Online Business Simulations: Authentic teamwork, learning outcomes and satisfaction

Paul Strickland, La Trobe University

Gui Lohmann, Griffith University

Pierre Benckendorff, The University of Queensland

Paul Whitelaw, Southern Cross University

Abstract

Educators have struggled to incorporate authentic team-based learning (TBL) into the business curriculum despite increasing evidence that collaborative learning can enhance the acquisition of management skills. We investigate the use of online business simulations as a platform for fostering authentic TBL for undergraduate and postgraduate business students studying at eight institutions in Australia and Hong Kong. Quantitative analysis of 365 surveys is triangulated with qualitative data obtained from three different student focus groups. Structural equation modeling (SEM) is used to model the relationships between teamwork, learning outcomes and satisfaction. Qualitative results support the statistical modelling and are presented to add further insights and conceptual richness. The findings support our proposition that online business simulations provide an authentic TBL environment, which contributes to learner satisfaction by supporting the development of management-related learning outcomes through socially constructed meaning. This conceptual contribution highlights further avenues for research and leads to a number of practical implications for educators using simulation-based pedagogies.

Keywords: online business simulation; teamwork; learning outcomes; experience; satisfaction

1. Introduction

Business education has emerged from pragmatic and utilitarian traditions that have emphasized management skills as the cornerstone of economic competitiveness. The ability to identify and work towards goals, communicate ideas, identify problems and solutions and make complex decisions are critically important management skills. Despite increasing evidence that these skills can be enhanced through collaborative learning, instructors have struggled to incorporate authentic team-based learning (TBL) into the business curriculum (Hansen, 2006). While the TBL approach promoted by Michaelsen, Knight and Fink (2002) has shown some promise, most team tasks are divided amongst team members who work independently to complete component parts. This tendency for students to compartmentalize team projects limits opportunities for socially constructed meaning and the development of higher order management skills such as identifying trends and creating and implementing plans and strategies. We address this issue by proposing and testing the argument that online business simulations create opportunities for authentic TBL which enhances the acquisition and development of management skills.

Our work is broadly situated within a constructivist education paradigm, with a focus on the use of simulations as an instructional strategy grounded in social constructivism. Social constructivists argue that learners construct knowledge through a social process of meaning-making founded on interaction and collaboration (Vygotsky, 1978; Piaget, 1952; Brown, Collins & Duguid, 1989). Collaborative learning techniques have frequently been examined as a means to develop a range of skills and knowledge through socially constructed meaning (e.g. Johnson, Johnson & Smith, 1998; Terenzini, Cabrera, Colbeck, Parente & Bjorklun, 2001; So & Brush,

2008). Both high and low achievers in collaborative learning teams have been shown to outperform their counterparts in individual learning environments (Ocker & Yaverbaum, 2004). Similarly, student learning outcomes were perceived to be higher in collaborative online courses than in courses where students worked individually (Arbaugh & Benbunan-Finch, 2006). Collaborative learning methods have also been shown to promote socio-affective and cognitive learning, resulting in higher levels of learner satisfaction (Chaparro-Peláez, Iglesias-Pradas, Pascual-Miguel & Hernández-García, 2013; Ocker & Yaverbaum, 2004).

With this in mind, we set to test the following two propositions: (1) Online business simulations provide an authentic TBL environment that contributes indirectly to learner satisfaction by supporting the development of management-related learning outcomes; and (2) Online business simulations provide an authentic TBL environment that contributes directly to learner satisfaction. In the following section we review the research on simulation-based learning as a tool for developing management skills. We then explore the teamwork factors that are relevant to the learning outcomes of online business simulations. In doing so, we consider behaviors that influence teamwork performance such as team dedication and interaction. Finally, we review the evidence regarding learning outcomes and learner satisfaction with the use of simulation-based pedagogies. This is followed by a description of the methodology; a presentation and analysis of the results; and a conclusion outlining contributions, limitations, as well as potential avenues for further research. The key contribution of our work is to highlight the synergistic role of TBL in facilitating learning outcomes and learner satisfaction in online business simulations.

2. Literature Review

The ascendance of neoliberal ideology and the concomitant shifts in education and labor market policies have placed universities under increasing pressure to produce employable graduates (Bridgstock, 2009; Giroux, 2010). The focus on employability has coincided with a period of rapid growth in both business school enrolments and business degree granting colleges and universities (Pfeffer & Fong, 2002). This success has created a number of challenges for business schools. Inevitably larger class sizes have led to reduced levels of interaction and transmissive teaching and assessment approaches that favor knowledge acquisition over the teaching of employability skills (Arias & Walker, 2004). More than two decades ago, Leavitt (1989, p. 39) lamented that the design of business programs had created "critters with lopsided brains, icy hearts, and shrunken souls." Mintzberg (1996) argued that the typical business school experience was too far removed from the context of management as a practice-based craft. While there are some exceptions, very little appears to have changed in the intervening years, with Pfeffer & Fong (2002. p. 85) observing that “students learn to talk about business but it is not clear they learn business.” They go on to argue for greater innovation in teaching and learning that emphasizes clinical training and learning by doing.

In this context, simulations have become an increasingly popular teaching and learning tool in higher education. Simulations offer learning environments that allow students to practice and master relevant knowledge and skills by replicating workplace tasks and processes. Computer simulations, virtual worlds, games and role playing are all examples of simulations. Several benefits are evident from the research on simulations in higher education environments. Simulations allow learners to apply critical thinking and decision-making skills in an

environment in which decisions and actions often lead to complex and unexpected outcomes (Summers, 2004; Adobor & Daneshfar, 2006; Douglas, Miller, Kwansa & Cummings, 2008). They also model aspects of reality in a safe environment, allowing learners to make mistakes that do not have real repercussions (Adobor & Daneshfar, 2006). Simulations offer a number of advantages over other experiential learning methods, including greater interaction in teamwork and collaborative learning (Drake, Goldsmith & Strachan, 2006), simultaneous feedback (Ocker & Yaverbaum, 2004; Edelheim & Ueda, 2007), and enhanced learner engagement (Fripp, 1997; Feinstein, Mann & Corsun, 2002; Edelheim & Ueda, 2007).

There are many types of simulations ranging from face-to-face interactive games and role playing to software-based simulations and simulations hosted online. Business simulations have become more prevalent over the last two decades with a number of useful studies, reviews and critiques of business simulations available in the business and education literature (Adobor & Daneshfar, 2006; Faria, Hutchinson, Wellington & Gold, 2009; Fripp, 1997; Summers, 2004). However, these broader reviews are often descriptive, with empirical studies often limited to small sample sizes and single cohorts using one simulation.

Online Business Simulations

Summers (2004) proposes that business simulations can be classified into three broad categories consisting of role playing simulations, physical simulations and virtual simulations. Role playing simulations require students to engage in fictional business scenarios by adopting a particular role or character. Physical simulations usually involve some type of physical representation of a

business or management setting using paper, board games or card games that require students to make decisions. Virtual simulations involve the use of computers, tablets, smartphones and other devices to present simulated business environments. Virtual simulations originally consisted of locally installed software or programs that could be run from a disc but the growth of the Internet and cloud-based computing has facilitated the development of online simulations that provide improved accessibility and portability for students.

A recent Australian audit has estimated that there are over 50 commercially available online business simulations (Benckendorff, Lohmann, Pratt, Reynolds, Strickland & Whitelaw, 2015). Some of these simulations focus on specific functional areas of business such as accounting, finance, marketing or business ethics, while others adopt an enterprise-wide approach that emphasizes the relationships between the various functional areas of an organization. The scope of this study is limited to enterprise-wide online business simulations that encourage learners to step outside their disciplinary focus by engaging in cross-functional decision making and problem solving (Clarke, 2009). These types of business simulations typically involve authentic teamwork requiring individual team members to take responsibility for specific functional areas while engaging with each other to obtain successful outcomes for their organization. The role of teamwork in providing a collaborative and dynamic environment that replicates the reality of organizational activities can therefore not be overlooked (Ceschi, Dorofeeva & Sartori, 2014).

