurs only when certain conditions are met e.g. when the learner has reached a certain stage (Leemkuil & De Jong, 2012).
Decision-making in simulation games provide students with hands-on experience and opportunities to make decisions in a safe environment, and thus allowing students to experiment and learn from experience (Zantow et al., 2005). For example, Leemkuil and De Jong (2012) argue that learning operations management using games is more effective than the traditional mode as learners have to develop effective decision making capabilities to address the complex and dynamic challenges presented to them in the simulation. The literature indicates that simulation games do enhance learning, thus, the first research question aims to corroborate this, does the use of simulation games enhance learning?

2.3 Learning theories

Proserpio and Gioia (2007) posit that effective learning occurs through the use of simulation games because playing is a constructive process (Hoffman & Goodwin, 2006), acts as a catalyst for social activity (Vygotsky, 1978) and can improve cognitive gains by focussing on solving complex problems (Pellegrino & Glaser, 1982). Game-based learning has strong links with experiential learning as it allows learners to develop knowledge by testing their ideas in a trial-and-error approach (Aldrich, 2003). Simulation games allow for active learning as learners have to 'do something' to acquire knowledge and produce meaning through their own device (Shaffer, Squire, Halverson, & Gee, 2005).
Problem-based learning also occurs as learners generate new knowledge and make new associations amongst concepts and perceive concepts differently (i.e. in new light, different context) (Zantow et al., 2005). This phenomenon is parallel to generative learning that involves the four categories of recall, organisation, integration and elaboration (Jonassen, 1988). In problem solving, learners must recall concepts learned, organize and integrate new knowledge into the current schema, and finally elaborate their mental models in increasing its 'sophistication'. Zantow et al. (2005) claim that generative learning is inherent in a strategic decision-making simulation as all four components of generative learning are induced in strategic decision making games. The preceding discussion provides a strong basis in the conjecture of the presence and role of learning theories in simulation game playing. However, more robust empirical evidence is required, and this leads us to the second research question; how and why do simulation games enhance learning?

3. Method

3.1 The research design

The purpose of this study is both confirmatory and exploratory, and thus the research design uses a multi-method (Teddlie & Tashakkori, 2009) approach in testing the hypothesis 'the use of simulation games will correlate positively with learning' and in addressing the research question, how and why do simulation games enhance learning?', framed within a case study (Yin, 2009).

Themes that help to explain how the simulation games contributed to learning is identified (Miles & Huberman, 1994) as the findings from each student are cross-analysed to identify the degree replication (Eisenhardt, 1989). The research method consisted of two parts; survey questionnaires and semi-structured interviews, with both using purposive sampling. The survey questionnaire was integrated with the university-mandated programme evaluation. The questionnaire was a five-point Likert Scale (1 ¼ 'strongly disagree' to 5 ¼ 'strongly agree'). Student learning was measured using students' self- report in terms of attaining ten of the programme of study's learning outcomes. Students were also asked to rate their learning through the lectures and seminars as means of comparison with learning through simulation games. The interviews were conducted within of period three weeks after the end of the programme of study. The de-facto representatives of each group were invited for the interviews with each group (i.e. board of directors) represented by at least one student.

3.2 The programme of study

This study involves research on the use of simulation games by final year undergraduate students in a two-semester (24 teaching weeks) programme of study on strategic management in the UK. Undergraduate students were targeted as real- world simulations are most likely to benefit them more than postgraduate students who have more work experience (Doh, 2009). The programme of study is compulsory for all final year business management students and was delivered through a blended learning system, involving weekly lectures and seminars, supported by a dedicated university virtual learning environment (VLE) site, and the proprietary strategic business simulation game, accessed through the online support site of a popular international text book.

3.3 The simulation game

3.3.1 Simulation game selection

The simulation game was an off-the-shelf software programmeme and its selection was partly based on its user- friendliness and utility for students (Venkatesh & Davis, 2000). In addition, the selection rationale of the programme is consistent with the 'heuristic' principles adapted from Proserpio and Gioia (2007) that the simulation game should; be based sound pedagogic principles; have an engaging story; involve mystery and opportunity for learner discovery; and be able to be supported and integrated with instructional design.

