Online Business Simulations
PEDAGOGY | ASSESSMENT | LEARNING

Online Business Simulations
Good Practice Guide

bizsims.edu.au

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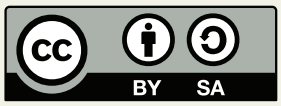

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List of acronyms

ABBREVIATION	FULL TEXT
ABDC	Australian Business Deans Council
ABSEL	Association for Business Simulation and Experiential Learning
ACEN	Australian Collaborative Education Network
ALTC	Australian Learning and Teaching Council
AQF	Australian Qualifications Framework
ASCILITE	Australian Society for Computers in Learning and Tertiary Education
CAUTHE	Council for Australasian Tourism and Hospitality Educators
Griffith	Griffith University
HE	Higher Education
HERDSA	Higher Education Research and Development Society of Australasia
HOTS	Hotel Operations, Tactics and Strategy
LTU	La Trobe University
OLT	Australian Government Office for Learning and Teaching
PBL	Problem-Based Learning
RWD	Responsive Web Design
TAFE	Technical and Further Education
TE	Tertiary Education
TEQSA	Tertiary Education Quality Standards Agency
TLO	Threshold Learning Outcome
UniSA	University of South Australia
UOW	University of Wollongong
UQ	The University of Queensland
UTS	University of Technology, Sydney
VET	Vocational Education and Training
VU	Victoria University
WAI	William Angliss Institute
WIL	Work Integrated Learning

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01 Project overview

1.1 Context and rationale

Enrolments in business fields such as management, marketing, accounting, finance, tourism and hospitality have expanded dramatically over the past decade. This growth has largely been due to the popularity of these programs among international students. However, this popularity has resulted in large class sizes, creating challenges for skills development. As a result, peak industry organisations such as the Business Council of Australia have expressed concern about the employability skills of business graduates. Business education has a strong vocational and technical history. Most business disciplines have emerged from pragmatic and utilitarian traditions that have emphasised workforce skills as the cornerstone of economic competitiveness. It has been argued that this emphasis on graduate capabilities requires a reframing of teaching practices to obtain desired learning outcomes (Biggs, 1999).

There is evidence that technology enhanced learning may help overcome some of the challenges faced by business education (Karakaya, Ainscough, & Chopoorian, 2001). Emerging learning technologies have created new opportunities for educators to create student-centred learning environments that foster the development of graduate capabilities. The evolving use of Information and Communication Technologies (ICTs) in teaching and learning "raises a whole series of questions ranging from the appropriateness of the 'chalk and talk' paradigm, through the role of assessment, to the need to cater for different learning styles" (Holmes, Tangney, FitzGibbon, Savage, & Meehan, 2001, p1). In particular, 'gamification' and the use of simulations have received recent attention in a number of fields.

Online simulations provide experiential learning environments that replicate workplace tasks or processes to allow students to practise relevant knowledge and skills. They allow learners to apply critical thinking and decision making skills in a non-linear environment in which decisions and actions often lead to complex and unexpected outcomes (Bowness, 2004).

Simulations are especially useful as a learning tool because they model aspects of reality in a safe environment, allowing learners to make errors that do not have real repercussions (Adobor & Daneshfar, 2006). In larger classes simulations offer a number of advantages over other experiential learning approaches because they provide automated and simultaneous feedback, enhance learner engagement and encourage productive teamwork (Edelheim & Ueda, 2007; Feinstein, Mann, & Corsun, 2002; Fripp, 1997).

Given these benefits, it is not surprising that a several open-source and commercial 'off-the-shelf' online simulations are available to educators. Some universities have also invested resources to create their own business simulations. However, before this project there was little understanding of the effectiveness of pedagogies and learning outcomes associated with simulations as a form of technology enhanced learning in business. A key observation is that previous studies have generally focused on single units and cohorts. Many are based on small samples focussed on one stakeholder group (such as students). Furthermore, many studies are nothing more than descriptive accounts of course design and assessment. It is also clear that very few studies have examined the teamwork aspects of simulations, although the work by Roberts (1999) on team formation and composition is one exception. Much of the earlier research is also focused on computer simulations installed on local machines rather than simulations that are accessed online.

Douglas, Miller, Kwansa and Cummings (2008) identified a lack of information and guidance for educators regarding the most effective pedagogic approaches for embedding simulations in the curriculum. Past ALTC/OLT projects focusing on the use of simulations and serious gaming in the health sciences and the built environment have had limited transferability to a business education context. This project was designed to specifically address a lack of knowledge about the use of online simulations in business and related fields by identifying how business educators could most effectively use online simulations to enhance graduate capabilities.

1.2 Project aims

The **purpose** of this project was to evaluate and promote pedagogies that enhance the learning outcomes of online business simulations. The **aims** of the project were to:

1. Map the features and characteristics of online business simulations;

2. Assess the challenges associated with the integration of online simulations into sustainable teaching practice in business education;

3. Evaluate the contribution of online simulations and related pedagogies to student learning outcomes; and

Figure 1: From left, Project Team Members Gui Lohmann, Paul Whitelaw, Paul Reynolds, Pierre Benckendorff, Marlene Pratt, Paul Strickland and Lainie Groundwater.

4. Identify and promote innovative pedagogies and strategies associated with the use of online business simulations in universities.

1.3 Project scope

Although there are many types of online simulations, including online virtual environments such as *SecondLife*, the scope of this project was limited specifically to business simulations that encourage learners to analyse the interrelationships between the various dimensions of an organisation. The project was concerned with innovative pedagogies that enhance the effectiveness of online simulations in universities. The role of simulations in linking theory with practice in a business context was also a focus of this project.

1.4 Project deliverables

In line with the project aims, the project **deliverables** included the following:

1. A simulation learning barometer for benchmarking the learning outcomes of online business simulations.

2. A dedicated **project website** (www.bizsims.edu.au) to provide resources for educators, including a good practice guide and an online multimedia toolkit of case studies, video vignettes, assessment and evaluation tools.

3. A series of **national forums** to disseminate and promote the findings of the project.

4. Reports and academic papers analysing the use of online business simulations based on:
- **a.** An **audit** of commercial and open access online simulations in business education;
- **b. Interviews** with experienced business educators to identify intended goals, learning strategies, challenges and innovative pedagogies associated with simulations;
- **c. Interviews** with senior policy makers and resource managers to understand the institutional priorities and challenges regarding simulations in curriculum design; and
- **d.** A series of **student surveys** assessing the learning outcomes of online simulations and related pedagogies at several universities.

1.5 Project approach

The project consisted of a multi-method approach divided into seven overlapping stages:

1. Project Initialisation (December 2013-April 2014): The first stage in this project involved the appointment of a Project Manager, implementation of a project management system, multi-institutional agreements, ethics applications, project branding, appointment of a reference panel and evaluation panel, and the development of an evaluation framework.

2. Literature Review and Audit (January-February 2014): A comprehensive review of the literature was conducted to identify key issues, measurement approaches and variables. This was followed by a desktop audit of existing business simulations.

3. Simulation Learning Barometer (January-June 2014): A Simulation Learning Barometer was developed from the literature and the findings of the project.

4. Data Collection (July 2014-June 2015): Data were collected from several stakeholders. Focus groups were conducted with students at two institutions. The Simulations Learning Barometer was deployed in 2014 and 2015 to collect data about the learning outcomes and team dynamics of simulation-based pedagogies. Interviews were also conducted with educators and senior university managers.

5. Design of Online Toolkit (August 2014-June 2015): Information from the previous stages was used to design the online multimedia toolkit that included a good practice guide, case studies, learning materials, assessment and evaluation tools for educators.

6. National Forums (November 2014-March 2015): A series of national forums were held with business educators in Adelaide, Brisbane, Melbourne and Sydney. A webinar was also held in March 2015 to reach a wider audience.

7. Project Finalisation (March 2015-June 2015): The final stages of the project included the completion of the final project report and planning for post-project activities.

1.6 Using this guide

This good practice guide has been designed as a resource for educators and learning designers wishing to improve or adopt simulation-based pedagogy. The guide is supported by several case studies developed as part of the Online Business Simulations project. These case studies can be accessed on the companion site at www.bizsims.edu.au. The case studies of simulations provide many ideas for pedagogy and assessment. Each case describes the key features, background, learning aims, pedagogy, assessment, resourcing and learning outcomes of simulations that have been successfully adopted in a range of business units. The cases include examples of commercial simulations as well as custom built simulations. Cases are drawn from a range of universities and private education providers and include undergraduate and postgraduate units. Many of the cases also include teaching materials such as syllabuses, assessment tasks and marking rubrics. Each case is accompanied by a YouTube video to enhance engagement with the content. Table 1 provides a summary of each of the case studies available online.

In this guide we refer often to students as **learners** because not all simulation-based training occurs in a formal educational environment. Similarly, we have used the term **educators** as a more inclusive way to refer to academics, lecturers, teachers and trainers. To avoid confusion arising from the different nomenclature used by institutions and training providers we use the term **unit** to refer to a semester length learning experience and the term **program** to refer to an entire degree or qualification. Lastly, the term **simulation provider** is used to describe the companies and organisations that design and provide simulations for business education.

Table 1: Introducing the case studies

SIMULATION	EDUCATOR(S)	FIELD	CLASS SIZE	LEVEL
AIRLINE Online	Pierre Benckendorff *The University of Queensland* Gui Lohmann *Griffith University*	Transport & Aviation Management	20-40	Postgraduate
CAPSIM Capstone	Sandy Barker *University of South Australia*	Strategic Management	36	Undergraduate
Ethics-LX	Robyn Davidson *University of Adelaide*	Ethics	200+	Undergraduate
Harvard Business Simulation	Srinivas Phan SP Jain School of Global	Organisational Behaviour, Leadership	100	Postgraduate
HOTS	Marlene Pratt *Griffith University*	Hotel Service Operations Management	150+	Undergraduate Capstone
HOTS	Paul Strickland *La Trobe University*	Hospitality Management	80+	Undergraduate
IDLE*	Belinda Gibbons *University of Wollongong*	Corporate Social Responsibility	1000+	Undergraduate
Ramsden*	Paul Reynolds *University of South Australia*	Human Resource Management	20-30	Undergraduate
RevSim	Paul Whitelaw *William Angliss Institute*	Revenue Management	80+	Undergraduate
STARLab*	Kevin Tant *Monash University*	Banking & Finance	70+	Postgraduate
StratSimMarketing StratSimManagement	Carl Driesener *University of South Australia*	Marketing	300	Undergraduate
XB	Elyssebeth Leigh *University of Wollongong*	Organisational Behaviour	20-40	Postgraduate

* Bespoke simulations

02 Understanding online business simulations

2.1 What are simulations?

A simulation can be defined as "an exercise involving reality of function in an artificial environment, a case study, but with the participants inside" (Thavikulwat, 2009, p. 243). Essentially, simulations are a **representation of reality**. Simulations can be used to introduce or reinforce concepts by providing a simplification of reality that facilitates the exploration of different scenarios and outcomes (Douglas et al., 2008). Computer simulations, virtual worlds, games, the use of cards and role playing are all forms of simulations that can encourage and engage learners to learn by doing (Edelheim & Ueda, 2007).

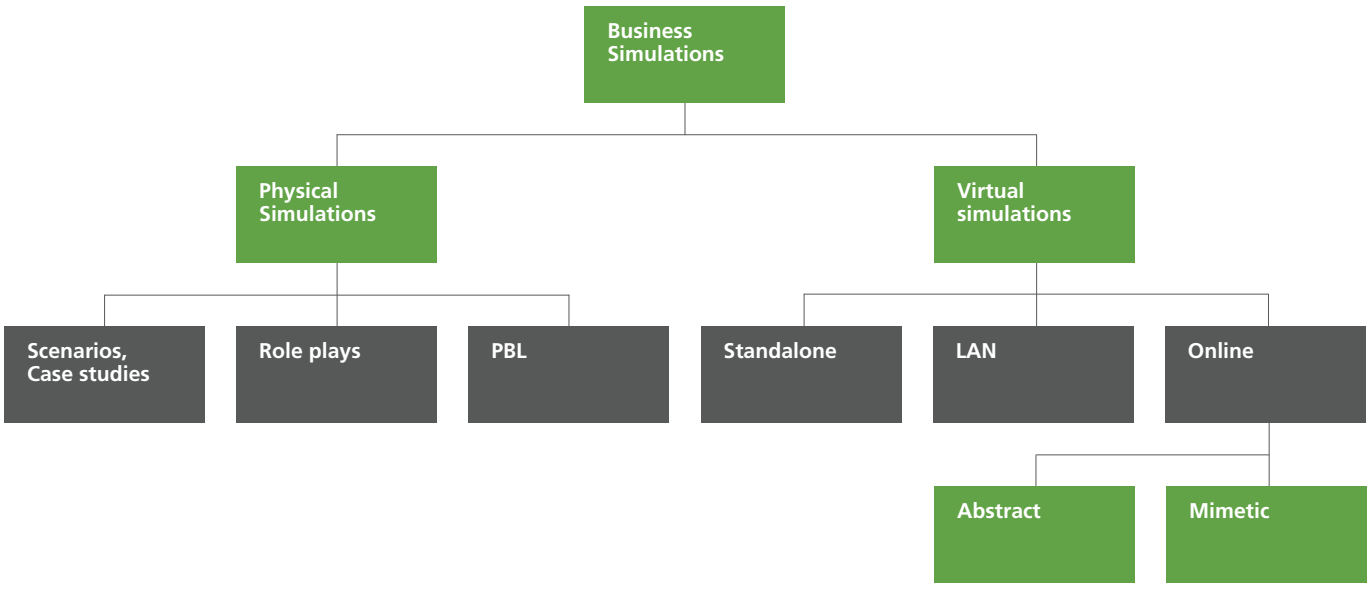
2.2 What are online business simulations?

