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Enhancing Student Learning Outcomes with Simulation-based Pedagogies

Online Business Simulations
PEDAGOGY | ASSESSMENT | LEARNING

Final Report 2016
(Part A)

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(Part A)

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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
IMPEL	Impact Management Planning and Evaluation Ladder
LTU	La Trobe University
OLT	Australian Government Office for Learning and Teaching
PBL	Problem Based Learning
PMAs	Post Meeting Actions
RWD	Responsive Web Design
SCU	Southern Cross University
TAFE	Technical and Further Education
TE	Tertiary Education
TEQSA	Tertiary Education Quality and Standards Agency
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

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Executive summary

This report provides a final account of the 'Enhancing Student Learning Outcomes with Simulation-based Pedagogies' (SP13-3261) project funded by the Australian Government Office for Learning and Teaching as part of the Strategic Priority Projects scheme in 2013.

Project overview

Enrolments in business fields such as management, marketing, accounting, finance, tourism and hospitality have expanded dramatically over the last decade. This popularity has resulted in large class sizes, which create challenges for encouraging interaction and skills development. There is evidence that technology enhanced learning may help to overcome some of the challenges faced by business education. In particular, 'gamification' and the use of simulations have received recent attention.

Online simulations provide experiential learning environments that replicate workplace tasks or processes to allow students to practise work 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. In larger classes, simulations offer a number of advantages over other experiential learning approaches because they provide automated and simultaneous feedback, enhance student engagement, encourage authentic teamwork and allow students to apply their skills and knowledge.

This project was conducted to address a problem concerning the lack of knowledge about online business simulations. Prior to 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 these fields. This project endeavoured 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 utilise online simulations to enhance graduate capabilities.

Project aims

The **purpose** of this project was to gather and disseminate good practice in the design of pedagogy and assessment in simulation-based units. 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
4. Identify and promote innovative pedagogies and strategies associated with the use of online business simulations in universities.

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.

Project outcomes and contributions

The project **deliverables** included (1) a **simulation learning barometer** for benchmarking the learning outcomes of online business simulations; (2) an **online toolkit** to increase the level of understanding about online business simulations and to provide useful resources for educators; (3) four **national forums** to disseminate and promote the findings of the project; and (4) published and planned **reports and academic papers** analysing the use of online simulations in business education based on an **audit** of 59 online business simulations from 25 different providers, **interviews** with 22 experienced business educators and four senior managers, student **focus groups** and **student surveys** across eight cohorts using the simulation learning barometer.

The project makes several key contributions regarding the learning outcomes, adoption, pedagogy, assessment and evaluation of online business simulations. These five areas form the basis for the 'Framework for Simulation-based Pedagogy'.

1. **Learning outcomes:** Simulations are particularly effective in helping learners to integrate and apply business knowledge and skills. Our findings also indicate that simulations allow students to practise analysis, evaluation, creation and collaboration skills.
2. **Simulation adoption:** Simulation-based pedagogies require tactful management of the institutional constraints and challenges that have been identified. A champion is needed to promote and sustain the use of a simulation. Active engagement with supportive program directors, senior managers and decisions makers is a necessity. The background and needs of students should also be considered. The Good Practice Guide and companion website attempt to address the complex landscape of online business simulations by providing an online toolkit to support adoption and implementation.
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.
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 included assessing team interaction; using reports and presentations to communicate proposals, plans, company performance and competitor analyses; asking students to reflect on their learning experience; or requiring students to complete a viva.
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.

Project engagement and impact

Face to face and online engagement with the project exceeded the team's expectations. Over 530 participants from 48 organisations attended project forums, webinars and presentations at conferences. The project website received over 2,100 visits from more than 1,400 users and the project's YouTube videos received over 600 views. Forum participants included educators and learning designers from public and private institutions as well as representatives of associations/companies. All team members have been able to use the findings of the project to implement changes at their own institutions, ranging from minor tweaks and refinements to the development of new simulation-based units and entire streams/majors. It is expected that within the next two years over 700 students per year will benefit from these changes. An ongoing legacy of the project is the creation of an Online Toolkit that will continue to have an impact beyond the life of the project.

Future opportunities

A number of future opportunities and ideas have arisen from the current project. The interest and momentum surrounding online business simulations continues to build. This project has generated a community of almost 200 interested stakeholders and there is scope to build on this

by forming a network to act as a custodian for the project website and to continue the legacy of the project. It is suggested that simulations and other technology enhanced learning pedagogies continue to be included and supported through future grant programs. Lastly, the project team suggests that considerable efficiencies could be realised through a more coordinated approach to national teaching and learning projects (e.g. an online calendar of OLT project events, and a database of experience project managers).

Chapter 1: 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 last decade. This growth has largely been due to the popularity of these programs amongst international students. However, this popularity has resulted in large class sizes, which create challenges for encouraging interaction and 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 and rethinking of teaching practices to obtain desired learning outcomes (Biggs, 1999).

There is evidence that technology enhanced learning may help to 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, p. 1). In particular, 'gamification' and the use of simulations have received recent attention in a number of fields (Jones & Sheppard, 2007; Mitchell, 2004; Thompson & Verma, 2003).