Simulations and Team-based Learning

There can be very little doubt that the ability to work in a team is one of the most highly sought after skills in business. A cursory glance at the skills mentioned most frequently in business-related job advertisements clearly reveals an employer penchant for teamwork and collaboration skills. It would be unusual to find a college or university that does not include teamwork or collaboration amongst their core graduate competencies or learning outcomes. In Australia, teamwork and collaboration skills feature prominently in statements of graduate attributes for most public universities. The national *Core Skills for Work Framework* explicitly acknowledges the importance of 'connecting and working with others.' According to the framework, this skill area is about "building the work-related relationships needed to achieve an outcome within a workgroup, or achieve goals through team based collaborations" (DIISRTE, 2013, p.29). The *Australian Qualifications Framework* (AQF) also mandates that learners should be provided with opportunities to develop collaborative skills through participation in teams (Australian Qualifications Framework Council, 2013). Furthermore, the recent development of *Threshold Learning Outcomes* for many business fields also explicitly identify teamwork or collaboration as important learning domains (see Table 1). The importance of teamwork skills is also noted in the accreditation requirements for both the Association to Advance Collegiate Schools of Business (AACSB) and the EFMD Quality Improvement System (EQUIS).

Insert Table 1 here

The benefits of teamwork for the learning process, both within the socio-affective and cognitive dimensions, have been discussed and demonstrated in a number of studies (e.g. Terenzini, Cabrera, Colbeck, Parente & Bjorklund, 2001; Proenca, 2009; Huang, Rauch & Liaw, 2010;

Chaparro-Peláez et al., 2013). Cognitive theories of collaborative learning examine the influence of collaboration and communication on individual learning (Dillenbourg, Järvelä & Fischer, 2009). Social learning theories contend that collaborative learning involves social interaction with a community of learners and teachers and the acquisition and sharing of experiences or knowledge (Zhu, 2012). Working in teams, learners are able to cooperate, exchange ideas and share experiences to develop their knowledge and skills (Dimitropoulos, Manitsaris & Mavridis, 2008; Huang, Rauch & Liaw, 2010). LaPointe and Gunawardena (2004) found that peer interaction had a strong effect on the learning outcomes reported by students. Learning occurs when social interaction exposes individual team members to a slightly higher level of difficulty than they have already achieved cognitively (Brandon & Hollingshead, 1999). Previous research findings indicated that more effective learning is facilitated when learners are actively involved rather than being passive listeners (Zhu, 2012). While not every collaborative activity might result in cooperation, most team activities are said to encourage social interactions as questions are raised, reasoning is shared and conflicts are resolved during the development of understanding of content and the co-construction of knowledge (Johnson, Johnson & Smith, 1998; Laverie, Madhavaram & McDonald, 2008).

Successful teams require members to define and achieve common goals and reach a consensus within the team (Chaparro-Peláez et al., 2013). Collaborative learning can result in group identification and dedication which, in turn, can lead to concern for other team members and a motivation to combine resources for the greater good (Brandon & Hollingshead, 1999). According to Chaparro-Peláez, et al., (2013), team dedication can be increased through interaction and interdependence. Interaction, in this context, refers to the relationship established

amongst students and is seen as central to performance and satisfaction. Following Thibaut and Kelley (1959), interdependence means that group members must perceive some value in working together for collaborative learning to occur. This can be established through task or role interdependence, shared team goals and the creation of complementary roles for each team member (Palloff & Pratt, 2005).

The use of simulations to support authentic TBL is well established in medicine and allied health education (Beaubien & Baker, 2004; Shapiro, Morey, Small, Langford, Kaylor, Jagminas, Suner, Salisbury, Simon & Jay, 2004). Many simulation-based pedagogies are designed to encourage students to actively engage in collaborative learning modes (Ocker & Yaverbaum, 2004; Drake, Goldsmith & Strachan, 2006). Despite the fact that many online business simulations require students to collaborate in teams, only a small number of studies have examined the role of TBL (Anderson, 2005; Chasteen, 2016; Drake, Goldsmith & Strachan, 2006; Jensen, 2003; Martín-Pérez, Martín-Cruz & Pérez-Santana, 2013). For example, Coffey and Anderson (2006) found that team dynamics influenced the perceived value students placed on the simulation learning experience. Similarly, Xu and Yang (2010) found that team interaction and psychological safety within a team supported synergistic knowledge development.

Learning Outcomes and Satisfaction

Studies of the learning outcomes of simulations have produced mixed results (Anderson & Lawton, 2009; van Staalduinen & de Freitas, 2011; Keys & Wolfe, 1990). This is primarily because the measurement of learning outcomes is complex. Some researchers have attempted to

use objective measures such as student grades and simulation performance while others have measured student perceptions of acquired learning outcomes. It is tempting to assume that simulation performance might be a proxy indicator of learning but this assumption has proved to be incorrect (Washbush & Gosen, 2001; Batista & Cornachione, 2005). Other objective measures of student performance, such as grades for exams and assessment tasks related to the simulation are similarly problematic because they do not account for the skills and knowledge students bring to the learning context prior commencing the simulation. In other words, some students receive good grades regardless of the simulation and it is therefore difficult to argue that the simulation was the cause of improved learning outcomes. Anderson and Lawton (2009) also question whether these tools are sensitive enough to detect changes achieved as a result of simulation-based pedagogies. They also note that it is easier to design and score assessment tasks that measure cognitive learning outcomes at lower levels of Bloom's taxonomy (Bloom, Englehart, Furst, Hill & Krathwohl, 1959), such as basic knowledge and comprehension. It is therefore not surprising to find fewer simulation studies focused on higher order skills such as analysis, evaluation and creation.

Given these challenges, many authors have instead relied on self-reported measures of skills and knowledge acquisition. While these measures are more subjective, they allow for individuals to reflect on their learning through a process of internal benchmarking by comparing skills and knowledge prior to the simulation with skills and knowledge acquired during the simulation at all levels of Bloom's taxonomy. While this approach is not without criticism (Bowman, 2010; Porter, 2011), several recent studies have continued to affirm the validity of self-reported learning outcomes, particularly when students are required to reflect over shorter time periods

(Anaya, 1999; Pike, 2011; Douglass, Thomson & Zhao, 2012). Although some of the limitations of quantitative self-reported measures can be overcome by triangulating the results with qualitative findings using a mixed methods design (Creswell, 2002) very few studies have used this approach. However, the literature generally supports the notion that business simulations are effective at developing critical thinking, problem solving, and cross-functional decision making skills (Chakravorty & Franza, 2005; Clarke, 2009). There is also some evidence that business simulations support the retention, transfer and application of conceptual knowledge gained through prior studies, readings and lectures (Arias-Aranda, 2007; Clark, 2007).

It has been suggested that simulations have a particular pedagogical value when focused on the development of decision-making and interpersonal skills within teams (Lamont, 2001; Drake, Goldsmith & Strachan, 2006). This is because the interactive and interdependent environment created by many simulations can foster the development of social skills required by teams to solve problems (Dimitropoulos, Manitsaris & Mavridis, 2008; Huang, Rauch & Liaw, 2010). An exploratory qualitative study by Devitt, Brady, Lamest, Dalton, Newman and Gomez (2015) provides further support for the notion that team-based simulations enhanced interpersonal skills such as communication, negotiation, decision-making, leadership and conflict management.

The outcomes of simulation-based learning can also be evaluated by assessing how students perceive their learning experience (Schumann, Anderson, Scott & Lawton, 2001). Koh, Tan, Tan, Fang, Fong, Kan, Lye and Wee (2010) tested the extent to which simulation-based learning met students' perceived satisfaction of psychological needs and motivation. They found that simulation-based learning met perceived needs for competence, relatedness and autonomy

support. In addition, an important predictor for satisfaction can be time dedication and perceived enjoyment of the individual and the team (Chaparro-Peláez et al., 2013). Enjoyment is not only considered as a motivational factor but also plays an important role in student learning and the acceptance of new technologies (Fu, Chou & Yu, 2007). Chaparro-Peláez et al. (2013) failed to find a relationship between enjoyment and perceived learning, arguably because the measures they used did not include aspects related to intrinsic motivation or interest but rather focused on the 'fun' aspect of simulations. However, the authors did find that enjoyment was related to satisfaction.