For the purposes of this guide, online business simulations are defined as complex simulations designed to teach strategy, competitive analysis, finance, marketing, HRM, cross-functional alignment, and the selection of tactics to build a successful business. Figure 2 provides a simple typology of simulations.

Business simulations are not a new teaching and learning tool. **Physical simulations** such as cases, scenarios and role plays have been used for many decades. **Virtual simulations** have been used since the 1970s to help students learn about various aspects of business. However these early simulations were clearly limited by the technology of the time. The sophistication of business simulations has advanced with the development of more powerful computers. Early simulations required **stand-alone** installation on a fixed desktop computer (usually located at the educational institution). Later developments allowed for a simulation to be hosted on a **local area network (LANs)**, supporting greater interactivity between users but usually still limiting learning to on campus facilities (Thavikulwat, 2009). In the past decade technological advances have allowed these simulations to make the leap **online**.

The OLT simulations project audit of online business simulations identified two types of online business simulations. The first category includes **abstract** simulations that use mathematical processes to simulate a phenomenon and support decision-making. Inputs are typically provided using text boxes and drop down menus and outcomes are usually presented in the form of various performance metrics (e.g. profit, satisfaction, balanced score cards). Examples include Capsim, Markstrat, HOTS and AIRLINEOnline. The second category includes **mimetic** simulations because they immerse learners in highly visual and interactive environments that heighten cognitive and affective

Figure 2. A simple typology of online business simulations



engagement. These simulations tend to be more narrative focused and are more likely to be represented as three-dimensional virtual learning environments. Examples include Ethics-LX, VirBELA, GoVentureWorld.

The most widely used online business simulations are commercial products that require users to pay a licensing fee to access the simulation. These simulations are by no means homogenous. Various simulations exist to serve different learning outcomes. Thavikulwat (2009) concluded that business gaming simulations can be classified by discipline (e.g. accounting, finance, marketing, strategy, entrepreneurship), industry (e.g. automotive, banking, telecommunications, hotels, airlines), scope (functional, total enterprise, and total economy), difficulty (simple and complex) and dependence (independent and dependent across firms). Total-enterprise simulations that focus on several organisational functions appear to be the most common in business education. Students typically work in teams to plan and manage a business that competes against other student businesses.

2.3 Why use online business simulations?

The theoretical basis for using simulations is positioned around four well-known conceptual frameworks:

1. Simulations draw on the **constructivist** education paradigm wherein learners participate to construct knowledge and understanding from their experiences (Boulos, Maramba, & Wheeler, 2006). Learning through simulations enables students to learn by manipulating artefacts, analysing information, making choices, and systematically generating and testing their ideas (Lainema & Makkonen, 2003).

2. Simulations can also be used as a tool **for problem-based learning (PBL)**. This pedagogical approach reverses the normal order of presentation and presents participants with a problem which they have to solve through the application of concepts and knowledge (Anderson & Lawton, 2009).

3. The use of simulations supports an **experiential learning** paradigm and can be described by Kolb's model (Kolb, 1984), which suggests that learning involves a continuous four step process of experimentation, experience, observation and conceptualisation.

4. Simulations pedagogy is informed by recent work on **authentic learning** in digital environments. Simulations have the potential to work as an effective substitute for real experiential contexts by providing students with an authentic learning environment. The authentic learning design framework developed by Herrington, Reeves, and Oliver (2010) provides a useful model for aligning learner needs, pedagogy and assessment in authentic online learning environments.

It is important to acknowledge that simulations are learning tools. They are one of many tools in the business educator's toolkit and it is important to select the best tool for the task. This analogy illustrates that like all learning tools, simulations have advantages and disadvantages.

ADVANTAGES OF SIMULATIONS

Many educators have written about the advantages of business simulations in general, and this project has uncovered a few more advantages related specifically to simulations offered online. Advantages for learners include:

- **Availability**: Online simulations are available 24/7 and can be accessed on a wide range of devices connected to the internet.

- **Realism**: Simulations provide more realistic scenarios than other common approaches to business education (e.g. case studies and lectures). They allow learners to apply critical thinking and decision making skills in a non-linear environment in which decisions and actions often lead to complex and unexpected outcomes (Bowness, 2004). Online simulations are especially useful as a learning tool because they model aspects of reality in a safe environment, allowing learners to make errors that do not have real repercussions (Adobor & Daneshfar, 2006).

- **Engagement**: Simulations can be 'fun', providing participants with enthusiasm and motivation to actively learn (Biggs, 1999; Feinstein et al., 2002; Fripp, 1993, 1997). Simulations provide students with increased interactivity and enjoyment, as well as variety in teaching modes (Penfold, 2009).

- **Graduate capabilities**: Unlike conventional classroom teaching, simulations are very effective in developing graduate capabilities identified in the Australian Qualifications Framework (AQF) and the threshold learning outcomes
(TLOs) developed for various business fields. This project found that students perceived high levels of learning across all levels of Bloom's taxonomy, but simulations were particularly useful for developing high order skills such as analysis, evaluation and creation. Most simulations allow students to practise their managerial decision making and problem solving skills. Business simulations can enhance the quantitative analysis skills of learners because they often require working with numeric data, calculating outputs and understanding the relationship between decisions and financial results (Fawcett, 2002; Toomey, Priestly, Norman, & O'Mahony, 1998). Some simulations can also develop communication and negotiation skills (Fawcett, 1996; Gopinath & Sawyer, 1999), conflict-resolution skills (Ruohomaki, 1995), the ability to cope with diverse personalities (Roberts, 1999), adaptability and behavioural change (Jennings, 2002).

- **Application and integration**: Simulations are particularly effective in helping learners to integrate and apply business knowledge and skills. In many simulations students need to use their critical thinking and problem solving skills to make sense of how individual business departments and operations impact on each other. This feature means that simulations are often very compatible with the aims of capstone units in business. As the recent OLT project on business capstones (**businesscapstones.edu.au**) illustrates, capstone simulations can be useful because they look both backwards and forwards. They look backwards by helping learners to make connections between the knowledge and experiences they have gained during their university studies and they look forwards by fostering the transition to employment (Bailey, van Acker, & Fyffe, 2012).

- **Continuous feedback**: The objective performance metrics produced by simulations allow learners to evaluate and learn from the outcomes of their decisions (Edelheim & Ueda, 2007; Tompson & Dass, 2000). One of our interviewees stated: *"They get to see, pretty immediately, the impact of their decisions, so there's no waiting around for the system to mark traditional assignments and get back to them weeks later. So I think they enjoy the immediacy of the impact."*

- **Teamwork**: Although much of the simulation learning experience involves human-computer interaction, this project has reinforced past research reporting that simulations provide an excellent context for authentic team-based learning, particularly when students from different business areas are required to work together (Ferreira, 1997; Roberts, 1999).

There are also advantages for educators and institutions:

- **Technical support**: Most commercial business simulations are hosted on the simulation provider's servers. This removes the need for a great deal of technical work associated with the installation, support and maintenance of software. Although technical issues can still happen, they are greatly reduced.

- **Continuous feedback**: While this is an obvious advantage for learners, the performance metrics produced by the simulation also takes some pressure off the educator by automating feedback. Simulations do not remove the need for educator feedback completely, but they do provide a continuous and objective stream of feedback.

- **Student satisfaction**: Most educators who were interviewed for this project reported very positive student evaluations. Most students enjoy the simulation experience and this usually results in high student evaluations.

Many variables impact on how well a unit achieves its aims, so finding an objective measure of effectiveness can be difficult. However, in our interviews educators spoke of the positive feedback they received from students. Many were passionate about the learning benefits of simulations, as the following quotes illustrate:

> *"The feedback we get from students is they find it hard, they struggle, but ultimately they learn a lot and they really seem to enjoy it. Even if they don't do particularly well, they all sort of report back to say yes, I learnt a lot. It was very complex and hard but gee, it really did facilitate my learning in the subject.*

> *I've had anecdotal reports from alumni saying … 'Wow, the stuff I learnt in the simulation was really like the business I'm now in, and I'm making the same sorts of decisions about the same kind of things.'*

> *What I found quite interesting about the simulation, because it was so applied and hands-on, you would get students who had not necessarily got good grades who would really come alive and get a lot out of it and get a really good grade for the unit and you'd get students who previously had been academically very gifted and done very well but could not deal with the ambiguities.*

> *I think the best aspect is that it does help them integrate their learning very quickly, it gives them the experience of running a general company over a period of weeks. They learn a lot very, very quickly and it just seems to add hugely to student enjoyment of the unit."*

As digital learning technologies continue to advance, there is increased potential for educators to create a more interactive and student-centred learning environment.

DISADVANTAGES OF SIMULATIONS

Simulations also have their limitations, which are generally related to their reality, validity and complexity, as well as the difficulty in gauging learning progress. Some disadvantages for learners include:

- **Simplicity**: Although the realism of simulations is often promoted as an advantage, simulations can never achieve true reality, regardless of their complexity. Some simulations lack validity because they cannot replicate complex business situations. As a result, participants can be misled, resulting in the development of unrealistic behaviours based on a false perception of reality (Edelheim & Ueda, 2007).

- **Steep learning curve**: Learners often find the initial set-up and orientation to simulations to be the most challenging (Penfold, 2009). The following quote from an educator illustrates this point: "*Students always have that very messy beginning to a simulation where nobody knows what they're doing and no-one understands and the students get a bit panicked at that stage, particularly the international students.*

But after two or three rounds they're fine and we just tell them just cope with the pain". The role of the educator as a facilitator is critical to the success of virtual learning (Bradshaw, 2006).

- **Learning styles**: Not all learners will find digital simulations a comfortable way to learn (Penfold, 2009). Some simulations are not user friendly and may be unrealistic or faulty, resulting in limited learning opportunities for students (Douglas et al., 2008; Galea, 2001; Starkey & Blake, 2001).

- **Time management**: Unlike many other assessment tasks where students can get away with cramming, simulations require sustained engagement across a longer time period. There is a risk that the gameplay and competitive nature of simulations will result in students spending too much time on the simulation at the expense of assessment tasks in other units.

Challenges for educators include:

- **Support and resourcing**: Often digital simulations are plagued with limitations and technical issues, including a lack of resources and support (Antonacci & Modaress, 2005). While this is less likely to be an issue with online simulations, funding is needed to cover the cost of licensing a commercial product or developing a bespoke simulation. In addition, some simulation providers provide excellent technical support while others provide mediocre customer service. It is especially important to be aware that educators located in Australia may not always receive immediate technical support from companies located in North America or Europe.

- **Professional development**: In order to support the learning experience educators, tutors and teaching assistants need to be very familiar with the simulation, technical requirements and common issues learners might face. Professional development extends beyond the simulation because the role of the educator changes from an instructor to a facilitator. This requires a willingness to learn about and trial new pedagogies and assessment techniques.

- **Learning spaces**: Many of the pedagogies that are best suited to simulations require learning spaces that differ from traditional classrooms. Traditional computer laboratories will sometimes suffice but collaborative learning spaces that allow students to work together in teams around visual monitors are ideal settings for learning with simulations. Another challenge associated with learning spaces is the use of inflexible timetabling rules. Simulations often require different teaching modes and contact hours to the two-hour lecture and one-hour tutorial format traditionally used in business education.

- **Scalability**: Although simulations are more scalable than many other pedagogies, large classes still need to be supported appropriately. In Australia, online business simulations have been used with very small cohorts of less than 10 students through to very large capstone units of several thousand students. Large classes require additional support in the form of assistants and tutors to assist teams in the early stages of the simulation, as the following educator quote illustrates: "*Basically I've got a technician who I work with because it's a very complex simulation and there's got to be a lot of back end settings. There's got to be a setting so that certain things occur … So people, what they see at the front end and the actual delivery part doesn't seem all that complicated, but if they had have seen what's required to run it for 3,000 students for a year and successfully manage that, it's a significant undertaking … and if you don't do it properly, it ends up in a complete and utter shambles.*"

- **Sustainability**: Most of the educators interviewed for this project used their own initiative to introduce a simulation to their unit. Often when educators move on there is an incentive for new staff to drop the simulation due to a lack of interest, time and resources.