Online simulations provide experiential learning environments that replicate workplace tasks or processes to allow students to practise and master work 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 team work (Edelheim & Ueda, 2007; Feinstein, Mann & Corsun, 2002; Fripp, 1997).

Given these benefits, it is not surprising that a number of 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 (e.g. Monash University's STARLab, University of Wollongong's IDLE, and UniSA's 'Ramsden' and 'Radicor' Hotels). However, prior to 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 these fields. A key

observation is that previous studies have generally focussed 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 focussed 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. Previous ALTC/OLT national teaching and learning grant projects have focussed on the use of online simulations and serious gaming in the health sciences and the built environment, with very little attention in the social sciences, management or commerce. This project endeavoured 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 utilise online simulations to enhance graduate capabilities.

1.2 Project aims

The purpose of this project was to gather and disseminate good practice in the design of pedagogy and assessment in simulation-based units. 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
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.

Figure 1. Project team members (from left) Gui Lohmann, Paul Whitelaw, Paul Reynolds, Pierre Benckendorff, Marlene Pratt, Paul Strickland and Lainie Groundwater.

Chapter 2: Background literature

The project draws on the wider teaching and learning literature, the general simulations literature and the specific literature on business simulations. The theoretical basis for this project is positioned around five well-known conceptual frameworks:

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

2. Simulations are a type of **problem-based learning (PBL)** because they present a problem that has to be solved using 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 occurs through a continuous four-step process of experimentation, experience, observation and conceptualisation.

4. The project is informed by recent work on **authentic learning** because simulations have the potential to work as an effective substitute for real experiential contexts by providing students with an authentic learning context (Herrington, Reeves & Oliver, 2010).

5. The project draws on **Bloom's Taxonomy** to evaluate the learning outcomes of simulations (Bloom, Englehart, Furst, Hill & Krathwohl, 1959).

Thavikulwat (2004) defines a simulation as "an exercise involving reality of function in an artificial environment, a case study, but with the participants inside" (p. 243). Computer simulations, virtual worlds, games, the use of cards and role playing are all forms of simulations. The literature on simulations includes several themes relevant to this project:

- Some studies have focussed on the attitudes of learners to simulation-based pedagogy. Generally, this literature suggests that participants view simulations more positively than lectures or case studies (e.g. Anderson & Lawton, 2009; Gosen & Washbush, 2004).

- Several studies have attempted to classify simulations (e.g. Feinstein & Parks, 2002).

- There has been a focus in the literature on weighing up the advantages and disadvantages of using simulations for learning (Antonacci et al., 2007; Fripp, 1997; Penfold, 2009).

- The literature has increasingly focused on understanding what participants learn from simulations. Evidence indicates that simulations are inefficient for lower order outcomes such as remembering terminology or understanding basic concepts but are effective at developing higher order skills (e.g. Anderson & Lawton, 2009; Faria & Wellington, 2004).

Many of these themes from the wider simulations literature are also evident in the business simulations literature. The following additional points are relevant to this project:

- There is evidence to suggest that business simulations result in learning, but there is a lack of evidence to support a relationship between learning and performance in the simulation (Gosen & Washbush, 2004; Wolfe & Luethge, 2003). However, Business simulations can provide learners with a good understanding of business performance metrics and can enhance their evaluation and analysis skills (Fawcett, 2002).

- Challenges of adopting business simulations include adapting to pedagogical change, professional development, technological infrastructure, learner expectations, clarifying the role of the instructor, and delivering appropriate learning spaces (Clarke, 2009).

- Like the simulation literature in general, the business simulation literature has also attempted to categorise simulations (Aldrich, 2005; Bolt, 2005; Gibson, Aldrich & Prensky, 2006; Romme, 2002; Vinod, 2004).

Chapter 3: Project approach

The project consisted of a multi-method approach divided into seven stages. Some of these stages overlapped to ensure that milestones were achieved in the available timeframe. Table 1 provides a simplified version of the project management framework by summarising the stages and related tasks. The overarching approach involved using a number of data sources (audit, focus groups, surveys and interviews) to evaluate online business simulations as learning tools. These data sources formed the basis for engaging with our project community to share resources and disseminate key findings.

Table 1. The project approach presented in stages

Stages	Tasks
Stage 1: Project initialisation *December 2013-April 2014*	▪ Appointment of a Project Manager to assist the Project Leader. ▪ First face-to-face project team meeting. ▪ Key tasks and responsibilities of each team member confirmed. ▪ Implementation of a project management system based around meeting agendas, minutes and post-meeting actions (PMAs). ▪ Multi-institutional agreement prepared and signed by each project partner. ▪ Ethics approval was received for key data collection activities. ▪ Project branding developed, project templates designed and approved by the OLT. ▪ Evaluation panel appointed by the OLT and evaluation framework confirmed. ▪ Engagement with the Australian Business Deans Council (ABDC) Teaching and Learning Network to ensure awareness of the project. ▪ Membership of the reference panel confirmed and arrangements made for the first reference panel meeting.
Stage 2: Literature review & audit *January-February 2014*	▪ Comprehensive review of the literature conducted to identify key issues, measurement approaches and variables. ▪ Desktop audit of existing online business simulations.
Stage 3: Barometer development *January-June 2014*	▪ Key variables identified from literature. ▪ Refinement of key variables and feedback from reference panel. ▪ Pilot test with three student focus groups, followed by further refinement. ▪ Trial of barometer with three student cohorts, including use of open-ended questions to identify missing variables.