The simulation game is inherently based on sound pedagogic principles as it was developed on the basis of the primary text book of the programme of study. It also has an engaging story that draws students into the role of board of directors of a transnational public relations, marketing and advertising firm. Students were provided with an elaborate vignette concerning the dynamics of the industry and history of the organisation. There is mystery and opportunity for learner discovery as each round of board meetings reflect a set of challenges (i.e. board meeting agenda) that are linked to the organisation's industry and external environment. These set of challenges were published on a week-to-week basis (each week is the equivalent to six months in the virtual world of the simulation game). The simulation provides a series of reports from a 'business analyst' who reports on the current environmental conditions. Students make their strategic decisions based on the current envi- ronmental conditions and also past decisions that is reflected in their share price and other key performance indicators (KPIs).

The simulation game is supported and integrated with instructional design almost by default as the simulation game was based on the primary text book used in the module. Students were given an induction to the simulation game to familiarise them with the navigation and features of the software programme. Students were also reminded of the various learning materials that they could

revisit in the VLE site that is linked to the content in the simulation game. The simulation game contains features that help reinforce key lessons. Game rules and game narrative were available to students, which are important if pedagogic gains are to be made from simulation games (Wu et al., 2012). The game rules emphasised the key aims for strategic management (e.g. satisfying shareholders and other stakeholders). The game narrative was provided by a 'mentor' who made cameo appearances in the simulation game providing hints and advice to the students concerning what they should have learned and what they should consider in the future.

3.3.2 Simulation game implementation

The implementation of the simulation was undertaken in recognition of the seven stages recommended by Salas, Wildman, and Piccolo (2009). The first and second stages involving the identification of student requirements and educational competencies are guided by the benchmark standard set by the UK government (The QAA, 2007). The third stage of setting learning objectives are based on the programme of study's learning outcomes derived from the course learning outcomes.

In the fourth stage, trigger events are mirrored by the tasks required to be performed by students when engaging with the simulation game in applying strategic management concepts, theories and frameworks. Trigger events were essentially the scenarios (i.e. application of knowledge and problem solving) (Gros, 2007). In terms of stage five, financial and non-financial indicators were used as performance measures and were disclosed to the students in real-time after each round of board meetings. Stage six of performance diagnosis and development feedback involved the tutors providing feedback to students in the weekly seminars. Finally, in stage seven, comprehensive developmental feedback session were also held with students involving reflections on their own learning using the simulation and in the programme of study. Although a competitive spirit was often evident, the simulation game was not played in 'market conditions' i.e. strong or weak performance by any group did not impact upon the attainments of other groups.

4. Findings

The survey response rate was relatively high as 155 (92.3 per cent) students completed and returned the questionnaire. The mean age of the questionnaire participants was 21 and 85 (54.5 per cent) were male. Most of the students reported their county-of-origin to be the UK (83, 53.2 per cent), followed by China with 60 students (38.5 per cent). There were two students each from the Cayman Islands, France and Switzerland and 11 other countries represented by one student each. In terms of work experience, 121 (72.0 per cent) students reported to have some work experience full-time, part-time and/or gained through the university's one-year placement/internship programme. Interviews were held with a total of 36 students, of which 27 (75 per cent) were male and 20 (56 per cent) home (UK) student, representing 94.0 per cent of all groups.

4.1 Enhanced learning

The achievement of the 168 students in the module appear to generally reflect the normal distribution of marks with almost half (42.3 per cent) of the students attained either a distinctive or merit grades, and with forty six per cent receiving satisfactory/acceptable grades. SPSS 21.0 was used conduct a Pearson correlation and multiple regression analysis. The correlation analysis revealed that learning through the simulation game has a significant positive correlation with attaining the learning outcomes ($r = 0.37$, $p < .01$). The hypothesis is therefore supported. Further analysis was also performed on the correlation between the learning methods of lectures and seminars, respectively, with the learning outcomes. The analysis revealed that lectures ($r = 0.23$, p

< .01) and seminar (r ¼ 0.29, p < .01) has a significant positive correlation with attaining the learning outcome. However, the correlation is not as strong as the result involving the simulation game. The result of this analysis is presented in Table 1.
A stepwise multiple regression analysis was further performed to analyse if learning with the simulation game was a better predictor of learning in terms of attaining the learning outcomes compared to learning via lectures and seminars. The results show that learning with the simulation game, independently, was the best predictor of meeting the learning outcomes (b ¼ 0.37, p < .01). The result of this analysis is presented in Table 2.
The results show that the use simulation games did enhance students' learning and this consequently offers a compelling case to further explore how the simulation game has been able to influence the students' learning. This involves under- standing the entwined constructs of the learners' experience and the application of the instructional design.