While many authors have examined learning outcomes and student satisfaction, these concepts are usually treated separately as dependent variables. Few studies have examined the notion that the accomplishment of learning outcomes may mediate the relationship between teaching and learning approaches such as TBL and student satisfaction. An analysis of 165 hospitality students using a business simulation found that self-reported improvements in critical and analytical thinking were significant predictors of satisfaction (Martin & McEvoy, 2003). A small study of 64 geography students studying at a US university found further support for the idea that student perceptions of acquired cognitive learning outcomes may mediate the relationship between educational quality, resource quality and student involvement, and satisfaction but the results were not significant (Duque & Weeks, 2010). Duque (2014) replicated this study to include several larger cohorts of students studying economics, business and nursing in Colombia and Spain. At this scale, the findings indicated that perceptions of acquired learning outcomes had a moderate and significant influence on satisfaction. Independent variables included measures of

student involvement, engagement and co-creation – all of which are germane to the TBL focus of this paper.

3. Methodology

The methodological design consisted of a mixed methods approach using a sequential explanatory design (Creswell, 2002). The first phase of the data collection consisted of a self-administered questionnaire designed to measure student perceptions of teamwork, learning outcomes and satisfaction. Following this quantitative phase, focus groups were conducted to further explore students' understanding of teamwork and its impact on student learning.

Quantitative Sample and Data Collection

Data were collected in 2014 and 2015 from seven tertiary education institutions in Australia and one in Hong Kong. The sampling strategy was designed to increase the diversity of students and simulations to allow for the results to be more generalized. The sample included courses covering topics such as strategy, service operations, corporate social responsibility, human resource management, aviation management and managerial decision making. Self-administered questionnaires were distributed to undergraduate and postgraduate students either in hard copy provided in class or through an online link. A total of 400 surveys were completed, with the final sample consisting of 365 valid surveys. A profile of respondents is presented in Table 2. The majority of respondents were full time students (92.9%) in the final year of their undergraduate studies (63.7%). Sixty-seven percent were female students and 51.2% were between 22 to 24

years of age. Despite most of the data collection taking place in Australia, the majority of students were from Hong Kong (24.1%) and China (22.2%), followed by Australia (19.7%) and South Korea (7.4%). More than half of the students (54.5%) come from a non-English speaking background (NESB) and almost half of the students (42.2%) were in part-time/casual employment whilst studying.

Insert Table 2 here

Students involved in this research used one of the following five online business simulations. *HOTS* was used by several of the participating institutions and represents more than half (64.9%) of the sample. *HOTS* is a commercially available simulation that requires teams of students to run a hotel while attending to core business functions such as strategy, human resources, marketing, finance, operations and sustainability. *IDLE* (*Interactive Dynamic Learning Environment*) was used by a large cohort of undergraduate students at one of the participating institutions. This is a bespoke total enterprise simulation created by the University of Wollongong to address the lack of simulations dealing with responsible decision making. Students form multidisciplinary teams and run a simulated business for a period of several weeks. Key performance areas include profit, quality, productivity, environmental impact, sustainability, social innovation and ethical performance. *Airline Online* was used with two smaller cohorts and is based around the planning, establishment and operation of an airline. The simulation is a commercially available education product that focuses on financial management, marketing and advertising, scheduling, business analysis, procurement, service levels, network planning and cargo operations. *Ramsden* is another bespoke simulation requiring teams of

students to run a hotel. Finally, *RevSim* is a commercial hotel revenue simulation with similar features to *HOTS.*

All simulations included in the sample were total enterprise business simulations requiring students to work in teams to set up a business and to achieve various business goals. In all cases teams competed against each other in a virtual marketplace. All of the simulations were run over a number of weeks to allow students to experience several business cycles. Teams were required to make decisions about operations, strategy, marketing, human resources, finance and sustainability. Teams were also presented with various challenges introduced by instructors as well as by the competitive dynamics of the simulation. In order to succeed students had to work together in their teams to set up virtual businesses, solve problems and make decisions. The courses completed by students included in this research were typically advanced final year or postgraduate courses where the learning outcomes required learners to work in a team to integrate and apply business knowledge and skills. In order to achieve these outcomes, students completed a number of teamwork learning and assessment activities, including setting up the online business based on a business plan or proposal and analyzing and reporting on business performance. In some of the courses students were also required to complete individual journals in which they reflected on the simulation and teamwork experience.

Measures

The questionnaire consisted of statements measuring the key constructs of interest within the model including perceptions about teamwork (independent variable), perceptions about acquired

learning outcomes (mediator/dependent variable) and student satisfaction (dependent variable). These constructs were developed from the literature, together with insights gathered from pilot testing the survey prior to data collection. Respondents were asked to indicate their level of agreement with each statement using a seven-point Likert scale (1=Strongly Disagree … 7 = Strongly Agree). The questionnaire included seventeen statements about teamwork adapted from Chaparro-Peláez et al. (2013), Coffey and Anderson (2006), Huang, Rauch, and Liaw (2010), Hurme (2010), and Ocker and Yaverbaum (2001). These items tapped into socially-shared metacognition, collaborative learning and the outcomes of teamwork. Perceived learning outcomes included a mix of fourteen statements about business knowledge and skills adapted from Kendall and Harrington (2003), Martin and McEvoy (2003), and Vos and Brennan (2010). Learner satisfaction was measured by evaluating satisfaction with the simulation itself, the use of the simulation as a learning tool and whether the simulation met expectations. Eleven items were adapted from Chaparro-Peláez et al. (2013), Martin & McEvoy (2003), Lo (2010), and Teo & Wong (2013). Prior to final data collection, a pilot survey was completed by 166 students at one institution. Overall, respondents indicated the survey was easy to follow but respondents identified a few issues with wording. Some statements were adjusted to ensure face validity. The full set of statements used in the final questionnaire are included in Appendix 1 at the end of this paper.

Qualitative Sample and Data Collection

In order to complement the data collected through the survey, focus groups were conducted with students using both the *Airline Online* and *HOTS* simulations. The purpose of the focus groups

was twofold. Firstly, we were interested in having both successful and less successful teams discussing team dynamics, as well as their satisfaction with the simulation as part of their learning experience, the resources provided to support their use of the simulation and the assessment items associated with the simulations. Secondly, it was also an opportunity for the research team to gain further insight into the responses obtained in the survey. Three focus groups were conducted across two institutions in Australia. One of the focus groups consisted of five postgraduate students using *Airline Online*, while the other two groups consisted of two teams of undergraduate students using *HOTS*. The focus group sessions lasted for approximately 30 minutes each.

4. Results

Quantitative Results

Before analyzing the data, the dataset was cleaned by removing invalid responses. The analysis included two stages. The first stage was designed to evaluate the measurement model through the use of exploratory factor analysis and confirmatory factor analysis, followed by the second stage analysis of the structural model. The proposed model was tested to determine simultaneous relationships between the latent variables and the overall fit of the model to the data. Exploratory factor analysis was conducted using the *Statistical Package for the Social Sciences* (*SPSS* 22.0), while confirmatory factor analysis was computed using *AMOS* 22.0. Structural equation modeling (SEM) was used to analyze the proposed relationships. The advantages of *SEM* include simultaneous evaluation of conceptual latent variables and the ability to take random and systematic measurement error into account (Gefen, Rigdon, & Straub, 2011). The two-step

approach of *SEM* involves measuring the confirmatory measurement model and then the structural model .