Stages	Tasks
Stage 4: Data collection *May 2014-June 2015*	▪ Focus groups conducted with three student groups ▪ Simulations Learning Barometer deployed in semester 2, 2014 and semester 1, 2015. ▪ Interviews conducted with two simulation providers and 22 educators in a number of disciplines across 14 institutions. ▪ Four interviews with senior managers/decision makers.
Stage 5: Design of online toolkit *August 2014-June 2015*	▪ Domain name registration and site development ▪ Development of case studies, including text, teaching resources and YouTube videos ▪ Development of *Good Practice Guide*
Stage 6: National forums *November 2014-March 2015*	▪ Forums held in Adelaide, Brisbane, Melbourne and Sydney. ▪ Webinar hosted by *Transforming Assessment* network in March 2015 to reach a wider audience.
Stage 7: Project finalisation *March 2015-June 2015*	▪ Completion of the final project report. ▪ Planning for post-project activities and publications.

Chapter 4: Outcomes and key findings

The multi-faceted approach to the project, described in Chapter 3, allowed the project team to collect data from a range of sources to triangulate our findings. The following sections summarise the project deliverables, key findings and outcomes from these sources. More detailed analyses will be published in a series of academic papers following the conclusion of the project. These papers will be available from the project website.

4.1 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.

4.2 Simulation audit

The first aim of this project was to map the features and characteristics of online business simulations. To achieve this, the project team undertook an audit of online business simulations. The audit identified 59 online business simulations offered by 25 companies. In addition we became aware of several bespoke simulators developed by Australian universities, including the IDLE Simulation at the University of Wollongong, STARLab at Monash University and Ramsgate and Radicor Hotels at the University of South Australia.

Key Findings

1. *Disciplinary coverage:* Most 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.

2. *Teamwork:* Most simulations are better suited to learners working in teams to run a business, although a small number are designed for individual use (e.g. Ethics-LX).

3. *Industry Sectors:* A wide variety of sectors are represented, including manufacturing (e.g. CAPSIM), retail (e.g. Mike's Bikes) and service businesses (e.g. HOTS, AIRLINEOnline).

4. *Interfaces*: Most simulation interfaces are menu-driven and data oriented. Students enter decisions using dropdown boxes and text boxes. Very few online business simulations offer 3D virtual worlds. 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. Furthermore, very few simulations are focussed on the development of personal capabilities such as interpersonal skills, ethics or corporate social responsibility (e.g. Ethics-LX, UOWs IDLE).

5. *Customisation*: Some simulations can be customised by automating or removing modules (e.g. marketing, human resources and sustainability).

6. *Pricing structures:* 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 once-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.

4.3 Student focus groups

The need to conduct focus groups with students was not identified in the original project proposal but became apparent early in the project. The purpose of the focus groups was twofold. Firstly, the focus groups allowed us to collect feedback to refine the Simulation Learning Barometer. Secondly, they allowed us to gain a better insight into student attitudes and the learning outcomes associated with simulations. This contributed toward achieving the third and fourth aims of the project. Focus groups took place in May 2014 with Masters students from The University of Queensland (one group of five students), as well as undergraduate students from

Griffith University (two groups with seven students in total, one high performing and one lower performing group). The focus group sessions lasted for about 30 minutes each (see Appendix A for focus group questions).

Key findings

1. *Real world experience:* There was a consensus among the interviewed students that the simulation provided them with 'real world' experience, in spite of any limitations that the simulation might have.
2. *Integrated problem solving:* Students reported that they had to use their critical thinking and problem solving skills to make sense of how individual business departments and operations impact on each other in a safe and risk free environment.
3. *Application of knowledge:* The opportunity to apply the theory learnt in the course (or an entire degree in the case of capstones) was highlighted as a unique and positive outcome.
4. *Time management:* One negative aspect identified by all students was the number of hours they have spent on the simulation, which required constantly checking their performance and improving their decisions. Hence, time management skills were essential to successfully juggle the simulation with other teaching, work or personal commitments.
5. *Authentic teamwork:* Students observed that they worked more closely with their team members than in other learning settings because of the interactive nature of the simulation. Students also reported a higher number of hours working together than in other group assignments. Communication between the team members was mentioned as a very important attribute for the overall performance of the group.
6. *Competition as a motivator:* While the competitive nature of the simulation motivated team members, some students highlighted that it was difficult to learn from peers outside their group, as they perceived that any help could hinder their final performance.
7. *Learning resources:* Students stated that learning resources (e.g. guidelines, manuals, videos) could be improved. They also felt that the amount of time taken to learn the simulation took up a considerable part of the course and that the simulation could be used in other courses to benefit the learning process across a larger number of weeks.
8. *Assessment*: Students used expressions like "overloaded" and "burdened" to refer to how they felt in regards to the large number assessment tasks. Students were also concerned about the fact that the simulation was done in groups, but that some major assessment tasks were submitted individually. On a positive note, students mentioned that the simulation created an opportunity to engage with a variety of authentic assessment tasks.
9. *Engagement*: It was clear that despite some concerns the students were very engaged with the simulation and enjoyed the learning experience. For example, one student mentioned: "*I think it's definitely better than any courses in the uni, because it's practical and you really make something happen and it's not only about theoretical things.*"