Some of the identified challenges and limitations can be overcome by increasing familiarity through training and promotion. Throughout this guide, we provide many ideas and tips for overcoming these challenges.

2.4 Framework for simulation-based pedagogy

This guide is organised around the five key elements identified through the course of our project and presented in our 'Framework for Simulation-based Pedagogy' (see Figure 3).

The framework focuses on learning outcomes, adoption, pedagogy, assessment and evaluation of online business simulations.

1. **Learning outcomes:** Learning outcomes should drive the adoption of a simulation. Simulations are particularly effective in helping learners to integrate and apply business knowledge and skills developed across a range of earlier units. Our findings also indicate that simulations allow students to practise analysis, evaluation, creation and collaboration skills (see Chapter 3).

2. **Simulation adoption:** Simulation-based pedagogies require tactful management of institutional constraints and a champion is often needed to promote and sustain this teaching and learning approach. Active engagement with supportive program directors, senior managers and decisions makers is a necessity. The background and needs of students should also be considered. This guide and the companion website attempts to address the complex landscape of online business simulations by providing an online toolkit to support educator adoption and implementation (see Chapter 4).

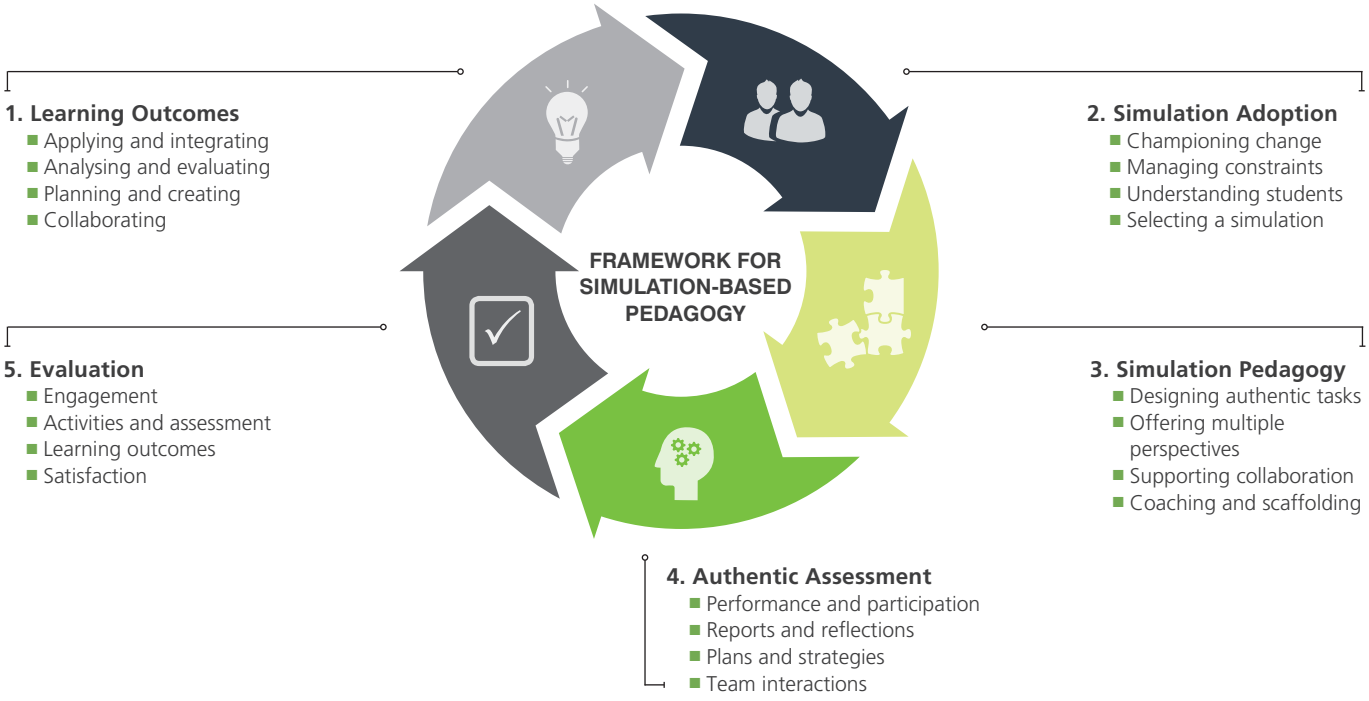
3. **Pedagogy**: Key suggestions for pedagogy include the use of non-traditional pedagogy that incorporates authentic learning tasks and activities, providing learners with opportunities to experience multiple perspectives, supporting collaboration and coaching and scaffolding learning. This includes clarifying time and teamwork expectations for students, providing resources that enhance learning, and designing activities that extend and link the simulation to real contexts (see Chapter 5).

4. **Assessment:** The development of higher order graduate capabilities can be encouraged by designing authentic assessment tasks that require students to practice these capabilities. Common methods include assessing team interaction; using reports and presentations to communicate proposals, strategic plans, company performance and competitor analyses; asking students to reflect on their learning experience; or requiring students to complete a viva. A key issue is the need to ensure that the assessment design does not result in over-assessing students. It is suggested that assessment tasks are grouped into a series of smaller interrelated, sequential, staged or nested tasks rather than larger discrete assessment tasks (see Chapter 6).

5. **Evaluation:** The project has developed a Simulation Learning Barometer for benchmarking and evaluating student engagement, learning activities and assessment, team dynamics, learning outcomes, and satisfaction (see Chapter 7).

KEY OUTCOMES

Figure 3: Framework for Simulation-based pedagogy



03 Learning outcomes

3.1 What are learning outcomes?

Learning outcomes describe what a student is expected to know and to be able to do by the end of a simulation-based unit. Unit learning outcomes are informed by several reference points, including the Australian Qualifications Framework (AQF) course level descriptors for knowledge, skills and application; discipline teaching and learning academic standards (LTAS) and program-level objectives. Unit learning outcomes serve several purposes. First, they communicate to learners what they should be able to do upon successful completion of a unit. Second, they indicate to learners what they may be expected to demonstrate in assignments and examinations. Third, they can help educators to design and align curriculum, pedagogy and assessment methods.

It is clear from the literature, interviews with educators and feedback from students that learning outcomes should drive the adoption of a simulation. With this in mind it is important to appreciate that simulations are not always the best tool for achieving unit learning outcomes. Educators must consider whether other pedagogic approaches are likely to be more appropriate for achieving learning outcomes.

3.2 Simulation learning outcomes

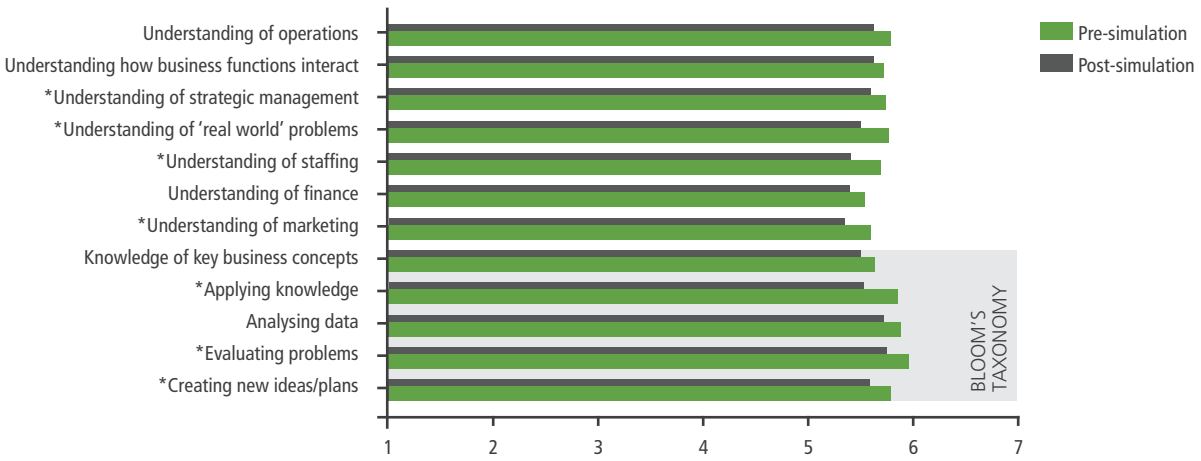
The educator interviews and student survey responses suggest that simulations are particularly effective in advanced units where the learning outcomes require learners to **work in a team** to **integrate** and **apply** business knowledge and skills developed across a range of earlier units. The Simulation Learning Barometer measured student expectations and perceptions about learning outcomes before and after completing a simulation. Our analysis highlights three interesting findings. First, pre-simulation expectations about knowledge and skills outcomes were higher than post-simulation learning outcomes (see Figure 4). This finding indicates that learners are likely to have elevated expectations of learning outcomes and it is important to focus on managing these expectations at the start of the semester.

A second key finding is that perceived learning outcomes for both business knowledge and skills were high across all business fields and levels of Bloom's taxonomy. In our focus groups and open-ended responses learners talked about the practical skills they gained, how they felt more confident about entering the workforce, and how the simulation experience made them more employable. Comments such as the following were common from learners:

> *"The simulation allowed me to develop academic skills such as writing, critical thinking and problem solving; and also other essential course related skills. For instance, forecasting skills, number of staff needed, pricing strategies … and also other skills such as teamwork skills, communication skills."*

> *"I learnt a variety of skills from the simulation including where to find and enter relevant data, monitor business performance and implement changes."*

Figure 4: Student perceptions of learning outcomes 1 = Strongly Disagree … 7 = Strongly Agree; *differences are significant at p=0.05



"I learnt just how much each department depends on the success of other departments. Also how the performance of the business will differ if one element is not successful."

The third finding is that learners had high expectations about developing their teamwork skills before completing the simulation and post-simulation evaluations indicated that these expectations were met. As Figure 5 shows, attitudes after the learning experience surpassed expectations about the importance of teamwork and the development of teamwork skills.

Responses from learners about the teamwork aspects of simulations were similarly effusive, as the following quotes illustrate:

"It was a good teamwork activity as everyone was made to work together yet we had our own responsibilities."

"I believe the stimulation helped us all work very well as a team. We all wanted to achieve good results so we would work together and contribute ideas and give each other feedback."

"I have learnt it is important to stay on track with your team, ensure that you understand what your task is, and that communication is very important for a group to prevail."

"I have learnt to take responsibility and respect others. Every one of us had a role which we had to contribute to the team by communicating with each other."

3.3 Developing learning outcomes for simulations

When developing learning outcomes for simulation-based units it is important to focus foremost on what a student should know and be able to do and these knowledge and skills can be evidenced through assessment. This requires a shift in attention from the content or curriculum aspects of a unit towards student attainment. Therefore, effective learning outcomes often start with verbs that explain what learners should be able to do on successful completion of the unit.

Bloom's taxonomy of educational objectives provides one useful framework for identifying verbs that can be used in learning outcomes (Bloom, Englehart, Furst, Hill, & Krathwohl, 1959). There are six levels in the taxonomy, moving through lowest order processes such as remembering and understanding to higher order processes such as analysis and creation. Table 2 provides an updated version of the taxonomy (Anderson & Krathwohl, 2001).

Following Biggs' (1999) principle of constructive alignment, the learning outcomes associated with simulation are

Figure 5. Student perceptions of simulations and teamwork 1 = Strongly Disagree … 7 = Strongly Agree

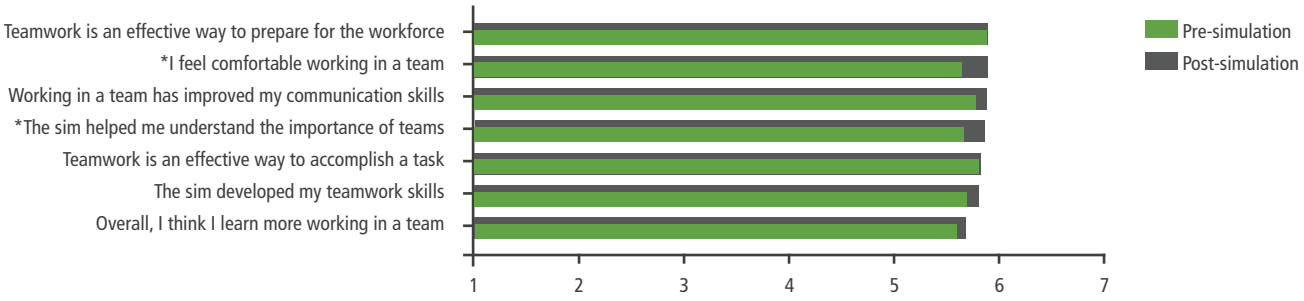


Table 2: Key verbs for cognitive learning domains in Bloom's taxonomy

DOMAIN	VERBS
Remember	define, describe, draw, find, identify, label, list, match, name, quote, recall, recite, tell, write
Understand	classify, compare, exemplify, conclude, demonstrate, discuss, explain, identify, illustrate, interpret, paraphrase, predict, report
Apply	apply, change, choose, compute, dramatise, implement, interview, prepare, produce, role play, select, show, transfer, use
Analyse	analyse, characterise, classify, compare, contrast, debate, deconstruct, deduce, differentiate, discriminate, distinguish, examine, organise, outline, relate, research, separate, structure
Evaluate	appraise, argue, assess, choose, conclude, critique, decide, evaluate, judge, justify, predict, prioritise, prove, rank, rate, select, monitor
Create	construct, design, develop, generate, hypothesise, invent, plan, produce, compose, create, make, perform, plan, produce

often supported by assessment tasks that require students to use higher order skills such as analysis, evaluation, creation and collaboration. Ideas for assessment tasks that achieve these outcomes will be explored in Chapter 6, but examples of learning outcomes from our case studies are shown in Table 3.