Exploratory factor analysis (EFA) was conducted on all items within the proposed model. This step was taken since some elements of the measurement model were previously untested. The final solution resulted in three factors: labeled *teamwork, learning,* and *satisfaction*. The total variance explained by the three factors was 70.2%. The maximum likelihood extraction method was used due to the skewness of the data, with Kaiser-Meyer-Olkin measure of sampling adequacy = 0.96. Bartlett's test of sphericity results were χ^2 =10218.9, *df* = 406, $p< 0.000$.

Based on the literature, it was anticipated that *teamwork* would be a multidimensional construct incorporating socially shared metacognition, collaborative learning, and individual outcomes. However, the EFA indicated that *teamwork* in the context of online business simulations appeared to be a unidimensional construct consisting of eleven items, as presented in the Appendix 1. These items were a combination of socially shared metacognition, collaborative learning and individual outcomes of students in the team work experience. The perceived *learning outcomes* factor comprised seven items and the student satisfaction contained six items (see Appendix 1). To confirm the measurement model, a subsequent confirmatory analysis was needed to evaluate and refine the resulting scales (Gerbing & Anderson, 1988).

Confirmatory factor analysis (CFA) was conducted to confirm the structure found in the exploratory factor analysis (EFA). Missing value analysis was first performed using the EM estimation procedure within *SPSS* to impute missing values on the validation sample. The scale

items were forced to load on the factors identified in the EFA. All latent factors were permitted to correlate with other factors. However, no error terms were allowed to co-vary. The CFA model with all the scale items from the EFA resulted in an excellent fit to the data (χ^2 = 620.32 (*df* =249, *p* <.00), χ^2/df = 2.4, CFI = 0.95, RMSEA = 0.06 (0.05, 0.07) and SRMR = 0.05.) The chi-square was significant, but this result was expected due to sample size (Anderson & Gerbing, 1988; Hair, Black, Babin, & Anderson, 2009). The normed chi-square was just above the recommended cutoff of 2.0 but less than 3.0. The CFI was equal to .95 and the RMSEA value was just slightly above the recommended good fit of 0.05. The SRMR was well below the marginal acceptance level of 0.08.

Although the fit indicators suggest an adequate fit, a few standardized residuals were greater than 4.0, which is an indication of problems or misfit (Hair, Black, Babin & Anderson, 2009). Six of the items used to measure *teamwork* were of a concern and were deleted from the model, as they did not represent unique attributes. Further evaluation identified similar problems with *learning outcomes*, with three items deleted from the model. The removed statements referred to understanding specific business functions such as marketing, staffing and finance. These items may be less reliable across multiple cohorts because student responses are likely to vary based on the features of particular simulations. On the other hand, more general learning outcomes such as problem solving and understanding real world problems were not likely to vary from one simulation to another and were subsequently retained. Initially specified measurement models almost invariably fail to provide an acceptable fit across all fit indicators and require some re-specification and re-estimation (Anderson & Gerbing, 1988). See Table 3 for final constructs and items. This revised CFA model excluding the deleted items resulted in an excellent fit to the data

(χ^2 = 79.54 (*df* =62, *p* <.066), χ^2/df = 1.2, CFI = 0.99, RMSEA = 0.03 (0.0, 0.04) and SRMR = 0.02). The chi-square is not significant and the normed chi-square is below the recommended cutoff of 2.0. Both the CFI and RMSEA value is below the recommended good fit of 0.05. SRMR is well below the marginal acceptance level of 0.08.

Table 3: Factors and reliability measures

Item	**Factor loadings[a]**	**Construct reliability[b]**	**Average variance extracted[c]**
Teamwork			
My team interactions helped me understand other points of view	0.918	0.91	66%
I learned new skills and knowledge from other team members	0.880		
My team worked well together	0.846		
My team actively exchanged ideas using online tools	0.833		
The contributions of other team members assisted my understanding of the simulation	0.796		
Learning Outcomes			
Problem solving skills	0.796	0.86	60%
Understanding of operations	0.846		
Understanding of strategic management	0.833		
Understanding of 'real world' problems faced by organizations	0.800		
Satisfaction			
Overall, the simulation has met my expectations	0.902	0.88	64%
Overall, I am satisfied with the simulation as a learning tool	0.898		
I am satisfied with the online software used for the simulation	0.870		
I enjoyed learning with the simulation	0.839		

[a] Based on the completely standardized loadings.
[b] Construct validity was computed for each factor (Hair, Black, Babin & Anderson, 2009).
[c] The average variance extracted was computed as an indicator of convergent validity (Hair, Black, Babin & Anderson, 2009).

The construct reliability for all factors is above 0.86, suggesting good reliability. That some factors achieved a construct reliability above 0.9 indicates that these measures consistently represent the same latent construct (Hair, Black, Babin & Anderson, 2009). Each latent construct has a variance extracted of greater than 0.5, as shown in Table 3. Table 4 presents the means, standard deviations, and correlations among the constructs.

Table 4: Means, Standard Deviations, Correlations and Reliabilities

	Variables	M	SD	1	2	3
1	Teamwork	5.69	1.12	0.94		
2	Learning outcomes	5.45	1.01	.39*	0.89	
3	Satisfaction	5.32	1.24	.46*	.74*	0.93

Note. N=365. Cronbach Alpha coefficients are in the diagonal matrix.
* $p<0.05$

The final step in the analysis process involved investigation of the relationships among the latent variables through the structural model using maximum likelihood estimation. The structural model contains one exogenous latent variable of teamwork (x_1), and two endogenous latent variables of student learning outcomes (h_2) and student satisfaction (h_1). See Appendix 1 for final constructs and items.

The overall fit of the structural model to the data was good (c2 = 79.5 (*df* = 62, *p* <.066), c2/*df* = 1.28, CFI = 0.99, RMSEA = 0.03 (.00, .04), and SRMR = 0.02). There was a significant relationship between *teamwork* and perceived *learning outcomes* (b=.41, p<.05). There was also a strong relationship between perceived *learning outcomes* and *student satisfaction* (b=.73, p<.05) thus supporting the direct effect of the mediator on the outcome variable. *Teamwork* had a significant direct influence on student *satisfaction* (b=.18, p<.05). however perceived *learning*

outcomes had a strong moderating influence on student *satisfaction*, as shown in Table 5. The full results of the model are shown in Figure 1 (item names as detailed as Appendix 1).

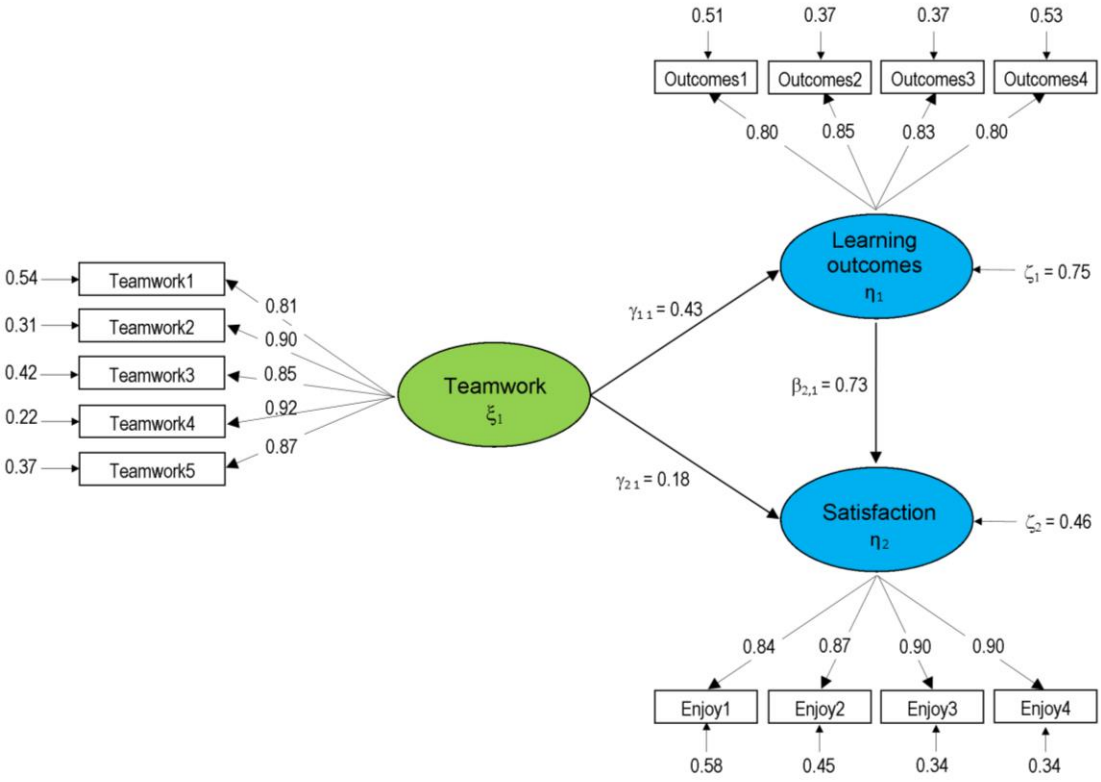

Figure 1: Teamwork, learning outcomes and satisfaction results. Note

Table 5: Direct and Indirect Effects of Teamwork on Learning Outcomes and Satisfaction