4.4 Simulation learning barometer

The third aim of the project was to evaluate the contribution of online simulations and related pedagogies to student learning outcomes. To achieve this aim the project team developed and deployed the 'Simulation Learning Barometer'. The Simulation Learning Barometer was designed as a benchmarking and monitoring device for measuring the impact of simulation-based pedagogies in business education. Key constructs for the barometer were identified from the literature and the survey was refined by using student focus groups, a trial and a pilot test in the first half of 2014. Feedback was also collected from the Reference Panel.

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. The items developed for the barometer draw together many disparate areas of the academic literature related to learning theory, learning outcomes, experiential learning, simulations, collaborative learning and self-directed learning (see Appendix B for sample surveys).

Data collection occurred from July 2014 to June 2015 in order to capture responses from a range of cohorts using simulations across several institutions. Data were collected at The University of Queensland (AIRLINEOnline), Griffith University (AIRLINEOnline, HOTS), La Trobe University (HOTS), University of South Australia (Radicor Hotel), William Angliss Institute (RevSIM), International College of Management Sydney (HOTS), University of Wollongong (IDLE). A total of 711 pre-simulation surveys and 414 post-simulation surveys were completed.

Key Findings

1. *Learning Outcomes*: Pre-simulation expectations about knowledge and skills development were higher than post-simulation evaluations (see Figure 2). In spite of this, perceived learning outcomes for both business knowledge and skills were high across all business fields and levels of Bloom's taxonomy. Students' ability to solve the case study questions improved significantly from a mean score of 3.7/7.0 before the simulation to a mean score of 4.0/7.0 after the simulation.

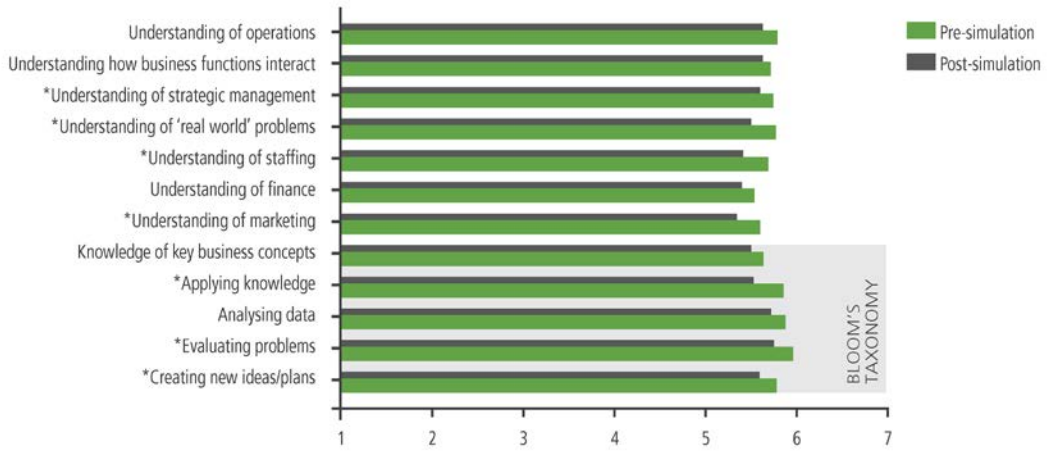

Figure 2. Student perceptions of learning outcomes

1 = Strongly Disagree … 7 = Strongly Agree; ***** differences are significant at p=0.05

2. *Teamwork:* Students had high expectations about developing their teamwork skills prior to completing the simulation and post-simulation evaluations indicated that these expectations were met. As Figure 3 shows, student attitudes after the learning experience surpassed expectations about the importance of teamwork and the development of teamwork skills. Students were more comfortable working in a team than they expected.

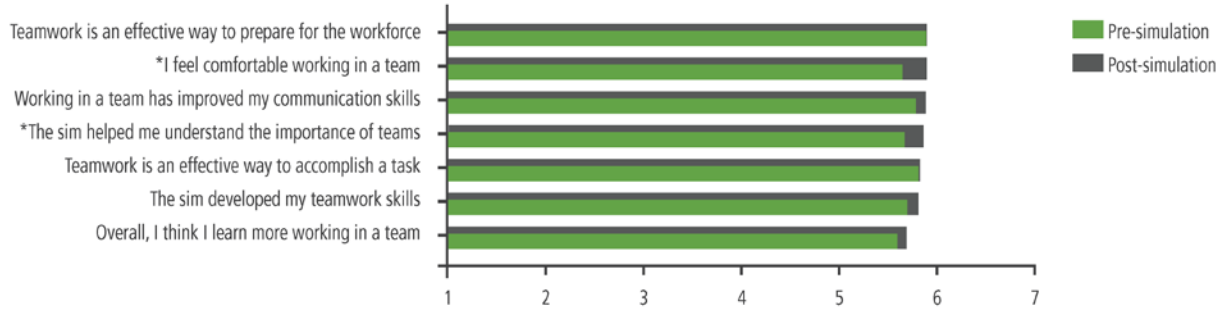

Figure 3. Student perceptions of simulations and teamwork
1 = Strongly Disagree … 7 = Strongly Agree; ***** differences are significant at p=0.05

3. *Student Engagement*: Individual engagement and general levels of confidence were found to improve after the simulation.