3.4 Summary

By way of summary, we would like to highlight that the learning outcomes associated with business simulations have a great deal in common with the outcomes identified in the OLT business capstones project (Bailey et al., 2012). Like capstones, simulations provide learners with an opportunity to:

1. **Integrate** the knowledge they have gained and to see how it all fits together.
2. **Consolidate** the key skills they will require in their professional lives, including:
   - the ability to collaborate and work effectively in a team;
   - the capacity to communicate effectively; and
   - the ability to think critically and to reconcile theory with practice.
3. **Apply** their knowledge in exploring an issue or solving an authentic problem, in a way that simulates professional practice.
4. **Reflect** on and evaluate their actions and experiences, to equip them to be reflective practitioners and citizens.
5. **Develop** their professional identity and confidence to participate in the workforce.

Table 3: Examples of learning outcomes in simulation-based units using Bloom's taxonomy

DOMAIN	EXAMPLES
Remember	• Demonstrate **knowledge** of the dynamics of working both within a team and a system. • Demonstrate **knowledge** of the principles and underlying concepts that define strategic aviation management.
Understand	• Acquire an **understanding** of the theoretical foundations of operational issues and revenue management within a hotel and service environment. • **Comprehend** strategic decision making and the need for rational approaches. • Demonstrate a deep **understanding** of theoretical principles that underpin the complexities of commercial practice. • Demonstrate an **understanding** of the use of specified information and communication technologies. • **Interpret** financial data and make decisions based on this information. • **Understand** strategic positioning and sustaining a market presence.
Apply	• **Apply** a wide range of innovative commercial practices as they construct and are constructed by intercultural values and identities in societies. • Demonstrate an understanding of and an ability to **apply** theories or tools to the hospitality sector through problem solving. • Demonstrate and **apply** the principles and ethical underpinnings of corporate governance best practice in a globalised environment.
Analyse	• **Analyse** data from a range of sources to make strategic decisions about the design, logistics and delivery of transport services for visitors. • Demonstrate the capacity to **problem solve** and effectively work in multidisciplinary contexts.
Evaluate	• Critically **evaluate** and analyse the impact of decisions within business strategy, marketing and sales, finance, operations and human resource management on the financial operations of a hotel. • **Evaluate** the role and importance of revenue management in hospitality, tourism and events.
Create	• **Create** and modify dealing strategies in the treasury dealing room. • **Develop** a marketing strategy including a SWOT and ETOP analysis. • **Develop** and organise the front office and back office functions of a simulated bank's treasury dealing room. • **Develop** corporate strategies and know the differences between a business level plan and a corporate plan including how they might be applied depending on the business model. • **Make** business decisions in a team environment. • **Plan** analytical procedures including demand analysis, forecasting, pricing, and revenue optimisation. • **Plan**, organise, analyse, justify and report on positions taken in the treasury dealing room. • **Plan**, verify and settle transactions completed in the simulated treasury dealing room.

04 Simulation adoption

Adopting and implementing a simulation poses significant challenges. Key considerations include:

- Unit and program learning outcomes
- Championing change
- Managing constraints
- Understanding students
- Selecting a simulation
- DIY simulations

Learning outcomes are discussed extensively in the previous chapter but the other considerations are reviewed below.

4.1 Championing change

Adopting and sustaining a simulation requires a commitment from senior managers, program directors and enthusiastic educators on the ground. Our interviews with educators who have successfully introduced simulation and our experience with the diffusion of technology suggests that front line educators need to be actively involved in not just adopting the technology but also championing it. On the other hand, without engaged and proactive support from program directors and senior management any developments in a new pedagogy are unlikely to grow and be adopted more widely in the institution. In fact, they are more likely to wither and die from lack of institutional support. The introduction of a simulation requires careful co-ordination between senior managers who set policy and provide resources and front line educators.

We know from our interviews that educators are often required to justify the additional resources required to either develop a simulation or adopt a commercial product. Several justifications can be used to create momentum for the adoption of a simulation. These include:

1. Student feedback highlighting a lack of integration, application or practical experience.

2. Quality assurance processes (e.g. program reviews, accreditation, evidencing TLOs) that require the institution to provide evidence of learning outcomes.

3. Resource pressures may justify the use of simulations as a less costly substitute for field trips and Work Integrated Learning (WIL) opportunities.

4. Broader goals for technology-enhanced learning and blended learning can also provide a useful justification in some institutional contexts.

5. The argument that simulations produce better graduates that in turn raise the reputation of the institution has also been used and evidence from the literature and our project can be used to support this claim.

4.2 Managing constraints

There are several institutional constraints related to the adoption and maintenance of a simulation. The first and most obvious issue is **funding**. Commercial simulations are not free and bespoke simulations require time and funding to develop. Given that simulations are often required for assessment, and given Australian legislation regarding incidental costs, most institutions are not able to pass the cost of a simulation on to students. This usually means that the institution must cover the cost. This is not dissimilar to the issues associated with buying case studies in most business schools.

Our audit of simulations revealed that a range of **pricing structures** were evident. Some simulation providers charged a license fee per student while others provided an option for a site license. Some providers charge a one-off setup fee, while others charge a setup fee for each cohort. In some cases technical support packages may also be charged separately. Additional charges may also be applied for optional modules or assessment and testing modules. However, as one of our interviewees noted:

> *"You would think that cost is the overall issue. But once you break down the cost on a per student basis, off-the-shelf business simulations are really affordable. The companies that own the software cannot afford not to be competitive so they have to make their product affordable or no one would use them."*

Many institutions provide internal **teaching and learning grants** to support the introduction of innovative pedagogies. These can be helpful in the first instance, but the **sustainability** of using and resourcing a simulation in the longer term is a second major consideration. In this context, the ongoing commitment and support of program directors and senior managers is critical, as we have noted above. The **expertise** of the educator and tutors are essential to the success of the delivery and learning outcomes. Educators require an intimate knowledge of how the simulation functions

and its capabilities. Large units can have in excess of ten tutors who must all be well trained in the simulation, as the following educator quote illustrates:

> *"This is a very complex simulation, it's very intensive on the tutors. We expect our tutors to at least do a tutorial about the simulation so they can answer basic questions, but even that is hard. Unless you actually play a couple of rounds of the simulation you don't really come to grips with it very well."*

Simulations represent a steep learning curve for most educators and a **succession plan** is needed to ensure that other educators are able to step in to facilitate the simulation when the original adopters are not available. The use of a **team teaching** approach would provide a more resilient model in this context.

A third resourcing issue is the availability of **technology** and **teaching spaces**. The online nature of business simulations means that students can often use their own devices to access the simulation but reliable wifi zones are a necessary pre-requisite. Learning is also greatly enhanced by access to **collaborative learning spaces** where students can work in teams around the simulation displayed onto a large screen.

Most Australian universities are able to offer these spaces but sometimes access is competitive and **timetabling** issues can create problems. Some institutions insist on two-hour lectures and one-hour tutorials and this is not helpful as our project confirmed that many simulations-based units usually do not use this pattern of engagement. There are examples of simulations being used in very large business capstones of more than 1000 students but these **large classes** generate additional challenges for timetabling and teaching spaces. Different infrastructure is also needed for students studying externally, including **virtual meeting spaces** and opportunities to interact with the educator. Overcoming some of these challenges requires working with leaders such as program directors, deans and associate deans (teaching and learning) who are willing to advocate on behalf of frontline educators.

4.3 Understanding students

The characteristics of the students studying the unit will influence the type of simulation that is adopted. Key considerations include:

- **Class size**: Some simulations are more scalable than others. Simulation providers that offer high quality 'how-to' guides and videos for learners as well as ideas and learning resources for educators can alleviate some of the workload associated with supporting large numbers of students.

- **Diversity**: Teaching a class of mainly Australian students is quite different to teaching a class made up of students from many nationalities. One of our project workshops generated some discussion about the North American focus of some simulations. The implication is that these simulations use business language with a US orientation and make assumptions about accounting practices, economic conditions and marketing traditions that do not always translate well to a more diverse international audience.

- **Disciplinary background**: Some of our case studies include reasonably homogenous student cohorts studying the same degree program or major, while others include capstone units with students from many majors (e.g. accounting, marketing, economics, logistics, human resource management, tourism, hospitality). Classes with students from many disciplinary backgrounds lend themselves to simulations where students need to work together across different areas of business (e.g. Capsim). Conversely, several simulations are available for more homogenous cohorts (e.g. Markstrat for marketing students, HOTS for hospitality management and AIRLINE Online for aviation management).

- **Year level**: Although simulations are often used as an integrating tool towards the end of a degree program, some simulations specialise in providing less complex simulations for foundation units. Simulations range in complexity and some can be customised (see below) to ensure that the learning experience matches the capabilities of students.

- **Prior learning**: If the simulation is used as a capstone experience it is helpful to find out what knowledge and skills students have, or should have, when they enrol in the simulation unit. Knowledge and skills deficits may only become apparent after running the simulation for the first time. It may be beneficial to conduct diagnostic work early in the unit as a way of revealing knowledge and skill gaps.

4.4 Selecting a simulation

There are a bewildering array of simulations and deciding which simulation to adopt is a major consideration. As far as we are aware, our online toolkit is the only non-commercial site that provides a comprehensive listing of the range of online business simulations available to educators. There are a several important considerations when selecting the most suitable simulation.

- **Chronology**: The representation of time is approached differently in various simulations. Thavikulwat (2004) proposes a three-dimensional framework that includes scaling (how time is segmented), synchronisation (synchronised and unsynchronised interactions) and

drive (how time is driven, i.e. administrator driven, participant driven, clock driven, activity driven). Most simulations require students to solve problems, implement decisions and analyse the results of these decisions through a series of 'cycles' until the simulation is concluded. The outcomes of decisions are reported to students using various performance metrics (e.g. financial data, balanced score cards, employee and customer satisfaction) at the conclusion of each cycle. Only a small number of simulations allow students to make decisions and view outcomes in real time.

- **Disciplinarity**: Most online business simulations require students to consider and integrate a range of business areas (e.g. Capsim) but some simulations focus on specific areas of business such as marketing (e.g. Markstrat), accounting and finance (e.g. Mt Nebo Pumpkins, GoVenture Accounting). The 'enterprise-wide' simulations are better suited to capstone courses but sometimes individual modules in these simulations can lack the sophistication found in more targeted simulations.

- **Collaboration**: Online business simulations are better suited to learners working in teams to run a business, although a small number are designed for individual use. Before adopting a simulation it is important to consider whether teamwork is an important learning outcome for your unit.

- **Industry focus**: A wide variety of sectors are represented, including manufacturing (e.g. CAPSIM), retail (e.g. Mike's Bikes) and service businesses (e.g. HOTS, AIRLINE Online). The industry focus provides the learning context and specific industries may be more desirable for particular degree programs and cohorts of students.

- **Interface**: As noted in Chapter 2, online business simulations can offer abstract or mimetic representations of the business environment. Most simulation interfaces are menu-driven and data oriented. Students enter decisions using dropdown boxes and text boxes. Very few online business simulations offer mimetic 3D virtual worlds. Furthermore, very few simulations are focussed on the development of personal capabilities such as interpersonal skills, ethics or corporate social responsibility (exceptions are VirBELA, IBMs INNOV8, GoVentureWorld, UOWs IDLE).

- **Customisation**: Most simulations allow the educator or administrator to control variables such as tax rates, interest rates etc. Some simulations can be further customised by automating or removing modules (e.g. marketing, human resources, sustainability). Some simulations (such as GoVenture CEO) are highly customisable and several simulation companies also offer bespoke services.

- **Competition**: Competition is a feature in many online business simulations. Businesses typically compete for market share in the same industry sector. In most cases it is also possible for the educator to establish their own business. This not only allows the educator to be more aware of events in the simulation, it also provides additional competitive pressure for resources and allows the educator to directly influence the environment and other businesses. Some simulations also allow artificial intelligence (AI) or computer-based businesses to compete with student businesses. This competition can be a powerful motivator for students but overly competitive behaviour can detract from the learning experience. Before adopting a simulation it is important to consider how this dynamic between teams will be managed.