4.2 Explaining enhanced learning

The following sub-section helps to address the research question ‘how and why do simulation games enhance learning?’ we first describe the context of the simulation game. The sub-sections present the most important findings concerning students' experience in using the simulation game and the board meetings, which was based on the simulation. Three broad categories were identified from the interviews and is presented in order of significance; Knowledge and Cognition, Attitudes and Engagement, and Transferable Skills.

4.2.1 Knowledge and cognition

Students stated that their knowledge in regards to strategic management and its related concepts had increased due the simulation. The simulation helped to augment students' knowledge by framing strategy concepts and actions in the form of a coherent ‘story’ that supports the students' visualisation of how these concepts may work in real life. The various scenarios presented by the simulation were not necessarily mutually exclusive in terms of strategic consequence thus students had to revisit a number strategic concepts and theories, and apply it from different perspectives and thereby reinforcing their knowledge.
In addition to the strategic concepts and theories, students also realised how important it was to be cognisant and to consider future trends. Some students learned this the ‘hard way’ by disregarding the business analyst’ recommendations and consequently made the wrong decisions. Different concepts may have different emphasis (e.g. stakeholders vs. shareholders) and hence keeping a balance in terms of knowledge also inevitably helped in balancing the virtual firm's performance in terms of its financial and non-financial KPIs.
The students generally agreed that the use of the simulation and the subsequent board meeting enabled them to expe- rience cognitive gains, specifically; critical thinking, problem solving and decision making. In terms of critical thinking, the students reported maturity in thinking as they realise that there were multiple perspectives that one could take for most of the scenarios in justification of adopting one of the four options presented to the students. Some students indicated that this maturity occurred as they progressed through the simulation. They stated that the debates that occurred in their board meetings had made them realise that there more than one legitimate view, and compelled them to think more critically in subsequent rounds. Some students intimated the use of the devil's advocate role as a mechanism in improving the quality of their rationale (behind each decision made).
The improvement in the students' critical thinking also helped them in improving their problem-solving ability. Students demonstrated this in two primary ways. The first involved using various

theoretical frameworks that was introduced to them to enable them to ‘see the problem’ using different lenses. This enabled them to view and articulate the problem in different contexts (e.g. human resources, financial and marketing). The second involved extrapolating the consequence of the potential solutions in evaluating the sustainability of the solutions.
The development of the students' problem-solving skills is intimately associated with the development of their decision making skills as the ‘solutions’ were provided to the students in the form of four options. Thus, students did not have to develop/create their own solutions but make a choice from four solution options. Deciding on one option from four was less straightforward than it seemed as the students reported that as a group they evaluated, compared and contrasted, each option against various criteria/principles such as; i) organisational vision/mission/objectives/priorities (that the group had set for themselves), ii) long and short term goals and iii) present financial standing and performance. Some of the students reported that they were steadfast in keeping to their decision-making principles even when attractive options that countered these principles materialised as they did not want to be perceived as being inconsistent in their decision-making approach.
Most students mentioned that some of the decisions were difficult to make as the options represented competing interest, but as a result they have learned to make trade-offs. A small number of students observed that they realised that strategic decision-making in groups are a political/social process, with some students reporting that this at times override rational reasoning. Overall, the students interviewed felt that the simulation game has helped with improving the judgement. Indeed, decision making skills were the most evident cognitive gain that the students collectively reported. The students agreed that the board meetings had demonstrated to them the complexity in strategy decision making (i.e. making decisions with incomplete information and with different but legitimate perspectives).
The cognitive gains of critical thinking, problem solving and decision-making appear to be underpinned by an improvement in the students reasoning abilities. In the interviews, some of the students provided examples of their own or groups rationalisation process. Many of these reflected the effective deductive and inductive reasoning abilities, as well as abductive reasoning abilities especially when they were asked to reflect upon their decisions in each round as part of the report writing exercise. Effective abductive reasoning abilities were demonstrated when students attempted to rationalise the results (e.g. performance indicators) against past decisions. Last but not least, the students' experience also reflected an improvement in mental flexibility and adaptability as they were able to assimilate and process new information that would compel a new line of reasoning and inquiry.