Constructs			**Direct effects**	**Indirect effects**	**Total effects**
Teamwork	→	Learning outcomes	0.431*		0.431*
Teamwork	→	Satisfaction	0.179*	0.316*	0.495*
Learning outcomes	→	Satisfaction	0.732*		0.732*

Note: N=365. Standardized effects provided.
*P<0.05

Qualitative Results

We now move to the qualitative results from the student focus groups to add further insight to the structural model. The focus groups were recorded and comments were transcribed subjected to a thematic analysis. Key themes and concepts were coded manually by reading the transcripts and creating a list of recurring concepts (Braun & Clarke, 2006). These concepts were then combined into themes. This process was undertaken independently by three researchers who then compared and combined their coding schemes and findings. This process was used to reduce the inherent subjectivity associated with coding qualitative data. Key themes included the importance of communication, interdependence of team roles, limited opportunities to learn from other teams, the skills developed through team interactions that were perceived to be authentic, and the impact of teamwork on student satisfaction.

Several students described that unlike other forms of group work, the simulation provided a sense of meaningful teamwork. In particular, students mentioned that the interdependent and competitive nature of the simulation required then to work more closely with their team-members. Students reported spending more time with their team members as compared with other group assignments. Communication between the team-members was mentioned as a very important skill for the overall performance of the team. A student from a team who had a less successful business stated: "We were a very active group … we were constantly in communication." She stated that their failure in the simulation still provided their group with an opportunity to keep engaged, aiming to improve their profitability in subsequent business cycles. A female student from another team stated: "I don't think I've ever communicated so much with my team members in a group before. Ten o'clock at night I'd be messaging [another student]. It

was just constant." Several teams described how they had set up Facebook pages or Google Docs so that they could communicate more effectively as a team.

In most instances, team members took on responsibilities that mirrored the structure of real organizations (e.g. marketing manager, operations manager, human resource manager, CEO), thereby requiring close communication and coordination because of the interdependence between these roles. One student mentioned: "Because I'm the marketing manager, I have to ask the financial manager how much budget I can use this month for advertising… Yeah, so I think communication is really important between us." One undergraduate female student explained: "I learned that every single decision being made by every team member could potentially affect my role… You can't really separate everything…accountability is really spread across the team." Similarly, another student explained:

> "This is one of those team assignments where if you did have one member that wasn't as involved as the rest it would really let down the whole team. Usually if one person's not doing the work you can compensate for this by just working a little bit harder. But I feel like this is one of those assignments where everybody really does have to contribute equally."

This view was reinforced by another participant, who described the consequences when one team member did not contribute: "I do have friends in the other class who have one member that didn't show up to any group meetings, didn't do anything and they just had a horrible time with it."

While the competitive nature of the simulation contributed to interaction among team members, some students highlighted that it was difficult to learn from peers outside their team as they

perceived that any help would hinder their final performance in the simulation. One female undergraduate student summarized this point: “no-one would even tell us their hotel name so we didn't know who was who”. Another student stated:

> "We didn't have any communication with other teams because our class was extremely competitive. It seemed like nobody wanted to share their secrets with anybody else [...] So we would have loved to have been able to talk to other groups to see what they were doing."

Focus group participants also acknowledged that the practical, industry-related nature of the simulation created an environment very similar to teams found in the workplace. The simulation provided authentic opportunities to solve problems collaboratively, manage conflict and make decisions. For example, one student described how the weekly feedback provided by the simulation allowed students to develop "problem solving skills that really help us to make decisions or come up with solutions in a short time."

Participants from two of the focus groups stated that they had internal arguments and that students from other teams also reported having arguments. The ability to listen to other points of view and resolve conflict was therefore a key learning outcome. One team member described how they would resolve conflicts: “Sometimes we had arguments but in the end we used the data to prove which decision would be better at that point, because we are running a business.” Another team member added:

> "The marketing manager would always argue with the finance manager. Since the finance manager would always say 'keep your eyes on your budget or your forecasting allowance for a year you're spending'. But the marketing manager would say 'how am I supposed to increase my productivity or advertising efficiency if I can't spend any money'? So … they actually have to compromise and find other alternatives".

One negative aspect identified by all participants was the number of hours they spent on the simulation, constantly checking their performance and improving their decisions as required since business cycles occurred on a weekly or bi-weekly schedule. A female undergraduate student stated that she was constantly babysitting the simulation environment, comparing it with a "Tomagotchi" toy. Hence, time management skills were identified as paramount to successfully juggling the extra load required by the simulation with other teaching, work or personal commitments. Students stated that the reflective journal was a great piece of assessment for them, enabling them to reflect on these challenges.

Despite these negative sentiments, it was clear that students enjoyed the team aspects of the simulation and that this enjoyment contributed to their satisfaction. One student described her experience as follows: "I'm the first person to say I absolutely hate teamwork…I hate teamwork with a passion. It's probably because I've never had a good team but this time I've had a good team." Another participant added: "Yeah, overall I do think the simulation was beneficial to my learning and it helps working in a team, it was great."

To sum up, it seemed that taking all into consideration, the students did appreciate the opportunity offered to learn from the simulation, with some statements to support this claim including "apply the knowledge in a more practical way", having the opportunity to make mistakes that "probably people won't forgive" in the real world, viewing the simulation as "something special that you will always remember", and acknowledging that "hands-on experience is important."

5. Discussion and Conclusions

We have highlighted that authentic team-based learning can encourage students to cooperate, exchange ideas and share experiences to develop knowledge and skills. We have also identified that online business simulations provide an authentic learning context for students to develop and apply management knowledge and skills. These observations indicate that online business simulations create opportunities for authentic TBL that enhances the acquisition and development of management skills. Furthermore, our modeling has demonstrated that these synergies enhance student enjoyment and satisfaction with the learning experience.

The data collected from the survey and focus groups confirmed the benefits of online business simulations for teamwork, learning outcomes and satisfaction. The dynamic nature of the online business simulations included in this study encouraged frequent and meaningful interactions and communication between team members. The need to engage with other team members and to understand their points of view was critical to maintaining a competitive business. Rather than synthesizing parts of an assignment as most team-based activities require, individuals adopted specific functional roles resulting in divergent opinions about how to advance the virtual

organization. This context allowed for disagreements to flourish and forced individuals to consider and learn from the perspectives of other team members, thereby creating a learning community of practice.

The authentic nature of the simulation, mirroring a number of managerial and operational decisions made in real world organizations, also provided opportunities to acquire or improve problem solving skills and understand operations and strategic management. Students indicated that the simulation provided the opportunity to understand 'real world' problems faced by organizations. These attributes are less likely to be identified in a traditional TBL activity or assignment without the use of simulations. Students also stated their satisfaction with the use of simulations as a learning tool and the enjoyment of learning with the use of simulation.