4.5 Interviews with educators

Interviews were conducted with two simulation providers and 22 educators from 16 institutions representing 12 different business simulations. These interviews contributed to all four of the project aims. The questions were divided into three sections (see Appendix C).

Key Findings

1. *Adoption*: The use of online business simulations is not prevalent in Australian institutions. In a few instances educators inherited courses containing a simulation but in most cases interviewees were responsible for introducing simulations themselves. The main reasons for adopting a simulation were to improve the learning experience and learning outcomes.
2. *Learning outcomes*: Most interviewees echoed the literature when asked about the learning outcomes related to their simulation. Key responses included integrating what students have learned, helping students think beyond their own discipline area to take a holistic view of business, giving students the ability to apply what they have learned, and developing and practicing skills that will help students transition to employment.
3. *Pedagogy*: Many interviewees did not use a conventional lecture/tutorial format. In fact, it appears common to have an intensive block of content followed by application of knowledge through the simulation. Class contact hours for simulation-based units were often higher than conventional units but contact hours may be managed by considering blended learning pedagogies such as a flipped classroom.

4. *Learning activities*: Several interviewees used case studies, guest speakers and class discussion to provide real world examples of what students were experiencing in the simulation. Some educators also created a wider narrative of events impacting on the simulation through newsletters and news broadcasts.
5. *Learning resources:* The resources and teaching materials used to support learning also form part of the pedagogy. Here provision of support materials such as user manuals, how-to guides, videos and flow charts are critical in conditioning students to the technical aspects of the simulation environment. Some simulation companies provide these resources but in other cases these resources must be created by the educator.
6. *Assessment*: Educators used a range of assessment techniques, including performance metrics from the simulation, business plans, reports and presentations, reflective assessment, vivas, memos, videos, wikis and student observation. A key consideration is whether students should be assessed based on the performance of their business. As the literature highlights, there may be no link between business performance and learning. For this reason some educators do not allocate any marks to the simulation itself, while others allocate only a small percentage (typically 5-15%). Another approach is to ask learners to select which metrics they wish to be evaluated on.
7. *Barriers and Constraints*: Since the interviews focussed on educators who had successfully implemented simulations very few barriers and constraints were mentioned but a few comments were made about timetabling constraints (i.e. insisting that all courses must have two hour lectures and one hour tutorials, availability of suitable learning spaces), inflexible assessment policies (i.e. timing, number and size of assessment tasks) and large class sizes. Cost was rarely mentioned as a constraint, presumably because the interviewees had successfully justified the cost of simulations to more senior managers.

4.6 Interviews with senior decision makers

The second aim of the project was to assess the challenges associated with the integration of online simulations into sustainable teaching practice in business education. To fully achieve this aim the team added to the educator interviews by conducting interviews with senior institutional decision makers. The interviews with senior decision makers were both troublesome and enlightening. A total of 13 institutions were approached: 11 public sector universities, one degree granting TAFE and a privately owned hotel school. Interviews were sought with individuals holding titles such as “Associate Dean Teaching and Learning”, or “Director of e-Learning” or similar. All had strategic and policy responsibilities and were considered senior members of their faculty or college. Upon a further explanation of the purpose of the interview all but four declined to be interviewed, with the four in question, from both public and private sectors, preferring to speak “off the record”.

Key findings

1. *Student expectations:* Interviewees acknowledged that students are increasingly comfortable with the technology (one interviewee used the term "digital natives") and had increasingly higher expectations for their learning experiences. In such an environment, the interviewees acknowledged that their institution had to do something about embracing online simulations as a means to meet student expectations.
2. *Top down approaches:* Two institutions made a strategic decision to make a substantial investment in the development and deployment of simulation based resources, and did so via a top down approach wherein senior management has made the decision, without necessarily engaging front line staff. One institution was spending well in excess of $1m on setting up "simulation suites". The other was spending even more on establishing a software authoring centre that was charged with developing a wide range of online simulation programs which will be rolled out across their institution. When asked, neither interviewee was able or prepared to talk about the level, form or nature of staff consultation that had taken place, or was planned to take place.
3. *Bottom-up approaches:* The other two institutions adopted a 'bottom up cargo cult mentality'. They recognised that such approaches needed to develop and bloom from within the teaching ranks and that the adoption of such pedagogies needed to be driven by champions. However, they had no policy, strategy or process by which such champions could be identified or supported.

4.7 Contributions to business education

It is useful to draw together all of the threads across these various deliverables and activities to address the final aim of the project: *Identify and promote innovative pedagogies and strategies associated with the use of online business simulations in universities.* It was not part of our project brief to develop 'recommendations' as such. However, key contributions can be identified regarding learning outcomes, adoption, pedagogy, assessment, and evaluation.