4.2.2 Attitudes and Engagement

Overall the use of the simulation game seemed to have a positive impact on students in terms heightening their interest in the field of strategy, and increasing engagement in their studies. A number of students stated they found the simulation game exciting and that they enjoyed this experience. Consequently, this resulted in them being more engaged in the programme of study. One student noted that the unpredictability of the simulation game made the whole exercise exciting in waiting anxiously every week wondering what the next scenarios would be. It is apparent that the real-time feedback from the simulation game helped to maintain the students' interest in the simulation game. Most students reported spending (perceived) disproportional number hours (relative to the module's credit) outside of class working on the module within their groups. Many students stated that the ‘extra’ hours spent on the module enabled them go in-depth into the topics to appreciate the complexity of strategy in terms of its concepts.
The appreciation of the complexity of strategic management was also reflected by statements in regards to strategic drift as a number of students stated that they now appreciate “how easy it is to

get seduced by [seemingly] attractive opportu- nities, get distracted and go off tangent". The simulation also enabled students to appreciate the limitations of organisational resources and the key principles of resource allocation. Some students mentioned that decision making became more difficult as the game progressed as "past decisions came back to haunt them [in terms of the performance indicators]". Some com- mented how they now value the environmental context, with one student commenting how "macro and micro aspects of organisations affect one another". Other students commented gaining more depth in their knowledge of the concepts enabled them to have more confidence in debates in the board meetings, and that gave them an effective basis to be persistent as they had more conviction in their ideas and reasoning.

4.2.3 Transferable skills

In terms of skills, the students generally agreed that they had made gains in team working, communication, negotiation and conflict resolution skills, as well as overall employability skills and prospects. The students stated team working skills were primarily developed in the board meetings as they had to cooperate with one another to complete the tasks. An important related lesson to team working was team goal setting. Teams inevitably had members with different levels of motivation and capabilities. Students had to negotiate team goals and 'recalibrate' personal expectations, and find a 'rhythm' that worked well for all team members. Student also learned to compromise as they recognised that there were different personalities, characters and cultures within a team, and one had to be flexible.

Many of the students also reported enhanced communications skills as the debates in the board meeting required clarity, tact and persuasiveness in making their team members buy into their suggestions. A by-product of this was the improvement in listening skills, as students had to demonstrate that they had listened to and considered the views of others in establishing and enhancing credibility amongst their team members. Due to the development of these skills, some students reported that they feel they had acquired some leadership skills along the way as they took the lead in some of the discussions.

Some students also reported that some debates within the groups became too 'lively' and they had to learn to resolve conflict through a number of tactics such as rational discussions, demonstrating empathy and learning to compromise. Some students opined that the experience within the board meetings enabled them to be more confident and effective in them- selves. The improvement in their self-efficacy has enabled them to 'bring out' what is already in them in terms of the portfolio of employability-related skills.

In summary, the students interviewed have most frequently specified their learning was in the cognitive domain, spe- cifically in terms critical thinking, problem solving and decision making. Students also reported a change in their attitude towards the subject and programme of study as they became engaged due to heightened interest and motivation. Finally, students claimed that they improved in terms of a number of transferable skills in particular team working, communication, negotiation and conflict resolution. The students also reported that they have enhanced their employability skills and prospects.

5. Discussion and conclusion

The findings suggest that the students have benefitted and learned from engaging with the strategic decision making simulation game. Whilst the use of simulation games can generally be argued to be beneficial in most situations in terms of cognitive gains, the benefits are still a matter of degree. The students seemed to genuinely enjoy engaging with the simulation game and this perhaps this may be due to its novelty. However, this is not unexpected as undergraduate students generally have less real-world experience (Doh, 2009).

Many forms of learning appear to have taken place by using the simulation game as both a stimulus and a vehicle for learning. In addressing the second research question, "how and why do simulation games enhance learning?", the findings were categorised into two distinct, but related, themes of i) simulation games as a catalyst for experiential learning, and ii) simulation games as a vehicle for learning at the centre of a community of inquiry. The discussion below synthesises the findings with the extant theoretical underpinnings in providing insight as to how learning theories may be applicable and discern if alternative explanations are present. The limitations of the study, as well as suggestions for future research are then discussed, concluding with a discussion on the implications and contributions to theory and practice.

5.1 Simulation games as a catalyst for experiential learning

The most evident starting point involves the stimulus that the simulation created in terms of students conducting their own research in regards to the issues faced, and the debates that they had in rationalising the right 'answer'. The actions of 'doing', discussing, experimenting and reflecting are quintessence of experiential learning cycle (Gros, 2007) as a meaning- making process (Kolb & Kolb, 2005).