- **Scale**: The scale of the simulation can refer to the geographic or economic scale of the simulation. Some simulations operate within a geographically constrained marketplace while others allow for student businesses to become multinational conglomerates. Economic scale refers to whether the simulation is limited to one organisation, one industry or interactions between many industries in an economy. Scale is an important consideration when determining how complex and realistic the simulation needs to be to achieve unit learning outcomes.

- **Starting mode**: Some simulations require students to plan and start a business from scratch, while others require all students to start with an existing scenario (i.e. an existing business facing a challenge, or an existing industry or economic scenario). Some simulations can be customised so that they allow for various starting scenarios. A preference for where students should start will also depend on the unit learning outcomes. If the emphasis is on planning, creating or developing a business then building a new business might be desirable. However, if the emphasis is on problem solving, analysis and evaluation then starting with a particular scenario or challenge might be more appropriate.

The diversity and ability to customise some simulations indicate that in many cases educators should be able to identify a simulation that is suitable for their context, rather than spending considerable resources developing a new simulation. We would encourage educators to create a shortlist of simulations that would appear to best achieve the learning outcomes for their unit and to collect more details by contacting each company with a specific list of questions regarding features, pricing and support.

4.5 Do It Yourself (DIY) Simulations

Developing a new bespoke simulation is a major undertaking but our case studies include several examples of successful approaches in three different fields. Two interviewees mentioned that they developed simulations specifically for their own courses

however the costs exceeded $100,000 and the DIY approach is not recommended for relatively small cohorts of students. The following quote from an educator also illustrates why many educators have opted for commercial simulations:

> *"Ideally we would love to develop one in house but the off the shelf ones are so good and so sophisticated that I'm not convinced that the cost benefit is there to develop your own in house at this stage of the game … I used to be a marketing manager for a software development company. I know how much it costs to develop up front, and also you have to make refinements to it later. You can't just develop it once … there is always some technical work that needs to be done, so there are ongoing costs as well."*

While our project was not focused on the development of new simulations, we did identify some areas that were not currently well served by commercially available simulations. Generally very few simulations offer real-time 3D virtual worlds. Most simulations are focussed on 'micro-worlds' (i.e. one company or industry sector) and few offer a 'macro-world' (i.e. many industries) perspective.

There is also scope to use simulations to develop interpersonal capabilities such ethics, corporate social responsibility, sustainability, negotiation and conflict resolution but very few simulations do this well. One exception is the IDLE simulation developed by the University of Wollongong. If these opportunities cannot be realised by commercial providers then there is a role for educational institutions to work together to develop new online simulations with these features. Developments in serious gaming and artificial intelligence offer promising new approaches for designing these simulations.

05 Simulation pedagogies

By now it should be apparent that simulation-based teaching and learning requires different approaches, activities and materials to traditional pedagogies. As we have discussed in section 2.3, there are a number of theoretical frameworks that can be used to understand simulation pedagogies. In this chapter we will use **authentic learning** as a framework to organise the ideas and tips that have emerged from our project (Herrington et al., 2010). Learning can take place in real settings or academic settings and can be decontextualized or authentic. As Figure 6 shows, simulations can be categorised as authentic tasks in academic settings.

Herrington et al. (2010) suggest nine key elements for authentic learning in digital environments:

1. Authentic contexts that reflect the way the knowledge will be used in real life
2. Authentic tasks and activities
3. Access to expert performances and the modelling of processes
4. Multiple roles and perspectives
5. Collaborative construction of knowledge
6. Reflection to enable abstractions to be formed
7. Articulation to enable tacit knowledge to be made explicit
8. Coaching and scaffolding by the teacher at critical times
9. Authentic assessment of learning within the tasks.

We will explore the first eight elements in this chapter. The authentic assessment aspect will be explored in Chapter 6. More detail about this framework can also be found at **www.authenticlearning.info**.

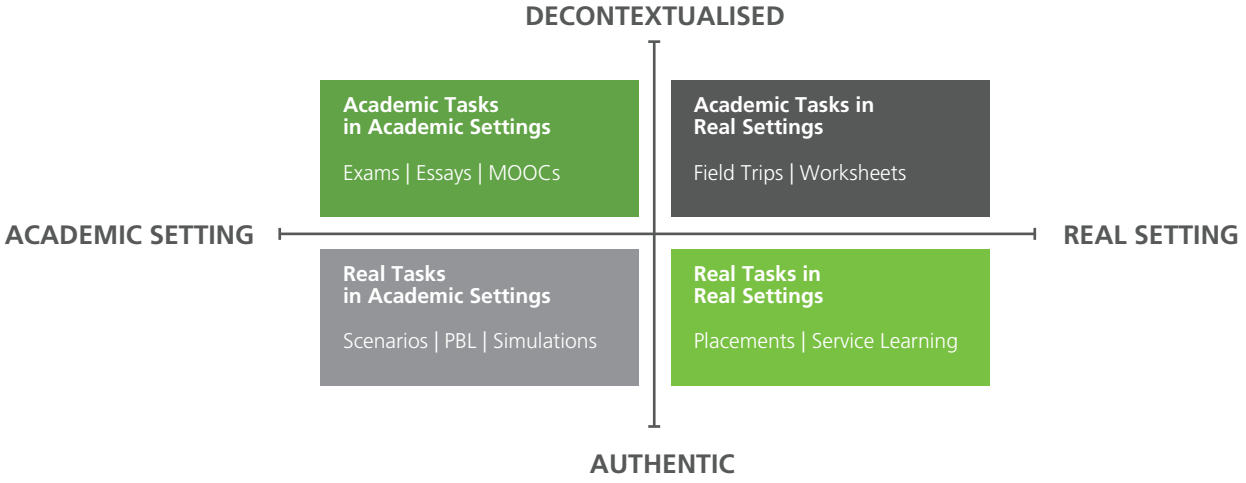
5.1 Authentic contexts

An authentic context requires pedagogy that preserves the complexity of real life settings. The simulation itself provides much of this context and careful consideration of the features discussed in the previous chapter is important. The context provided by the simulation must provide a setting where skills and knowledge can be applied. However, the pedagogy that surrounds the simulation can also add an authentic context. In our project, several case studies extended the learning context by creating a wider narrative of events impacting on the simulation through **newsletters** and **news broadcasts** (see AIRLINE Online and IDLE cases). The simulation can be extended into the classroom by connecting virtual events to content presented in the unit. For example, a weekly **debrief** session might consider the performance of different businesses in the simulation and student reflections about key events and outcomes.

5.2 Authentic tasks

Authentic tasks involve clear goals with real world relevance and the production (rather than reproduction) of knowledge. Task goals should be broadly defined rather than specific. For example, the goal when using the simulation might be to increase profitability or return on investment without providing step-by-step instructions. The choice of simulation will determine the authenticity of the tasks students must complete. The greatest challenge when designing authentic learning tasks is to ensure that students are supported without providing too

Figure 6: Authenticity matrix (Adapted from Herrington et al., 2010)



much help. This is because too much help can damage the authenticity of the learning experience.

The use of **scenarios** that impact on the simulation environment are an example of an authentic task. For example the educator might use a newsletter or news broadcast to communicate economic conditions such as oil prices or interest rates to learners. Learners must then apply their knowledge of economics to determine how these conditions will impact not only on their own business but also competing businesses so that they can develop a strategic response that will improve the performance of the business relative to competitors.

5.3 Expert performance

Expert performance provides learners with access to a variety of expert perspectives. This can be achieved in several ways when using simulations. One common technique is to invite industry speakers into the classroom to share their experiences at various points during the simulation. For example, an aviation management unit might include **industry speakers** from the airlines and local airport or a financial markets simulation might include stockbrokers or treasury representatives. A variation of this approach is to use industry members or alumni as **mentors** to support students teams. For smaller classes, **field trips** offer a complementary means to provide access to expert perspectives and real world contexts. Another idea involves the use of **industry panels** to act as 'shareholders' to judge business proposals or pitches at the start of the semester or to evaluate the performance of teams at the end of the semester. The following quote from one of our educator interviews illustrates the value of expert performance:

> *"One of the things I ended up doing with my unit is I had the ACCC come in every semester and give a talk about what you can and can't do in marketing. That started off because a student asked me: 'Can we do a deal with a competitor where we just run a sports car and they just run a family car and we don't compete with each other?' I said: 'Yeah, you can, but there are a few issues with doing that'. So then I asked around and the ACCC were quite happy to come in and run this lecture twice a year. So you can bring in some bodies like that to talk in your class as well, which really adds to the learning experience."*

Allowing different student teams to share their experiences in the classroom is another strategy for sharing expertise, although this can be more challenging to achieve when teams are competing with each other. In blended and external learning contexts learners can be directed to **videos** that extend their learning.

5.4 Multiple perspectives

Enterprise-wide simulations provide many opportunities for illustrating multiple perspectives about what makes a business successful. In many of our interviews educators described how at the start of the simulation students would arrive with the view that their discipline or major (e.g. marketing, accounting, HRM) was most important to the success of a business. By forming teams made up of **learners from different majors,** learners are exposed to the ideas of other disciplines. Each team member contributes a unique perspective. It does not take long for learners to realise that the success of a business depends on the interaction between financial, marketing, customer, staffing and other variables. Activities and assessment tasks that provide students with the time and space to reflect and learn from these multiple perspectives and interactions are essential.

Educators can also provide students with **learning resources** and **case studies** to illustrate the interaction between different parts of a business. Carefully selected case studies of real companies from clearing houses such as Harvard Business School Press and Ivey Publishing can provide real world illustrations of the processes and challenges students are facing in a simulation.

5.5 Collaboration

Although much of the simulation learning experience involves human-computer interaction, the findings demonstrate that simulations are an effective tool for **authentic team-based learning**. Simulations provide many opportunities for joint collaboration and effective pedagogy should be designed to provide social support. Team learning opportunities can be encouraged outside the simulation by using pedagogies such as **flipped classrooms** and **collaborative learning** techniques and readily available online collaborative tools such as wikis, Facebook pages and Skype. This collaborative environment does suggest that at least some of the assessment related to the simulation should be team-based (see Chapter 6).

A discussion of collaboration in simulations would not be complete without also mentioning **competition**. While collaboration between team members is often crucial to the success of virtual businesses, competition between teams can be a powerful motivator. This competition needs to be carefully managed to ensure it does not consume the experience. Learning activities should not only support and encourage collaboration within a team, but also foster an understanding of the dynamics of competition between teams. The following quote from one of our educator interviews illustrates this important point:

> *"As much as anything it's about giving students, particularly undergraduates, the experience of working and understanding how marketing fits inside of business in a competitive framework and also the experience of competing against other people. So students get used to the fact that it's not just about them, it's about the rest of the world as well impacting on their outcomes. So really it was that understanding of the competitive framework."*

5.6 Articulation

Articulation provides learners with opportunities to share their growing knowledge. As we have already noted above, activities such as **discussing** simulation experiences either with the whole class or within each team can support learning. More formal approaches, such as encouraging teams to **present** and **defend** a performance report or a competitor analysis in front of other students or a panel or industry experts are recommended. One of our forum participants reported using **memos** as a device for students to communicate and share events from the simulation. Digital alternatives include making **videos** to promote the company or regular **Twitter updates** of company performance. A collaborative **forum** or **discussion board** provides a different platform for learners to share their tips and ideas. The act of composing these messages will help students to make tacit knowledge more explicit, and encourages learners to make connections (Herrington et al, 2010).

5.7 Reflection

Reflection requires opportunities for learners to think about, reflect and discuss decisions. Simulations that rely on timing cycles rather than real-time settings are often more conducive to reflection because they provide an action learning cycle where learners make decisions, implement these decisions, review the outcomes and then reflect on how they can improve the performance of their business in the next cycle. This reflection can be supported by reflective assessment tasks such as diaries, journals or blogs completed throughout the simulation experience (see Chapter 6). Ideally students should receive feedback on these reflections throughout the simulation rather than after the simulation. This continuous reflection is important for ensuring that students can act on their reflections.

5.8 Coaching and scaffolding

In simulation-based pedagogies, the educator is often a **facilitator** rather than an instructor or transmitter of knowledge. This requires a different mindset for students and educators – one where the educator is a coach rather than an expert. This coaching role involves guiding students to generate their own solutions rather than providing direct answers, as the following educator quote illustrates:

> *"The big thing with the tutors is to get them out of the mode that we're going to teach somebody anything at all and that they actually facilitate. So they don't answer questions directly. The first few weeks they do, but after that, basically they just put it back onto the students all the time that they have to run this sim - this business, that's what they're there for."*

Students also need to be supported, particularly during the early stages of the simulation, as the following educator comment illustrates:

> *"What I found when I first started was the guy who was running it before was a bit of a 'throw them in the deep, cold deep end of the cold icy water' and if they swim, that's luck, if they don't that's bad luck, that's business. I don't think that's good education practice. I spend a lot of time in the first two to three weeks scaffolding students up so that they understand what's expected of them and how to do it."*

Sentiments such as these are not uncommon among educators using simulations, and the quote highlights the importance of facilitating and scaffolding student learning. Providing a **trial period** or practice round before the assessable part of the simulation commences supports students to explore and learn about the simulation environment. Students should be encouraged to experiment with the simulation without worrying about the consequences. The length of this trial period will depend on the mode of delivery but in typical semester long units a trial period of two to three weeks at the start of the semester is usually sufficient. It takes time to learn to use most simulations and learning can be supported through clear guidelines, manuals and videos. Often the simulation providers offer these resources but sometimes they need to be created by the educator.