These findings make several conceptual and practical contributions. Conceptually, this paper provides evidence that TBL plays an important role in enhancing the learning outcomes reported by students after using an online business simulation. This finding conforms with the social constructivist perspective of learning, which argues that knowledge and skills acquisition is enhanced by interactions with peers. The practical implication of this finding is that educators need to consider how opportunities for socially constructed meaning can be supported and embedded into the curriculum. Non-traditional pedagogies that incorporate authentic TBL can support collaboration and provide learners with opportunities to experience multiple perspectives. In simulation-based pedagogies, the educator is often a facilitator rather than a transmitter of knowledge. This requires a different mindset for students and educators – one where the educator is a coach and a cheerleader rather than a content expert. The coaching role

involves guiding teams to generate their own solutions rather than providing direct answers, while the cheerleading role involves rewarding of positive behaviours and team interactions by recognising and celebrating team successes. Innovations such as flipped classrooms provide opportunities for teams to work together during class time, allowing the instructor to become a facilitator of learning. Team interactions can also be encouraged outside the classroom by guiding students to use readily available online collaborative tools such as wikis, Facebook pages and Skype. The qualitative analysis highlights that learning activities should not only support and encourage collaboration within teams, but also foster an understanding of the dynamics of competition between teams.

This study presented both quantitative and qualitative results based on self-reported measures of learning outcomes. The mixed-methods design was adopted to triangulate the findings and to add further insight. While the qualitative results confirmed the quantitative analysis, future studies may benefit from including objective measures of learning gains alongside self-reported measures. The study was based on a large sample of students consisting of several cohorts using different simulations, it would be useful to conduct further research on the influence of teamwork on simulation learning outcomes in other cultural settings and learning contexts. Teamwork interactions, expectations and outcomes are influenced by cultural and anthropological backgrounds that vary in different regions of the world. A comparison of differences between collectivist and individualistic cultures, or Confucian and Western learners would be instructive. In addition, it would be interesting to measure how simulations could enhance management skills by tracking and analyzing the progress of one cohort of students using simulations across several years of study. Likewise, it would be useful to example whether

teamwork results in the same outcomes in non-university learning environments such as school or formal workplace training programs.

This study focused on the student perspective. Including graduates and alumni in future studies would provide additional insight into whether participation in online business simulations resulted in improved employment or promotion outcomes. It would also be beneficial to explore instructors' views about the value of teamwork in facilitating the acquisition and development of management skills when using online business simulations. This line of inquiry might focus on the pedagogies, assessment and support mechanisms instructors use to encourage meaningful team interactions that optimize learning outcomes.

Acknowledgements

Support for this project has been provided by the Australian Government Office for Learning and Teaching (OLT). The views in this project/activity do not necessarily reflect the views of the OLT. The project team would like to acknowledge the assistance of Dr Char-Lee McLennan, Dr Jakob Trischler, Wendy London and Lainie Groundwater and the contributions of the Reference Panel consisting of A/Prof Mark Freeman, Prof Janne Liburd, Prof Ulrike Gretzel, Dr Trish Andrews and Dr Sandra Barker. Any errors are the authors' responsibilities.

Declaration of Interest Statement

There are no conflicts of interest and no additional funding except for a grant from the Australian Government Office for Learning and Teaching (OLT). This was a collaborative project with five tertiary institutions participating.

References

Adobor, H., & Daneshfar, A. 2006. Management simulations: Determining their effectiveness. ***Journal of Management Development***, 25(2): 151-168.

Anaya, G. 1999. College impact on student learning: Comparing the use of self-reported gains, standardized test scores, and college grades. ***Research in Higher Education***, 40(5): 499-526.

Anderson, J. R. 2005. The Relationship Between Student Perceptions of Team Dynamics and Simulation Game Outcomes: An Individual-Level Analysis. ***Journal of Education for Business***, 81(2): 85-90.

Anderson, P. H., & Lawton, L. 2009. Business simulations and cognitive learning: Developments, desires, and future directions. ***Simulation & Gaming***, 40(2): 193-216.

Arbaugh, J. B., & Benbunan-Finch, R. 2006. An investigation of epistemological and social dimensions of teaching in online learning environments. ***Academy of Management Learning & Education***, 5(4), 435-447.

Arias, J. J., & Walker, D. M. 2004. Additional evidence on the relationship between class size and student performance. ***The Journal of Economic Education***, 35(4), 311-329.

Arias-Aranda, D. 2007. Simulating reality for teaching strategic management. ***Innovations in Education and Teaching Internationa****l*, 44(3): 273-286.

Australian Qualifications Framework Council. 2013. ***Australian Qualifications Framework*** (Second Edition). Adelaide: Australian Qualifications Framework Council.

Batista, I.V.C., & Cornachione, E.B. 2005. Learning styles influences on satisfaction and perceived learning: Analysis of an online business game. ***Developments in Business Simulation & Experiential Learning***, *32*(22-30).

Beaubien, J. M., & Baker, D. P. 2004. The use of simulation for training teamwork skills in health care: how low can you go? ***Quality and safety in health care***, *13*(suppl 1), i51-i56.

Benckendorff, P., Lohmann, G., Pratt, M., Reynolds, P., Strickland, P., & Whitelaw, P. 2015. ***Enhancing Student Learning Outcomes with Simulation-based Pedagogies: Final Report 2015***. Sydney: Australian Government Office for Learning and Teaching.

Bloom, B. S., Englehart, M. D., Furst, E. D., Hill, W. H., & Krathwohl, D. R. 1959. ***Taxonomy of Educational Objectives: The classification of educational goals. Handbook 1: The cognitive domain***. New York: David McKay.

Bowman, N. A. 2010. Can 1st-year college students accurately report their learning and development? ***American Educational Research Journal***, 47(2): 466-496.

Brandon D. P., & Hollingshead A. B. 1999. Collaborative learning and computer-supported groups. ***Communication Education***, 48(2): 109-126.

Braun, V., & Clarke, V. 2006. Using thematic analysis in psychology. ***Qualitative Research in Psychology***, 3(2): 77-101.

Bridgstock, R. 2009. The graduate attributes we've overlooked: Enhancing graduate employability through career management skills. ***Higher Education Research & Development***, 28(1): 31-44.

Brown J.S., Collins A., & Duguid P. 1989. Situated cognition and the culture of learning. ***Educational Researcher***, 18(1): 32-42.

Chakravorty, S. S., & Franza, R. M. 2005. Enhancing cross-functional decision making: A simulation approach. ***Decision Sciences Journal of Innovative Education***, 3(2): 331-337.

Chaparro-Peláez, J., Iglesias-Pradas, S., Pascual-Miguel, F.J., & Hernández-García, Á. 2013. Factors affecting perceived learning of engineering students in problem based learning supported by business simulation. ***Interactive Learning Environments***, 21(3): 244-262.

Chasteen, L. 2016. Simulations for strategy courses: Measuring teamwork. ***Developments in Business Simulation and Experiential Learning***, 43(1): 141-146.

Clark, R. 2007. Microsimulations: bridging the theory and practice in the composition of practicum. ***Simulation & Gaming***, 8(3): 352-61.

Clarke, E. 2009. Learning outcomes from business simulation exercises: Challenges for the implementation of learning technologies. ***Education & Training***, 51(5/6), 448-459.

Ceschi, A., Dorofeeva, K., & Sartori, R. 2014. Studying teamwork and team climate by using a business simulation: How communication and innovation can improve group learning and decision-making performance. ***European Journal of Training and Development***, 38(3): 211-230.

Creswell, J. W. 2002. ***Research Design: Qualitative, quantitative, and mixed methods approaches*** (2nd ed). Thousand Oaks, CA: Sage.

Coffey, B. S. & Anderson, S. E. 2006. The students' view of a business simulation: Perceived value of the learning experience. ***Journal of Strategic Management Education***, 3: 151-168.

Devitt, A., Brady, M., Lamest, M., Dalton, G., Newman, N., & Gomez, S. 2015. Serious games in marketing education: Developing higher order cognitive skills through collaboration in a simulation game. ***INTED2015 Proceedings***, 6340-6349.