The stimulus and the virtual environment in the simulation provide students with 'concrete experience' as they are compelled to first understand the rules and the 'grammar' (e.g. insights, cause-and-effect relationships) of the game, and then assimilate this knowledge within their own mental models (Proserpio & Gioia, 2007). 'Concrete' experience also occurs when adaptive advice (e.g. reports from the 'business analyst' at the start of each round of meetings) is assessed and assimilated to enable students to make more informed decisions (Leemkuil & De Jong, 2012). The reflection stage of experiential learning is akin to deutero learning that involves learning about the context in which action and consequences occur (Visser, 2007) by recognising implicit rules and the pattern of association in terms of cause-and-effect (Proserpio & Gioia, 2007). At the conceptualisation stage, students are more able to apply points of learning in specific instances to broader contexts (Engestro€m, Miettinen, & Punama€ki, 1999). Finally, students then progress to the fourth and final stage in the form of 'experimenting', and it is this stage that simulation games truly distinguishes itself from various other learning and education methods as it allows students to test their new ideas and concepts ideas (Gros, 2007). The overall result is an improvement in the students' cognitive skills.

Maturity in thinking, as an indicator of critical thinking (Facione, Facione, & Giancarlo, 2000; Irani et al., 2007), was re- flected in terms of taking multiple perspectives in viewing the task at hand in the simulation game. The cognitive skills reflected in the students' efforts in balancing short and long term goals, and making trade-offs, seem to be consistent with the cognitivist paradigm of learning. The dynamism in game playing appears to have helped to improve the effectiveness of information processing.

Cognitive gains can also be explained by the elaboration and attribution theories. Elaboration theory involves the orga- nisation of materials from simple to complex (Reigeluth, 1983), whilst attribution theory involves learners attempting to explain the results of a phenomenon (abductive reasoning) (Weiner, 1974). The effects of elaboration theory were observed by students expanding and detailing the consequences of the specific decision options, with skills related to making inference (deductive and inductive reasoning abilities) underlying this cognitive process. On the other hand, the students' application of the abductive reasoning in attempting to understand their interim results (e.g. share price, financial information, non- financial performance indicators and financial performance indicators) is an indicator of the attribution theory.

Generative learning also appears to be in effect, which has been widely reported by learners in the use of simulation games (Zantow et al., 2005), as students experienced the process of developing

structures and establishing relationships amongst concepts and information that they have attempted to comprehend. The presence of adaptive advice should have prompted students to think about the suggestions (rather than that being the answer) (Leemkuil & De Jong, 2012) in seeking new information through their own individual research and through debates with the fellow board member, and potentially assimilating and integrating the new information within their mental models and schemas (Hoffman & Goodwin, 2006; Wittrock, 1992).

5.2 Simulation games as a vehicle for learning at the centre of a community of inquiry

The second theme identified is the learning experienced by the students by learning from one another in the board meetings. The simulation game, in essence, played a role as a vehicle for learning. The full benefits of the integration between a simulation games and communities of inquiry could only be derived through effective instructional design for blended learning. The simulation game and communities of inquiry appeared to have role in the virtuous cycle of interest-enjoyment- learning.

The key learning paradigm supporting this theme is constructivism, which views learners as the developer and constructor of knowledge as they create their own understanding of reality through subjective lens (Berge, 2002; Marsick & Watkins, 2001). Situated learning and case-based learning are the relevant theories in explaining the findings. Situated learning views learning as embedded in the context and activity of the learning environment (Lave & Wenger, 1991) and case- based learning is a form of apprenticeship based learning-by-doing approach in structured small group sessions (e.g. in seminars) (Powell, 2000).

The situated-learning theory explicates that simulations must fit with the curriculum (Vogel et al., 2006), and this inte- gration and cohesion potentially results in enhanced learning. The board meetings as well as the weekly seminar meetings with the tutors and other students from other groups enabled students to develop quasi communities of inquiry, adopting collaborative constructivist approach (Garrison & Vaughan, 2008). This form of active learning enabled students to develop skills that were reported in the findings section.

The social presence of other learners is critical for one another's learning (i.e. members of a board). The actions and de- cisions of groups in the simulation did not impinge and/or affect one another, and thus the students were more willing to cooperate in sharing experiences and ideas with one another. Students also perceived the tutor's presence as critical espe- cially as a coach who walked students through the rationale of their decision making process as tutors provided a form of ‘scaffolding learning’ (Wu et al., 2012).

The findings revealed the students felt that the use of the simulation made them more interested in the module and in strategic management, with a number reporting the developing transferable skills in the board meetings. Problem-based learning and cooperative group work helped to enhance students' attentiveness. The experience of seeing their contribu- tion to the construction of knowledge in the board meetings reinforces and perhaps further heightened the students' interest and motivation in the board meetings.