Students also need to be supported by providing resources that can help them develop strategies for time management and collaboration. Simulations are different to many other learning experiences. Student **expectations** regarding assessment tasks, time commitment and teamwork should be clarified early. Unlike many other assessment tasks where students can get away with cramming, simulations require sustained engagement across a longer time period and it is important to guide students through an in class activity to help them appreciate this. There is also a risk that the gameplay and competitive nature of simulations will result in students spending too much time on the simulation at the expense of assessment tasks in other units. It is essential for educators to develop a sense of the amount of time required to participate in the simulation, either by playing alongside students or by trialling the simulation before adoption. It is then important to communicate clearly how much time students are expected to spend on the simulation as individuals and as a team.

A simulation-based unit typically requires more class contact time than traditional units. It is not unusual for content to be delivered **intensively** in the first half of a unit and to use the second half exclusively for the simulation to scaffold student learning. One strategy for dealing with the student workload generated by simulations is to reduce the workload associated with other aspects of the unit. This suggests that a unit should be redesigned with the simulation at the core so that class time and learning activities are centred on the simulation rather than introducing new content. As the recent OLT Business Capstones project (PP10-1646) recommends, a focus on the integration and application of knowledge rather than new content is particularly important when the simulation is used in a capstone unit (Bailey et al., 2012).

06 Simulation assessment

According to Bailey et al. (2012), alumni have ranked simulations as the third most useful final year assessment item (after work placements and presentations). The findings of our project clearly demonstrate that the most common learning outcomes from simulations are related to application, evaluation, analysis, creation and collaboration. Designing authentic assessment tasks that require students to evidence these outcomes can encourage deeper learning (Herrington & Herrington, 1998). The following sections present ideas for assessing simulation-based learning. We have used Bloom's taxonomy to arrange these ideas to illustrate the alignment between learning outcomes and assessment. We conclude by considering how the collaborative aspects of simulations can be assessed.

6.1 Remembering and Understanding

Remembering and understanding are not commonly assessed using simulation-based pedagogies, but some educators do prefer to test learner recall and understanding of key concepts and ideas. This can be useful if testing is followed up by in class activities where knowledge gaps and misconceptions are addressed before students are asked to apply their knowledge in a simulation. Many of our case studies indicate that **quizzes** and **tests** are typically used as assessment tasks to achieve this outcome. One approach that works particularly well with simulations is the use of a **Readiness Assurance Process (RAP)** that require students to respond to questions about key concepts prior to engaging with the simulation (Michaelsen, Knight, & Fink, 2002). Students first complete a short five to 15-minute quiz individually before completing the same test again with members of their team. This method both reinforces key concepts and supports team cohesion.

Another approach used by several of our interviewees is to require students to compete a short quiz to test their knowledge of the simulation itself (see example below). This can be presented as a test to gain their 'simulation license'

! EXAMPLE: HOTS Quiz

Students are required to review HOTS material and the HOTS Learning Guide for the three quizzes. The first two quizzes will be completed online during week 3 and 4 (5% each). The third quiz will be a closed book quiz during the tutorial in week 6 (10%). Each quiz will have multiple choice questions based on HOTS Learning Guide and lecture material.

Griffith University, HOTS Simulation

It should also be noted that in many instances lower order learning domains are not assessed directly because they are implicit in the achievement or higher order outcomes. In other words, it can be difficult for learners to apply, analyse, evaluate or create if they do not understand.

6.2 Applying

By their very nature, simulations require learners to apply what they have learned to produce successful outcomes. A key consideration is whether students should be assessed based on their performance in the simulation. As the literature highlights, there may be no link between learning and simulation participation or **performance metrics**. It is important to assess learning outcomes rather than inputs (e.g. time and effort spent on the simulation). For this reason some educators do not allocate any simulation participation or performance marks towards the final grade, while others allocate only a small percentage (typically 5-15%). Many simulations produce a variety of performance measures (such as profits, balanced score cards, return on investment, customer satisfaction, employee morale, and sustainability) and one approach is to ask learners to select which measures they wish to be evaluated on (see example). This provides learners with greater strategic flexibility when setting the goals for their business (i.e. some businesses may have a strong profit motive while others may wish to pursue a strong corporate social responsibility objective).

! EXAMPLE: Performance Measures

The simulation offers eight performance measures: 1. Cumulative Profit 2. Ending Market Share 3. Average ROS 4. Average Asset Turnover 5. Average ROA 6. Average ROE 7. Ending Stock Price 8. Ending Market Capitalization

Prioritize these measures by applying a weight between 0% and 40%. The percentages across all measures must add up to 100%. For example, you might set Profit to 30%, Market share to 20%, ROS to 10%, ROE to 10%, Stock price to 10%, and Market Capitalization to 20%. Given your measures, the simulation will score all teams to develop a winner by your criteria.

Given your company results at the end of Round 2, which FOUR performance measures will give your company the best possible score? You will need to determine the best percentage allocation for each of the four chosen success measures.

University of South Australia, CAPSIM Simulation

.6.3 Analysing and evaluating

Although analysis and evaluation is typically required in order to succeed in the simulation itself, these outcomes are usually assessed using other assessment tasks. These may be completed individually or in teams and can include **financial reports**, **evaluations of business performance**, **annual reports** or **competitor analysis**. These tasks can be presented as a written document or as an oral presentation to the class, a group of 'investors' or a 'board of directors'. Another approach used more commonly in medicine and applied health is to conduct individual **vivas** with students. Typically this involves the learner analysing or evaluating a scenario or problem to formulate a solution.

! EXAMPLE: Annual Report

Your team must prepare an Annual Company Report based on the performance of your airline in its first year. Annual reports are usually prepared by companies to update investors and other stakeholders about the organisation's operation and financial performance. Your annual report should focus on the performance of your airline over a one-year period.

You might find it useful to look at a few annual reports of existing real world airlines (e.g. Qantas, Singapore Airlines, Ryanair, Cathay Pacific etc.) before commencing this task. An investigation of a few real examples will indicate that there are many ways to organise an annual report and you are encouraged to develop your own structure. It is up to you and your team to prioritise and organise the content to optimise readability and as a result these guidelines do not suggest a standard structure to follow. However, your report should include a message from the CEO, industry & company overview, financial & operational performance, operating environment, external environment, competitor analysis, and future directions.

You may include other sections and information in our annual report but you should focus on accomplishments rather than activities. The report should summarise what you did as well as why you did it. What were the results? Why did you spend your time and money the way you did? What difference did it make? It is very important to refer to the goals presented in your proposal and to comment on whether these have been achieved by providing an overview of key performance measures and highlights.

The University of Queensland, AIRLINE Online Simulation

The importance of **reflective tasks** were discussed in Chapter 5 and our case studies illustrate that reflective assessment tasks such as blogs, journals or reflective essays are common. Reflective tasks allow students to evaluate their own decisions and performance. Reflective assessment tasks tend to be more successful if they are used throughout the simulation. Ideally students should receive feedback on these reflections throughout the simulation rather than after the simulation. This continuous reflection is important for ensuring that students can act on their reflections by returning to the simulation.

! EXAMPLE: Individual Reflection

The purpose of asking you to respond briefly is for you to reflect on your contribution and challenges experienced during the session. You are required write 600 words summarising these in regards to the following:

1. Key areas learnt throughout the session
2. How you will apply these areas in your future working life
3. A belief statement about how you feel the UN Global Compact Principles should effect business
4. Your thoughts on whether this subject helped shape these opinions

The individual reflection can be written in the first person.

University of Wollongong, IDLE Simulation

6.4 Creating

Tasks that require learners to create or develop **business plans**, **strategies** or **procedures** are common. For example, learners may be asked to develop a business plan, a marketing strategy or a proposal to solve a particular business scenario. These tasks can be submitted as written plans or as in class presentations or pitches. In smaller classes the presentation of business pitches to a Dragon's Den or panel of industry representatives can enhance student engagement.

! EXAMPLE: Business Pitch

This is a team assessment requiring you to present a short pitch for a new airline. The presentation must be short, concise and persuasive. You might find it useful to imagine you are presenting to a group of busy financial investors.

If you are recording the audio of your presentation, it is not necessary for each team member to present. In fact this will be difficult in the short time frame and considering we have external students involved. Other team members should contribute to the preparation of slides and content for the presentation.

Each airline will start with $100 million of capital and your proposals should focus on the first year of your airline. The content of your presentation must include the following:

- Propose a name for your airline
- What type of airline are you proposing? Regional, domestic or International? Full Service or Low Cost Carrier?
- The markets/segments you hope to attract. Who will you cater for?
- Key routes. Where will you fly to? What is the timeline for expanding your network over the first year?
- Identify performance targets for the first year of your airline. Growth targets may include passenger numbers, fleet size, profit, RASK, CASK, load factors or other performance measures included in the simulation.

Griffith University, AIRLINE Online Simulation

6.5 Collaborating

Most of the assessment tasks already discussed can be set as either individual or team tasks. Team interaction is typically measured using conventional **peer evaluation** techniques, online tools or alternately by assessing **videos**, **wikis** or **memos** of team interactions. Software such as SparkPLUS (www.spark.uts.edu.au) enables students to rank their own and team members' contributions to team projects. Teams can also be given a **scenario** to solve in a limited time and assessment can then be based on **observation**.

6.6 Assessment feedback

As we have noted throughout this guide, simulations produce copious amounts of automated feedback to help students reflect on the outcomes of the decisions. However, educator feedback should also be provided throughout the simulation.

Therefore progressive assessment tasks or an assessment structure that allows students to receive feedback on various tasks throughout the semester offers better learning opportunities than setting one large assessment task at the end of the simulation.

Our case studies at www.bizsims.edu.au provide many examples of assessment tasks and marking rubrics to help you introduce a simulation in your unit. A final note of caution: with all these assessment ideas it is easy to get carried away! Care is needed to ensure that students are not over-assessed. Assessment should be clearly linked to learning outcomes. The time students are required to commit to the simulation and the assessment should be considered in the overall assessment design. Assessment should be grouped into a series of smaller interrelated, sequential, staged or nested tasks rather than larger discrete assessment tasks.

07 Evaluating simulations

Implicit in our approach to this project is the need to continually evaluate whether the use of a simulation delivers the outcomes claimed by educators and students. To address the need for benchmarking and evaluation, the project has developed and shared a Simulation Learning Barometer for benchmarking and evaluating student engagement, learning outcomes, team dynamics and satisfaction (see Appendix A). It is recommended that this barometer be used alongside other feedback mechanisms such as student evaluations, focus groups and informal feedback.