DIISRTE. 2013. ***Core skills for Work Developmental Framework***. Canberra: Commonwealth of Australia.

Dillenbourg, P., Järvelä, S., & Fischer, F. 2009. The evolution of research on computer-supported collaborative learning. In N. Balacheff, S. Ludvigsen, T. Jong, A. Lazonder, & S. Barnes (Eds.), **Technology-Enhanced Learning:** 3-19. New York: Springer.

Dimitropoulos, K., Manitsaris, A., & Mavridis, I. 2008. Building virtual reality environments for distance education on the web: a case study in medical education. ***International Journal of Social Sciences***, 2(1): 62-70.

Drake R., Goldsmith G., & Strachan R. 2006. A novel approach to teaching teamwork. ***Teaching in Higher Education***, 11(1): 33-46.

Douglas, A., Miller, B., Kwansa, F., & Cummings, P. 2008. Students' perceptions of the usefulness of a virtual simulation in post-secondary hospitality education, ***Journal of Teaching in Travel & Tourism***, 7(3): 1-19.

Douglass, J. A., Thomson, G., & Zhao, C. M. 2012. The learning outcomes race: The value of self-reported gains in large research universities. ***Higher Education***, 64(3): 317-335.

Duque, L. C. (2014). A framework for analysing higher education performance: Students' satisfaction, perceived learning outcomes, and dropout intentions. ***Total Quality Management & Business Excellence***, 25(1-2), 1-21.

Duque, L. C., & Weeks, J. R. 2010. Towards a model and methodology for assessing student learning outcomes and satisfaction. ***Quality Assurance in Education***, 18(2), 84-105.

Economics Learning Standards Working Party. 2013. ***Economics Learning Standards for Australian Higher Education***. Sydney: Australian Government Office for Learning and Teaching.

Edelheim J., & Ueda D. 2007. Effective use of simulations in hospitality management education - A case study. ***Journal of Hospitality, Leisure, Sport and Tourism Education***, 6(1): 18-28.

Faria, A. J., Hutchinson, D., Wellington, W. J., & Gold, S. 2009. Developments in business gaming a review of the past 40 years. ***Simulation & Gaming***, 40(4), 464-487.

Feinstein, A.H., Mann, S., & Corsun, D.L. 2002. Charting the experiential territory: Clarifying definitions and uses of computer simulation, games, and role play. ***Journal of Management Development***, 21(10): 732-744.

Finance Learning Standards Working Party 2014. ***Academic Learning Standards for Finance in the Australian Higher Education Context***. Canberra: Australian Business Deans Council.

Fripp, J. 1997. A future for business simulations? ***Journal of European Industrial Training***, 21(4): 138-142.

Fu, F.-L., Chou, H.-G. & Yu, S.-C. 2007. Activate interaction relationships between students acceptance behavior and e-learning. In G. Dong, X. Lin, W. Wang, Y. Yang, and J. Xu Yu (Eds), **Joint 9th Asia-Pacific Web Conference and 8th International Conference on Web-Age Information Management**: 670–677.

Gefen, D., Rigdon, E.E., & Straub, D. 2011. An Update and Extension to SEM Guidelines for Administrative and Social Science Research. ***MIS Quarterly,*** 35(2): iii-xiv.

Gerbing, D. W., & Anderson, J. C. 1988. An updated paradigm for scale development incorporating unidimensionality and its assessment. ***Journal of Marketing Research***, *25*, 186-192.

Giroux, H. A. 2010. Bare pedagogy and the scourge of neoliberalism: Rethinking higher education as a democratic public sphere. ***The Educational Forum***, 74(3): 184-196.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. 2009. ***Multivariate data analysis: with readings*** (7th ed.). New York: Prentice-Hall.

Hansen, R. S. 2006. Benefits and problems with student teams: Suggestions for improving team projects. ***Journal of Education for Business***, 82(1), 11-19.

Huang, H.-M., Rauch, U., & Liaw, S.-S. 2010. Investigating learners' attitudes toward virtual reality learning environments: Based on a constructivist approach. ***Computers & Education***, 55(3): 1171-1182.

Hurme, T.-R. 2010. ***Metacognition in group problem solving - A quest for socially share metacognition.*** University of Oulu, Finland.

Jensen, K. O. 2003. Business games as strategic team-learning environments in telecommunications. ***BT Technology Journal***, 21(2), 133-144.

Johnson, D. W., Johnson R. T., & Smith K. A. 1998. Cooperative learning returns to college what evidence is there that it works? ***Change: The Magazine of Higher Learning***, 30(4): 26-35.

Kendall, K. W., & Harrington, R. J. 2003. Strategic management education incorporating written or simulation cases: An empirical test. ***Journal of Hospitality & Tourism Research***, *27*(2), 143-165

Keys, B., & Wolfe, J. 1990. The role of management games and simulations in education and research. ***Journal of Management***, 16(2): 307-336.

Koh, C., Tan, H. S., Tan, K. C., Fang, L., Fong, F. M., Kan, D., Lye, S. L. & Wee, M. L. 2010. Investigating the effect of 3D simulation based learning on the motivation and performance of engineering students. ***Journal of Engineering Education***, 99(3): 237-251.

Lamont, L. M. 2001. Enhancing student and team learning with interactive marketing simulations. ***Marketing Education Review***, 11(1): 45-55.

LaPointe, D. K., & Gunawardena, C. N. 2004. Developing, testing and refining of a model to understand the relationship between peer interaction and learning outcomes in computer-mediated conferencing. ***Distance Education***, 25(1): 83-106.

Laverie, D.A., Madhavaram, S., & McDonald, R.E. 2008. Developing a learning orientation: The role of team based active learning. ***Marketing Education Review***, 18(3): 37-52.

Learning and Teaching Academic Standards Project 2010. ***Learning and Teaching Academic Standards Statement for Accounting***. Sydney: Australian Learning and Teaching Council.

Leavitt, H. J. 1989. Educating our MBAs: On teaching what we haven't taught. ***California Management Review***, 31(3), 38-50.

Lo, C. C. 2010. Student learning and student satisfaction in an interactive classroom. ***The Journal of General Education***, 59(4): 238-263.

Marketing Learning Outcomes Working Party. 2012. ***Academic Learning Standards for Marketing in the Australian Higher Education Context***. Canberra: Australian Business Deans Council.

Martin, D., & McEvoy, B. 2003. Business simulations: A balanced approach to tourism education. ***International Journal of Contemporary Hospitality Management***, 15(6), 336-339.

Martín-Pérez, V., Martín-Cruz, N., & Pérez-Santana, M. P. 2013. Learning teamwork knowledge, skills and abilities: Business simulation vs. case studies. ***International Journal of Management in Education***, 7(4), 376-392.

Michaelsen, L. K., Knight, A. B., & Fink, L. D. (eds.) 2002. *Team-based Learning: A transformative use of small groups*. Westport, CT: Praeger.

Mintzberg, H. 1996. Ten ideas designed to rile everyone who cares about management. ***Harvard Business Review***, 74(4), 61-67.

Ocker, R. J., & Yaverbaum, G. J. 2004. Collaborative learning environments: Exploring student attitudes and satisfaction in face-to-face and asynchronous computer conferencing settings. ***Journal of Interactive Learning Research***, 15(4): 427-448.

Palloff, R.M., & Pratt, K. 2005. ***Collaborating online: Learning together in community.*** San Fancisco: Josey-Bass.

Piaget, J. 1952. ***The origins of intelligence in children***. New York: International Universities Press.

Pike, G. R. 2011. Using college students' self-reported learning outcomes in scholarly research. ***New Directions for Institutional Research***, 2011(150), 41-58.

Pfeffer, J., & Fong, C. T. 2002. The end of business schools? Less success than meets the eye. ***Academy of Management Learning & Education***, 1(1), 78-95.