5.3 Implications for theory and practice

The findings are consistent with extant literature and theories. The learning paradigms of humanism, constructivism, cognitivism and behaviourism all seemed to play a role in simulation albeit in varying degrees. The key theories that played a major role in enhancing student learning are experiential learning (with generative learning, deutero learning, elaboration and attribution theory as secondary theories), situated learning and problem-based learning (Leemkuil & De Jong,

2012; Wu et al., 2012; Zantow et al., 2005). Nonetheless, not all learning theories were represented directly from the simulation game playing. Some learning aspects were derived from other activities e.g. board meetings. Hence, this prompts the role of instructional design in extracting maximum benefits from the use of simulations in learning and education.

Learners must be supported by effective instructional design as learners that face difficulty in engaging with the task, will

be frustrated and thus this negates any possibility of learning from the process (Leemkuil & De Jong, 2012). Students should be supported with three types of support; interpretative support (background information and relevant 'input' knowledge, include elaborative and explanatory feedback), experimental support (in developing perspectives and propositions) and reflective support (inquiry process and knowledge gained from the simulation) (Reid, Zhang, & Chen, 2003). Theoretical constructs involving simulation games should also include those involving instructional design in developing a holistic view of the learning dynamics that occur in, with and around simulation games.

In terms of practice, this study has demonstrated the virtues of blended learning in terms of the use of a simulation and board meetings in enhancing learning. The guidelines provided by Proserpio and Gioia (2007), and Salas et al. (2009) in the selection and implementation of simulation games, respectively, appear to be effective. The integrative aspect of 'blended learning' was found to be effective due to the instructional design as it is a form of learner support. Simulations games are not sufficient on their own to promote learning as they must be supported and supplemented by effective instructional design (Leemkuil & De Jong, 2012). For example, students' engagement with simulations must be coupled with effective instruc- tional design that involve regular intervention and support from tutors through coaching and playing the role of mediator when group conflict occur (Graham et al., 2013).

The contextual nature of simulation games shapes its effectiveness. Different settings such as different education sectors will require practitioners to take note of key situational factors at play. For example, secondary schools, further education, and professional executive education providers clearly cater for different types of learners in terms of maturity, experience and specificity of learning outcomes, for example. Thus any simulation game used and the instructional design must cater for such variances.

In addition, blended learning may be a necessity as it helps with meeting different learning needs e.g. students with disabilities and students that may need to work at different pace due to full time work. Finally, instructors of learners from the virtual generation should design learning in the context of a conducive and supportive social setting, emphasise active involvement from the learners and focus learning activities on problem-solving (Alavi, Wheeler, & Valacich, 1995).

5.4 Limitations and future research

Whilst every effort was made to ensure that the research methods were rigorous and robust, there were a number of limitations. Firstly, the survey questionnaire is mono source and cross sectional. Secondly, the study is correlational and does not infer causal links between learning from the simulation games with the students' actual performance on the programme of study. Thirdly, a comparison of the students' performance between programmes of study was not undertaken, specifically between a programme of study that involves the use of a simulation game and another that does not. This comparison would have enabled the study to further isolate the effects of simulation games on learning.

Future research may involve collecting data from various sources (e.g. official student records) in establishing the relationship between learning and performance. Future research may also involve a (quasi) experiment in comparing student performance in two learning programmes, one

involving a simulation game (experimental group) and the other without (control group). There is an opportunity to involve postgraduate students who have more work experience to assess their experiences with simulation games. As this study did not investigate each student's learning needs in detail, future research may address this gap by investigating the impact of individual differences in learning with simulations and how different aspects of a simulation (e.g. adaptive advice) impacts student learning.

Appendix

Table 1
Means, standard deviation (SD) and correlations for the measured variables.

	Mean (SD)	1	2	3
1. Learning outcomes	3.9 (0.4)			
2. Learning through the simulation game	3.9 (0.8)	0.37**		
3. Learning through lectures	4.0 (0.6)	0.23**	0.29**	
4. Learning through seminars	3.9 (0.8)	0.29**	0.18*	0.40**

Notes: *p < .05, **p < .01.

Table 2
Stepwise multiple regression analysis on learning outcomes.

Variables	Model 1				Model 2			
	B	SE B	b	t	B	SE B	b	t
1. Learning through the simulation game	0.19	0.42	0.37**	4.5	0.17	0.04	0.33**	4.22
2. Learning through seminars					0.13	0.42	0.25*	3.15

Notes: *p < .05, **p < .01.

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