Learning outcomes

It is clear from the literature, interviews with educators and feedback from students that learning outcomes should drive the adoption of a simulation. Not all learning outcomes are suited to simulations and educators must consider whether other pedagogic approaches are likely to be more appropriate for achieving learning outcomes. The data collected in this project suggests 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. Our findings also indicate that simulations allow students to practise analysis, evaluation, creation and collaboration skills.

Simulation adoption

Several key contributions regarding the adoption of simulations emerge from the various data sources used in this project:

1. *Championing change:* The use of simulations as pedagogic tools requires a commitment from both senior managers as well as 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 staff need to be actively involved in not just adopting the technology but also driving it. On the other hand, without engaged proactive support from senior management any developments in a new pedagogy are unlikely to grow and be adopted more widely in the institution.
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 these 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. For educators wishing to adopt simulations this means making a compelling argument to justify the additional cost of using a simulation. Other constraints identified and discussed in the Good Practice Guide include professional development for educators, technology, teaching spaces and timetabling.
3. *Understanding students:* Our interviews highlight the importance of understanding the characteristics of the learners using the simulation, including aspects such as class-size, diversity, disciplinary background, level and prior learning.
4. *Selecting a simulation:* There is a bewildering array of simulations and deciding which simulation to adopt is a major consideration. The project attempted to address this confusing landscape by providing an online toolkit to support educator adoption and implementation. As far as we are aware, this online toolkit is the only non-commercial site that provides a comprehensive listing of the range of online business simulations available to educators. Based on the audit, Good Practice Guide also outlines a number of considerations when selecting a simulation.

The findings also highlighted some gaps. 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. Furthermore, very few business simulations focus on the development of interpersonal capabilities such ethics, corporate social responsibility, sustainability, negotiation and conflict resolution.

Pedagogy

Once a simulation has been selected it is critical to ensure that an appropriate pedagogy is developed to optimise student learning. The findings offer some rich insights into how students learn with online business simulations and how business educators can better support learning.

Herrington, Reeves, & Oliver (2010) suggest a framework for authentic learning in digital environments. We have used elements of this framework to organise the implications for pedagogy that have emerged from our project:

1. *Designing authentic tasks and activities*: Authentic tasks involve clear goals with real world relevance and the production (rather than reproduction) of knowledge. The greatest challenge when designing authentic learning tasks is to ensure that students are supported without providing too much help. One approach identified from our interviews includes creating a wider narrative of events impacting on the simulation through newsletters and news broadcasts. The simulation should be embedded within these learning activities rather than appearing to be an add-on to a traditional unit.

2. *Providing access to multiple perspectives:* The simulation can be extended into the classroom and the real world by connecting events to content presented in the unit, using case studies and guest speakers to provide real world examples of what students are experiencing in the simulation.

3. *Supporting 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. These learning opportunities can be encouraged by using pedagogies such as flipped classrooms and collaborative learning techniques and readily available online collaborative tools such as wikis, Facebook pages and Skype.

4. *Coaching and scaffolding*: It takes time to learn most simulations and student learning should 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. Student expectations regarding assessment tasks, time commitment and teamwork should be clarified early.

A simulation-based unit typically requires more class contact time than traditional units. A 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 *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, van Acker, & Fyffe, 2012). Non-traditional pedagogies such as flipped classrooms may also be appropriate.

Assessment

Student learning needs to be assessed and a key contribution of this project is the range of authentic assessment approaches identified from the findings. The findings clearly demonstrate

that the most common learning outcomes from simulations are related to application, evaluation, analysis, creation and collaboration. These outcomes require students to demonstrate higher order skills such as *collaboration, analysis, evaluation* and *creativity*. Designing authentic assessment tasks that require students to practise these skills can encourage deeper learning (Herrington & Herrington, 1998). An analysis of the educator interviews identified the following common approaches to assessment:

1. *Performance metrics:* A key consideration is whether students should be assessed based on the performance of their business. As the literature has pointed out, there may be no link between business performance and learning. For this reason some educators do not allocate any marks to the simulation itself, while others allocate only a small percentage.
2. *Reports and presentations:* these may be done individually or in teams and include proposals, strategic plans, company performance, annual reports or competitor analysis.
3. *Reflective tasks:* these are usually completed individually and require students to maintain a blog or journal or to submit a reflective piece at the end of the simulation.
4. *Team interaction:* typically measured using conventional peer evaluation techniques or alternately by assessing videos, wikis or memos of team interactions. Teams can also be given a problem to solve in a limited time and assessment can then based on observation.
5. *Vivas:* another approach, used more commonly in medicine and applied health education is to conduct vivas based on scenarios and questions related to the simulation.

Evaluation

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 activities and assessment, learning outcomes, team dynamics and satisfaction. It is recommended that this barometer be used alongside other feedback mechanisms such as student evaluations, focus groups and informal feedback.

A Framework for simulation-based pedagogy

We have synthesised these findings and contributions by developing a 'Framework for Simulation-based Pedagogy' (see Figure 4). This framework highlights that **learning outcomes** should be the first consideration when adopting a simulation. The framework also highlights that the **adoption** of the simulation should be embedded and supported by appropriate **pedagogy** and **assessment**. Lastly, the project has developed and shared a tool to support the **evaluation** of simulations. The five elements form the basis for the detailed ideas and tips presented in the Good Practice Guide.