Porter, S. R. 2011. Do college student surveys have any validity? ***The Review of Higher Education***, 35(1), 45-76.

Proenca, T. 2009. Self-managed work teams: a lean or an autonomous teamwork model? ***International Journal of Human Resources Development and Management***, 9(1): 59-80.

Schumann, P. L., Anderson, P. H., Scott, T. W., & Lawton, L. 2001. A framework for evaluating simulations as educational tools. ***Developments in Business Simulation and Experiential Learning***, 28: 215-220.

Shapiro, M. J., Morey, J. C., Small, S. D., Langford, V., Kaylor, C. J., Jagminas, L., Suner, S., Salisbury, M. L., Simon, R. & Jay, G. D. 2004. Simulation based teamwork training for emergency department staff: does it improve clinical team performance when added to an existing didactic teamwork curriculum? ***Quality and Safety in Health Care***, 13(6), 417-421.

So, H.-J., & Brush, T.A. 2008. Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors, ***Computers & Education***, 51(1): 318-336.

Summers, G. J. 2004. Today's business simulation industry. ***Simulation & Gaming***, 35(2): 208-241.

Thibaut, J. W., & Kelley, H. H. 1959. ***The Social Psychology of Groups.*** New York: John Wiley & Sons, Inc

Teo, T., & Wong, S. L. 2013. Modeling key drivers of e-learning satisfaction among student teachers. ***Journal of Educational Computing Research***, *48*(1), 71-95.

Terenzini, P. T., Cabrera, A. F., Colbeck, C. L., Parente, J. M., & Bjorklund, S. A. 2001. Collaborative Learning vs. Lecture/Discussion: Students' Reported Learning Gains. ***Journal of Engineering Education***, 90(1): 123-130.

van Staalduinen, J.P. & de Freitas, S. 2011. A game-based learning framework: Linking game design and learning. In M. S. Khyne (Ed.). ***Learning to play: exploring the future of education with video games***: 1-37. New York: Peter Lang

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

Vygotsky, L. S. 1978. ***Mind in Society: The development of higher psychological processes***. Translated by A.R. Luria, M.M. Lopez-Morillas, Michael Cole and J. Wertsch. Cambridge, MA: Harvard University Press.

Washbush, J., & Gosen, J. J. 2001. An exploration of game-derived learning in total enterprise simulations. ***Simulation & Gaming***, 32(3): 281-296.

Whitelaw, P. A., Benckendorff, P., Gross, M., J., Mair, J., & Jose, P. 2015. ***Tourism, Hospitality & Events Learning and Teaching Academic Standards***. Melbourne, Vic: Victoria University.

Xu, Y., & Yang, Y. 2010. Student learning in business simulation: An empirical investigation. ***Journal of Education for Business***, 85(4): 223-228.

Zhu, C. 2012. Student satisfaction, performance, and knowledge construction in online collaborative learning. ***Journal of Educational Technology & Society***, 15(1): 127–136.

Appendix 1: Key quantitative measures

Construct	Item name	Statement	Retained Items
Teamwork	Teamwork1	The contributions of other team members assisted my understanding of the simulation	E, C
	Teamwork2	My team worked well together	E, C
	Teamwork3	My team actively exchanged ideas using online tools	E, C
	Teamwork4	My team interactions helped me to understand other points of view	E, C
	Teamwork5	I was able to learn new skills and knowledge from other members in my team	E, C
	Teamwork6	It was easy for the team to agree on important decisions	
	Teamwork7	Key decisions about our company were made by the entire team	E
	Teamwork8	I was comfortable sharing my ideas with my team	
	Teamwork9	Most of the time, members of my team asked each other for feedback on their work	E
	Teamwork10	Team members acknowledged the points of view of others	
	Teamwork11	There was a team leader who guided the simulation	
	Teamwork12	My team had regular meetings to evaluate our performance	E
	Teamwork13	My team performed well in the simulation	
	Teamwork14	My team was dedicated to the task	
	Teamwork15	The unique skills and talents of each team member was fully valued and utilized	E
	Teamwork16	Working as a team allowed me to work smarter, not harder	E
	Teamwork17	Competition between teams motivated me to spend more time on the simulation	
Learning	Outcomes1	Problem solving skills	E, C
	Outcomes2	Understanding of operations	E, C
	Outcomes3	Understanding of strategic management	E, C
	Outcomes4	Understanding of ‘real world’ problems faced by organizations	E, C
	Outcomes5	Planning skills	
	Outcomes6	Understanding of finance	E
	Outcomes7	Understanding of marketing	E
	Outcomes8	Understanding of staffing	E
	Outcomes9	Understanding of how the different departments of	

		an organization interact with each other	
	Outcomes10	Knowledge of key business terms, concepts and conventions	
	Outcomes11	Ability to apply my knowledge to a business	
	Outcomes12	Ability to analyze data	
	Outcomes13	Ability to evaluate problems and make decisions	
	Outcomes14	Ability to create new ideas or plans	
Satisfaction	Enjoy1	I enjoyed learning with the simulation	E, C
	Enjoy2	I am satisfied with the online software application used for the simulation	E, C
	Enjoy3	Overall, I am satisfied with the simulation as a learning tool	E, C
	Enjoy4	Overall, the simulation has met my expectations	E, C
	Enjoy5	The simulation was challenging	
	Enjoy6	The simulation made the course more interesting	
	Enjoy7	The simulation allowed me to build on knowledge gained from previous courses	
	Enjoy8	The simulation allowed me to learn from my mistakes through trial and error	
	Enjoy9	I feel I am more ‘work ready’ after using the simulation	
	Enjoy10	The skills and knowledge learnt during the simulation will be useful for my future career	E
	Enjoy11	Overall, I learned a lot from the simulation	E

Note: E = retained after Exploratory Factor Analysis; C = retained after Confirmatory Factor Analysis.

Table 1. Team-based Threshold Learning Outcomes (TLOs) for business-related fields in Australia

Field	Domain	Descriptor
Accounting	Communication and Teamwork	Justify and communicate accounting advice and ideas in straightforward **collaborative** contexts involving both accountants and non-accountants
Finance	Communication and Teamwork	Present and justify, orally and in writing, financial information and decisions in straightforward **collaborative** contexts involving specialist and non-specialist audiences
Economics	Communication	Present a clear and coherent exposition of economic knowledge, ideas and empirical evidence both orally and in writing, individually or in **collaborative** contexts.
Marketing	Communication	Effectively communicate straightforward marketing ideas in selected personal and **group** contexts.
Tourism	Collaboration	**Work together** with key stakeholders to acquire and convey knowledge and ideas effectively to achieve shared goals in unambiguous contexts.

Sources: Learning and Teaching Academic Standards Project (2010); Economics Learning Standards Working Party (2013); Finance Learning Standards Working Party (2014); Marketing Learning Outcomes Working Party (2012); Whitelaw, Benckendorff, Gross, Mair, & Jose (2015).

Table 2: Profile of Respondents

Demographic Characteristics	No.	Percentage
Gender (n=356)		
Female	238	66.9%
Male	118	33.1%
Age groups (n=346; mean = 23.9)		
19 to 21 years	76	22.0%
22 to 24 years	177	51.2%
25 to 30 years	77	22.3%
Over 30 years	16	4.6%
Nationality (n=365)		
Hong Kong	88	24.1%
China	81	22.2%
Australia	72	19.7%
South Korea	27	7.4%
Japan	10	2.7%
Malaysia	10	2.7%
Vietnam	10	2.7%
Other	67	18.4%
Student Characteristics		
Studying part-time	26	7.1%
Studying externally	27	7.4%
Non-English speaking background	199	54.5%
Working part-time	154	42.2%
Working full-time	32	8.8%
Year Level (n=350)		
First year	50	14.3%
Second year	26	7.4%
Final year	223	63.7%
Postgraduate	51	14.6%
Simulation Used (n=365)		
HOTS	237	64.9%
IDLE	60	16.4%
Airline Online	28	7.7%
Ramsden	25	6.8%
RevSim	15	4.1%