The Simulation Learning Barometer is a benchmarking and monitoring device for measuring the impact of simulation-based pedagogies in business education. The barometer can also be used to monitor changes in learning outcomes following adjustments to pedagogy (e.g. assessment, learning resources). The barometer can be downloaded in various formats from www.bizsims.edu.au

7.1 Development of the Barometer

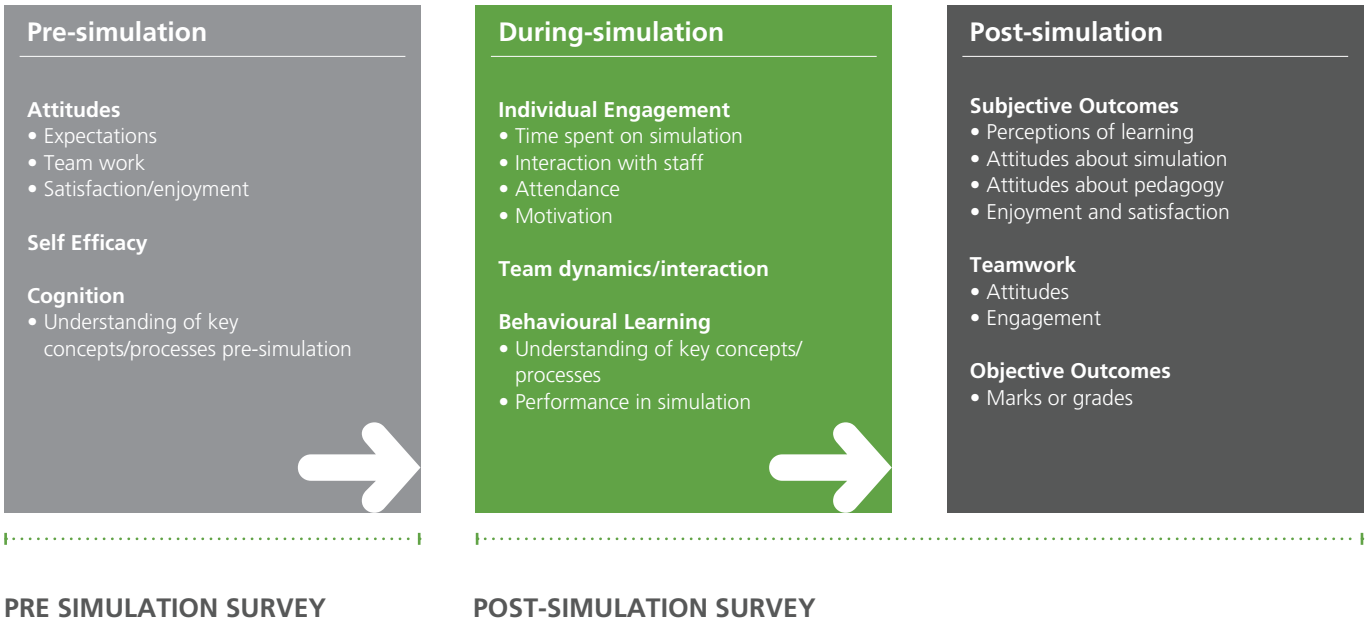
The development of the barometer included the following steps:

- Identification of key constructs and scales from the literature
- Development of a conceptual framework
- Development of survey questions and scales by the project team
- Student focus groups to refine survey items
- Pilot-testing of pre- and post-simulation surveys with a small cohort of students (25 respondents)
- Trial of pre- and post-simulation surveys with an undergraduate and postgraduate cohort, including open-ended question to capture additional constructs (200+ respondents).
- Statistical analysis to verify key constructs
- Feedback from the project reference panel

7.2 Format of the Simulation Learning Barometer

The Simulation Learning Barometer consists of a pre-simulation survey and a post-simulation survey, however some survey items would be suitable for use at regular intervals to monitor learning engagement and outcomes throughout a simulation. The post-simulation survey includes a number of items and takes about 20 minutes to complete. The barometer consists of a collection of items and educators can select only the items they wish to measure.

Figure 7: Key constructs measured by the Simulation Learning Barometer



7.3 Structure of the Simulation Learning Barometer

The barometer consists of pre-simulation and post-simulation surveys, which are used to determine changes in learning over the semester. This approach is encouraged and supported by other researchers (Cronan & Douglas, 2012; Foster, 2011; Hsu, 1989; Seethamraju, 2011). The barometer is built on the premise that the impact of simulations can be measured by monitoring different variables before, during and after the simulation (see Figure 7 on previous page).

PRE-SIMULATION

Antecedents to learning include attitudes about learning expectations, teamwork and enjoyment as well as self-efficacy (Ineson, Jung, Hains, & Kim, 2013). The barometer measures a number of these items using a set of self-reported rating scales developed from the literature, student focus groups and trial surveys.

Table 4: Pre-simulation survey items

CONSTRUCTS	MEASUREMENT
Expected learning outcomes	*Section 1: Learning from simulations* Q2 (items 1 to 9)
Bloom's Taxonomy	*Section 1: Learning from simulations* Q2 (items 10 to 14)
Expected enjoyment	*Section 1: Learning from simulations* Q3 (items 1 to 6)
Collaboration	*Section 2: Teamwork* Q4 (items 1 to 7)
Self-efficacy	*Section 3: Individual engagement* Q5 (items 1 to 9)
Demographics	*Section 4: About You* Q6 to Q14

The learning outcomes of simulations have been tested with cognitive measures, such as student grades, and with affective measures, such as student perceptions of learning and student satisfaction. The complexities of measuring learning outcomes have been acknowledged and attempts to measure the learning outcomes of simulations have resulted in mixed results (Anderson & Lawton, 2009; De Freitas & Jarvis, 2007; Keys & Wolfe, 1989). Initial research in the field assumed that simulation performance could be used as a proxy for learning but this has proved to be inaccurate (Batista & Cornachione, 2005). A meta-analysis of research on simulations found that of the 248 studies evaluated, only 32 could be included in the meta-analysis owing to methodological and reporting flaws (Vogel et al., 2006). The absence of a theoretical framework and lack of rigor in design have been identified as problems with previous efforts to measure the impact of simulations (Ruben, 1999; Wu, Chiou, Kao, Hu, & Huang, 2012). Finally, much of the research is conceptual rather than empirical (Feinstein & Parks, 2002), as is evident by the lack of empirical testing and measurement.

In evaluating simulations, very few studies have reported both subjective and objective measures (Anderson & Lawton, 2009; Cronan, Léger, Robert, Babin, & Charland, 2012). These are sometimes described as indirect or direct measures (Lo, 2010).

In the Simulation Learning Barometer objective measures will be captured through a problem-based scenario while behavioural learning will be measured through students' performance in the simulation. The problem-based scenario provides a baseline for the post-simulation survey but it will be necessary to adapt the scenario for different simulators. This item has not been included in the survey presented in the appendix because it will need to be customised for each stimulation but examples are available from www.bizsims.edu.au. Subjective measures will include self-reported expectations and perceptions of knowledge and skills acquired during the simulation (Batista & Cornachione, 2005). These skills are measured before the simulation by asking students what they expect to learn and this is then compared with perceptions of what they learned in the post-simulation survey.

DURING THE SIMULATION

Although these items relate to inputs and processes during the simulation they are measured at the end of the simulation using the post-simulation survey. Chaparro-Peláez et al. (2013) found three factors that affect students' perceived learning: satisfaction, time dedication, and collaborative learning. Online business simulations generally require students to work in teams to plan, coordinate and manage a virtual business. Students learn by developing knowledge and understanding from their experiences and interactions with others through a process of social constructivism (Boulos et al., 2006; Jonassen, Peck, & Wilson, 1999). Simulations provide fertile opportunities for constructivist learning because they provide multiple representations of reality, attempt to represent the natural complexity of the real world and attempt to replicate authentic tasks (Lainema & Makkonen, 2003). The learning barometer includes items designed to measure engagement and collaboration through teamwork. The problem-based case study used in the pre-simulation survey is presented again on the post-simulation survey to measure whether students have developed a better understanding of key concepts/processes. As noted earlier, the problem-based items are not shown in the appendix but examples are available from www.bizsims.edu.au.

POST-SIMULATION

The barometer draws on Bloom's taxonomy to evaluate the learning outcomes of simulations. Hsu (1989) argues that the outcomes of simulations should be measured across all three of Bloom's domains of cognitive, affective, and psychomotor

learning. Previous simulation research found that learning exists when a personally responsible participant cognitively, affectively and behaviourally processes knowledge, skills and/or attitudes in a learning situation (Agnello, Pikas, Agnello, & Pikas, 2011). Cognitive learning can be described as developing an understanding of basic facts. Affective learning is where the simulation participants perceive that they learn, hold positive attitudes and satisfaction. Whilst behavioural learning might be described as simulation participants taking the facts and formulating correct decisions or actions (Agnello et al., 2011). Behavioural learning should demonstrate problem analysis and decision-making and the application of cross functional skills (Hermens & Clarke, 2009). The barometer requires students to reflect on what they have learned by responding to a series of scale items representing cognitive, affective and behavioural outcomes and skills at different levels of Bloom's taxonomy.

Table 5: Post-simulation survey items

CONSTRUCTS	MEASUREMENT
Perceived learning outcomes	*Section 1: Learning from simulations* Q2 (items 1 to 9) Business knowledge & skills Q2 (items 10 to 14) Bloom's Taxonomy
Simulation attitudes	*Section 1: Learning from simulations* Q3 (items 1 to 5) Attitude Q3 (items 6 to 8) Career readiness Q3 (items 9 to 12) Satisfaction
Pedagogy	*Section 2: Learning Activities* Q4 (item 1) learning activities Q4 (items 2, 3, 4,) assessment tasks Q4 (item 5) user interface Q4 (items 6 to 11) resources Q4 (items 12 to 14) course satisfaction
Collaboration	*Section 3: Teamwork* Q5 (items 1, 3, 5, 10, 12, 14) collaborative learning Q5 (items 9, 11, 13) Q5 (items 2, 4, 6, 7, 8) socially shared metacognition Q5 (items 15, 16, 17, 18) individual outcomes Q7-Q8 online engagement
Collaboration attitudes	*Section 3: Teamwork* Q6 (items 1 to 8)
Self-efficacy	*Section 4: Individual engagement* Q10 (items 1 to 9)
Engagement	*Section 4: Individual Engagement* Q9 (items 1-5) Section 5: About You Q11, 12, 13, 14, 15

Subjective measures include student's perceptions of learning from the simulation, attitudes toward the simulation, collaboration and self-efficacy.

- Evaluation of the simulation includes perceived cognitive outcomes, which is an indirect measure of cognitive outcomes. Students perceived cognitive outcomes are their perceptions of learning which include a range of skills. These include for example, development of skills in finance, marketing, and HR. More advanced skills were also included in line with Blooms Taxonomy, such as problem solving and critical thinking.

- Students' attitudes toward the simulation include affective attitudinal statements of enjoyment and satisfaction. It also includes perceptions of the simulation assisting their future career prospects and communication skills. Positive attitudes and satisfaction have been found to improve student learning.

- Students experience surrounding attitudes toward group work, perceptions of collaborative and social cognitive learning are included.

- Individual engagement is captured through motivation, level of self-directed learning, and self-efficacy.

The barometer also measures learner attitudes regarding resources, learning activities and assessment tasks. Student performance and grades are an important part of the barometer but are not captured using the survey because educators would already have this information. Students are asked for their ID number so that survey responses can be matched to their grades.

7.4 Using the Barometer

Although the Simulation Learning Barometer consists of a pre-simulation survey and a post-simulation survey, some survey items would be suitable for use at regular intervals to monitor learning engagement and outcomes throughout a simulation. As a result, the barometer consists of a collection of items and educators can select the items they wish to measure. These items have been shared in several formats on the project website. Benchmark data for several simulations are available from the project website.

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Appendix: Simulation Learning Barometer

Pre-simulation survey

This survey seeks your views about the use of online simulations in business education and should take less than 15 minutes to complete. The survey is part of an Australian Government funded project titled Enhancing Student Learning Outcomes with Simulation-based Pedagogies. This project will evaluate the learning outcomes of simulations in business and related fields.

Your participation is entirely voluntary and you can cease completion of the survey at any time without comment or penalty. All answers are confidential and can in no way be linked to your personal details. Once a survey is completed it is impossible for any collected data to be withdrawn. Aggregated data and project reports may be used by the Australian Government, or their licensees, as comparative data in future projects, and will be presented in a publicly accessible online site. Individual data will not be published separately. By taking the survey you are giving consent to be part of this research. This study adheres to the Guidelines of the ethical review process of The University of Queensland. Whilst you are free to discuss your participation in this study with Dr Pierre Benckendorff (contactable on (07) 3346 7089 or p.benckendorff@uq.edu.au) if you would like to speak to an officer of the University not involved in the study, you may contact the Ethics Officer on (07) 3365 3924.

1. What is your student identification number?

Note: this information will only be used to link your pre-simulation and post-simulation surveys and will not be retained for further analysis.

➡													

SECTION 1: LEARNING FROM SIMULATIONS

Read each question and mark your answers by filling the circles like this: ●

2. The following items are about your **expectations** of how the simulation may benefit your **learning**. Please rate your agreement with the following statements.

I EXPECT THAT THE SIMULATION WILL DEVELOP MY…	◀ STRONGLY DISAGREE						STRONGLY AGREE ▶
…problem solving skills	○	○	○	○	○	○	○
…planning skills	○	○	○	○	○	○	○
…understanding of finance	○	○	○	○	○	○	○
…understanding of marketing	○	○	○	○	○	○	○
…understanding of staffing	○	○	○	○	○	○	○
…understanding of operations	○	○	○	○	○	○	○
…understanding of strategic management	○	○	○	○	○	○	○
…understanding of how the different departments of an organization interact with each other	○	○	○	○	○	○	○
…understanding of ‘real world’ problems faced by organisations	○	○	○	○	○	○	○
…knowledge of key business terms, concepts and conventions	○	○	○	○	○	○	○
…ability to apply my knowledge to a business	○	○	○	○	○	○	○
…ability to analyse data	○	○	○	○	○	○	○
…ability to evaluate problems and make decisions	○	○	○	○	○	○	○
…ability to create new ideas or plans	○	○	○	○	○	○	○

3. The following items are about your **expectations** of enjoyment and satisfaction. Please rate your agreement with the following statements.

	◀ STRONGLY DISAGREE						STRONGLY AGREE ▶
I think the simulation will be challenging	○	○	○	○	○	○	○
I think I will enjoy learning with the simulation	○	○	○	○	○	○	○
I expect the simulation will make the course more interesting	○	○	○	○	○	○	○
I expect that the simulation will allow me to build on knowledge gained from previous courses	○	○	○	○	○	○	○
I expect that the simulation will make me more 'work ready'	○	○	○	○	○	○	○
I hope the skills and knowledge learnt during the simulation will be useful for my future career	○	○	○	○	○	○	○

SECTION 2: TEAMWORK

4. The following items are about your **attitudes** toward teamwork. Please rate your **agreement** with the following statements.