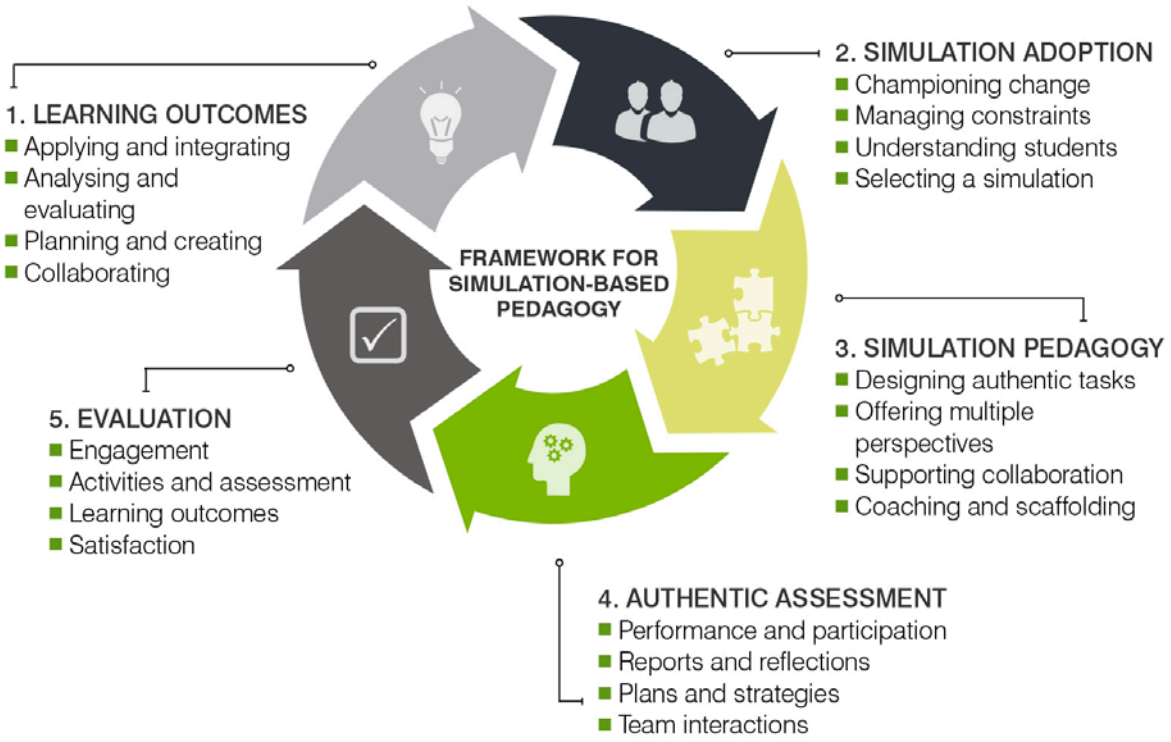

Figure 4. Framework for Simulation-based pedagogy

Chapter 5: Project impact and evaluation

This chapter provides a detailed explanation of the dissemination and engagement activities undertaken by the project team to achieve the aims of the project. The impact of project activities are reviewed using the IMPEL framework. Internal and external evaluation of the project took place throughout the project using both formative and summative indicators and these are briefly discussed at the end of this chapter.

5.1 Project dissemination

Project website

The project website (www.bizsims.edu.au) is one of the most tangible outcomes of the project and will provide an ongoing legacy of the project. The website is the main mechanism for ensuring that other educators benefit from the outcomes of the project. The website provides a range of resources that will demystify the process of adopting and embedding a simulation in a business unit. These resources include:

1. An **A-Z index** of online business simulations as well as more detailed profiles for some of the more popular simulators.

2. A series of 12 detailed **case studies** describing 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.

3. The **Simulation Learning Barometer**, including downloadable files of survey items in various formats as well as benchmark data.

4. A **Good Practice Guide** providing background information and tips for developing simulation-based pedagogies and assessment. The guide has been professionally designed and is available as a PDF file on the project website.

5. An **assessment** section providing tips and ideas for designing assessment to optimise learning from online business simulations.

6. A **resources** section provides newsletters, videos and archived content such as videos, slides and transcriptions of the project forums and webinar.

The website makes use of Responsive Web Design (RWD) to provide an optimal viewing experience across a wide range of devices (from desktop computers to tablets and smartphones). Web analytics and other impact factors are presented in Chapter 6.

National forums

The Project Manager spent a great deal of time creating a contact database of heads of school, program directors, directors of teaching and learning, associate deans of teaching and learning and educational designers. The database included universities as well as the vocational education sector and private education providers. This database was used to introduce the project and to invite participants to the forums. The forums were also promoted through social media channels, university newsletters as well as the networks of our sister projects (funded at the same time).

An initial forum program was developed for Brisbane (hosted by Griffith University), Melbourne (hosted by William Angliss Institute) and Sydney (hosted by The University of Sydney) based on the theme of business graduate capabilities (see Appendix D). Rather than focussing exclusively on online business simulations the Reference Panel suggested a format that included a showcase of three projects focussed on business graduate capabilities. These projects included the Integrated Business Consulting project at UTS (presented by Associate Professor Christine Burton); the ALTC Business Capstones Project (presented by Associate Professor Janis Bailey and Dr Elizabeth van Acker); and the current project (presented by Associate Professor Pierre Benckendorff). Showcase presentations were followed by a panel session and a 90 min interactive workshop focussed on the simulations project (see Appendix E for forum slides). Attendees in Brisbane and Melbourne were also able to participate in a demonstration of a business simulation. These forums were held in November and December 2014.