	◀ STRONGLY DISAGREE						STRONGLY AGREE ▶
Teamwork is an effective way to prepare for the workforce	○	○	○	○	○	○	○
Teamwork is an effective way to accomplish a task	○	○	○	○	○	○	○
I feel comfortable working in a team	○	○	○	○	○	○	○
I expect that the simulation will reinforce my understanding of the importance of teams	○	○	○	○	○	○	○
I expect that the simulation will develop my teamwork skills	○	○	○	○	○	○	○
I expect that working as part of a team during the simulation will improve my communication skills.	○	○	○	○	○	○	○
Overall, I think I learn more working in a team	○	○	○	○	○	○	○

SECTION 3: INDIVIDUAL ENGAGEMENT

5. The following items relate to your general level of **confidence**. Please rate your agreement with the following statements.

	◀ STRONGLY DISAGREE						STRONGLY AGREE ▶
Even when things are tough, I can perform quite well	○	○	○	○	○	○	○
In general, I can obtain outcomes that are important to me	○	○	○	○	○	○	○
I am confident I can learn the concepts taught in this course	○	○	○	○	○	○	○
I am confident that I can perform effectively in different tasks	○	○	○	○	○	○	○
Compared to other people, I can do most tasks very well	○	○	○	○	○	○	○
I am confident that I have the computer skills to complete the simulation requirements of this course	○	○	○	○	○	○	○
I am able to achieve most of the goals that I have set for myself in this course	○	○	○	○	○	○	○
I am confident of earning a good grade in this course	○	○	○	○	○	○	○
I can succeed in almost any endeavour I set my mind to	○	○	○	○	○	○	○

SECTION 4: ABOUT YOU

6. Please tell us, are you:

- ◯ Female
- ◯ Male

7. In what year were you born? _____

8. If you are an international student, what is your home country? _____

9. What is the name of your university? _____

10. What is the name of the degree you are completing? _____

11. What is the code and/or title of the course using the simulation? _____

12. What is your current GPA? _____

13. What year level are most of the courses you are studying this year?

- ◯ First year
- ◯ Second year
- ◯ Third year
- ◯ Postgraduate

14. Which of the following apply to you? (Select all that apply)

- ◯ I am studying part-time
- ◯ I am studying externally (distance education)
- ◯ English is not my first language
- ◯ I am an International student
- ◯ I am working casually / part-time while studying
- ◯ I am working full-time while studying
- ◯ I am an exchange student

Post simulation survey

This survey seeks your views about the use of online simulations in business education and should take less than **20 minutes** to complete. The survey is part of an Australian Government funded project titled *Enhancing Student Learning Outcomes with Simulation-based Pedagogies*. This project will evaluate and promote pedagogies that enhance the learning outcomes of online simulations in business and related fields.

Your participation is entirely **voluntary** and you can cease completion of the survey at any time without comment or penalty. All answers are **confidential** and can in no way be linked to your personal details. Once a survey is completed it is impossible for any collected data to be withdrawn. Aggregated data and project reports may be used by the Australian Government, or their licensees, as comparative data in future projects, and will be presented in a publicly accessible online site. Individual data will not be published separately. By taking the survey you are giving **consent** to be part of this research.

This study adheres to the Guidelines of the ethical review process of The University of Queensland. Whilst you are free to discuss your participation in this study with Dr Pierre Benckendorff (contactable on (07) 3346 7089 or p.benckendorff@uq.edu.au) if you would like to speak to an officer of the University not involved in the study, you may contact the Ethics Officer on (07) 3365 3924.

1. What is your student identification number?

Note: this information will only be used to link your pre-simulation and post-simulation surveys and will not be retained for further analysis.

SECTION 1: LEARNING FROM SIMULATIONS

Read each question and mark your answers by filling the circles like this: ●

2. The following items are about how the simulation has benefitted your **learning**. Please rate your agreement with the following statements.

THE SIMULATION DEVELOPED MY...	◄ STRONGLY DISAGREE						STRONGLY AGREE ►
...problem solving skills	○	○	○	○	○	○	○
...planning skills	○	○	○	○	○	○	○
...understanding of finance	○	○	○	○	○	○	○
...understanding of marketing	○	○	○	○	○	○	○
...understanding of staffing	○	○	○	○	○	○	○
...understanding of operations	○	○	○	○	○	○	○
...understanding of strategic management	○	○	○	○	○	○	○
...understanding of how the different departments of an organization interact with each other	○	○	○	○	○	○	○
...understanding of 'real world' problems faced by organisations	○	○	○	○	○	○	○
...knowledge of key business terms, concepts and conventions	○	○	○	○	○	○	○
...ability to apply my knowledge to a business	○	○	○	○	○	○	○
...ability to analyse data	○	○	○	○	○	○	○
...ability to evaluate problems and make decisions	○	○	○	○	○	○	○
...ability to create new ideas or plans	○	○	○	○	○	○	○

3. The following items are about your **satisfaction** and **enjoyment** of the simulation. Please rate your agreement with the following statements.

	◀ STRONGLY DISAGREE						STRONGLY AGREE ▶
The simulation was challenging	○	○	○	○	○	○	○
I enjoyed learning with the simulation	○	○	○	○	○	○	○
The simulation made the course more interesting	○	○	○	○	○	○	○
The simulation allowed me to build on knowledge gained from previous courses	○	○	○	○	○	○	○
The simulation allowed me to learn from my mistakes through trial and error	○	○	○	○	○	○	○
I feel I am more 'work ready' after using the simulation	○	○	○	○	○	○	○
The skills and knowledge learnt during the simulation will be useful for my future career	○	○	○	○	○	○	○
I am satisfied with the online software application used for the simulation	○	○	○	○	○	○	○
Overall, I learned a lot from the simulation	○	○	○	○	○	○	○
Overall, I am satisfied with the simulation as a learning tool	○	○	○	○	○	○	○
Overall, the simulation has met my expectations	○	○	○	○	○	○	○

SECTION 2: LEARNING ACTIVITIES

4. The following items are about the **resources, learning activities and assessment tasks** related to the simulation. Please rate your agreement with the following statements.

	◀ STRONGLY DISAGREE						STRONGLY AGREE ▶
I am satisfied with the in-class activities which assisted my understanding of the simulation	○	○	○	○	○	○	○
I am satisfied with the assessment tasks related to the simulation	○	○	○	○	○	○	○
I am satisfied with the assessment weighting attached to the simulation	○	○	○	○	○	○	○
The assessment attached to the simulation enhanced my understanding of business operations	○	○	○	○	○	○	○
The simulation interface was easy to use	○	○	○	○	○	○	○
The learning resources (e.g. user guides, videos, tutorials) provided with the simulation enhanced my learning	○	○	○	○	○	○	○
I am satisfied with the information I received to perform my tasks with the simulation	○	○	○	○	○	○	○
There were sufficient resources (e.g. user guides, videos, tutorials) to help me learn the simulation	○	○	○	○	○	○	○
My teachers were knowledgeable about the simulation	○	○	○	○	○	○	○
My teachers worked hard to help me learn from the simulation	○	○	○	○	○	○	○
There were sufficient opportunities to ask my teachers questions about the simulation	○	○	○	○	○	○	○
Overall, I am satisfied with this course	○	○	○	○	○	○	○
Overall, this particular course has met my expectations	○	○	○	○	○	○	○
I would recommend taking this course to other fellow students	○	○	○	○	○	○	○

SECTION 3: TEAMWORK

5. These items are about **team interaction** during the simulation. Please rate your agreement with the following items.

	◀ STRONGLY DISAGREE						STRONGLY AGREE ▶
It was easy for the team to agree on important decisions	○	○	○	○	○	○	○
Key decisions about our company were made by the whole team	○	○	○	○	○	○	○
I was comfortable sharing my ideas with my team	○	○	○	○	○	○	○
Most of the time, members of our team asked each other for feedback on their work	○	○	○	○	○	○	○
Team members acknowledged the points of view of others	○	○	○	○	○	○	○
There was a team leader who guided the simulation	○	○	○	○	○	○	○
The contributions of other team members assisted my understanding of the simulation	○	○	○	○	○	○	○
My team had regular meetings to evaluate our performance	○	○	○	○	○	○	○
Our team performed well in the simulation	○	○	○	○	○	○	○
My team was dedicated to the task	○	○	○	○	○	○	○
My team worked well together	○	○	○	○	○	○	○
My team actively exchanged ideas using online tools	○	○	○	○	○	○	○
The unique skills and talents of each team members were fully valued and utilised	○	○	○	○	○	○	○
Team interactions helped me understand other points of view	○	○	○	○	○	○	○
Working as a team allowed me to work smarter, not harder	○	○	○	○	○	○	○
I was able to learn new skills and knowledge from other members in my team	○	○	○	○	○	○	○
Competition between teams motivated me to spend more time on the simulation	○	○	○	○	○	○	○
Overall, working as a team on the simulation was better than other team assessment tasks I have experienced.	○	○	○	○	○	○	○

6. The following items are about your **attitudes** toward teamwork. Please rate your agreement with the following items.

	◀ STRONGLY DISAGREE						STRONGLY AGREE ▶
Teamwork is an effective way to prepare for the workforce	○	○	○	○	○	○	○
Teamwork is an effective way to accomplish a task	○	○	○	○	○	○	○
I feel comfortable working in a team	○	○	○	○	○	○	○
The simulation helped me understand the importance of teams	○	○	○	○	○	○	○
The simulation helped develop my teamwork skills	○	○	○	○	○	○	○
Working in a team has improved my communication skills	○	○	○	○	○	○	○
Overall, I think I learn more working in a team	○	○	○	○	○	○	○

7. Did your team use any of the following online collaboration tools to interact? Please add any online tools not listed below if needed.

- ◯ Facebook
- ◯ Google+
- ◯ Google Docs
- ◯ Skype/Google Hangouts/Facetime
- ◯ Instant Messaging
- ◯ Other:

8. Was the use of any of these tools particularly challenging?

- ◯ No
- ◯ Yes

If yes, could you tell us briefly which of the tools were challenging and why?

Which tools were the most useful?

SECTION 4: INDIVIDUAL ENGAGEMENT

9. The following items are about your **engagement** with the course and the simulation. Please rate your **agreement** with the following statements.

	◀ STRONGLY DISAGREE						STRONGLY AGREE ▶
I spent more time than usual on this course as a result of the simulation	◯	◯	◯	◯	◯	◯	◯
I attended class regularly	◯	◯	◯	◯	◯	◯	◯
I learned how to organize my time efficiently	◯	◯	◯	◯	◯	◯	◯
I sought advice from teaching staff	◯	◯	◯	◯	◯	◯	◯
I kept up-to-date with my studies	◯	◯	◯	◯	◯	◯	◯
The effort I put into the simulation resulted in successful outcomes for my company	◯	◯	◯	◯	◯	◯	◯
I will be able to use what I learnt in the simulation in the future	◯	◯	◯	◯	◯	◯	◯

10. The following items relate to your general level of **confidence**. Please rate your agreement with the following statements.

	◀ STRONGLY DISAGREE						STRONGLY AGREE ▶
Even when things are tough, I can perform quite well	◯	◯	◯	◯	◯	◯	◯
In general, I can obtain outcomes that are important to me	◯	◯	◯	◯	◯	◯	◯
I am confident I can learn the concepts taught in this course	◯	◯	◯	◯	◯	◯	◯
I am confident that I can perform effectively in different tasks	◯	◯	◯	◯	◯	◯	◯
Compared to other people, I can do most tasks very well	◯	◯	◯	◯	◯	◯	◯
I am confident that I have the computer skills to complete the simulation requirements of this course	◯	◯	◯	◯	◯	◯	◯
I am able to achieve most of the goals that I have set for myself in this course	◯	◯	◯	◯	◯	◯	◯
I am confident of earning a good grade in this course	◯	◯	◯	◯	◯	◯	◯
I can succeed in almost any endeavour I set my mind to	◯	◯	◯	◯	◯	◯	◯

SECTION 5: ABOUT YOU

11. How much did you contribute to the success of your team?

- ◯ Far more than other team members
- ◯ More than other team members
- ◯ About the same as other team members
- ◯ Less than other team members
- ◯ Far less than other team members

12. How many of your classes did you attend this semester?

- ◯ 80% to 100%
- ◯ 60% to 79%
- ◯ 40% to 59%
- ◯ 20% to 39%
- ◯ Less than 20%

13. On average, how many **hours per week** did you personally spend on the simulation and related assessment?

14. On average, how many **hours per week** did you spend working with your group on the simulation and related assessment?

15. On average, how many **hours per week** did you spend on paid work this semester?


Online Business Simulations
PEDAGOGY | ASSESSMENT | LEARNING