Following the success of these forums the project team were invited to present another forum in Adelaide in March 2015. Although the original project proposal only included three national forums the budget was able to accommodate a fourth forum in Adelaide focussed on transforming teaching and learning using simulations.

Figure 5. Dr Gui Lohmann presenting at the Adelaide Forum

In order to reach a wider audience, a webinar was organised as part of the 'Transforming Assessment' network led by Professor Geoff Crisp from RMIT University and Dr Mathew Hillier from The University of Queensland. The webinar included participants from around the globe and generated a great deal of 'chatter' during the 50 minute presentation. Evaluations were very positive, as the following comment illustrates: "*It was so timely for my needs! About to start looking at business simulations for online subjects, and currently know *nothing* about them, so session was perfect for me, and the project website looks just what I need to follow up on. Thanks!*"

In total, 174 academics and educational designers participated in these forums and the webinar. The forums generated further interest in the project and provided an important platform for promoting the project website and online resources. All of the forums included learning designers working with academic staff to implement teaching and learning innovations, potentially increasing the impact of the project. For example, one participant at the Adelaide forum noted on her evaluation: "*I'll take ideas back to my school on how these sims could be incorporated into courses and especially a capstone course which we are currently developing.*"

Research and publications

Given that academic papers are often written at the end of a project and the peer review process requires additional time the project team has focussed on the collection of data to support the publication of papers after the funding period. While the timelines do not allow for academic publications within the funding period, the team has been active in disseminating the project through various conference presentations. The project was showcased at a number of national conferences and forums by supporting activities, events and sessions that raise the profile of the project. Table 2 provides a summary of completed and planned presentations, publications and reports.

Table 2. Project presentations, publications and reports

Working Title	Type	Target/Source	Status
Project Overview	Presentation	*OLT Conference, Sydney*	Presented 06/2014
Online Business Simulations	Presentation	*Joint Universities Research Symposium, SCU*	Presented 08/2014
Online Business Simulations	Presentation	*Griffith University Celebrate Teaching Week Active Learning Session*	Presented 11/2014
Online business simulations and AIRLINEOnline	Presentation	*Griffith University Celebrate Teaching Week 'Fire Up' Session*	Presented 11/2014
Technology enabled learning: Can it enhance the student learning experience?	Sharing Practice Session	*ASCILITE Conference*	Presented 11/2014
Creating educator resources for online simulation-based pedagogies in tourism	Refereed	*CAUTHE Conference*	Presented 2/2015

Working Title	Type	Target/Source	Status
and hospitality	Conference Paper		
Good Practice Guide: Online Business Simulations	Report	*Project Website*	Published 6/2015
Transforming learning and assessment with online business simulations	Full Journal Article	*Journal of Management Education*	Draft by 7/2015
Teamwork and online business simulations	Full Journal Article	*Academy of Management Learning and Education*	Draft by 7/2015
A bibliometric analysis of the business simulations literature	Full Journal Article	*Education + Training*	Draft by 8/2015
Learning outcomes of online business simulations	Full Journal Article	*International Journal of Educational Research*	Draft by 9/2015
Modelling satisfaction and academic performance associated with online business simulations	Full Journal Article	*Academy of Management Learning and Education*	Draft by 10/2015

5.2 Project engagement

A concerted effort was made to establish a project community. At the conclusion of the project this community included 170 participants from 48 different institutions and organisations, including 28 Australian universities and three New Zealand universities, five private education providers, one VET provider and eleven other companies and associations. Project team members engaged with stakeholders by undertaking a number of activities to raise the profile of the project. These activities included the national forums and webinar, the project website, conference presentations, social media and newsletters. Table 3 provides a summary of major presentations. The number of participants at the project forums far exceeded the expectations of the project team. It would be fair to say that there is considerable interest in the use of simulations in business education and that many participants had not yet implemented a simulation at their institution. More detailed evaluations for the forums held in Adelaide, Brisbane, Melbourne and Sydney are provided in Appendix F, while an evaluation report for the webinar is provided in Appendix G.

In terms of reach, the forums organised by the project in Adelaide, Brisbane, Melbourne and Sydney attracted 174 educators and learning designers. Support staff (mainly learning designers) were the largest group, accounting for 38 per cent of participants. 28 per cent of participants were lecturers and 17 per cent were senior lecturers. The academic audience included nine associate deans with teaching and learning responsibilities. Universities were well represented, with 84 per cent of the audience but our efforts to widen the project community also attracted private education providers (6.5 per cent), VET teachers (5.6 per cent) and various other associations and organisations (4.2 per cent). Not surprisingly most participants were from New South Wales, Victoria, South Australia and Queensland but a small number of participants

travelled from interstate and subsequently the forums reached participants from all Australian states as well as the ACT and New Zealand. The webinar conducted in March further widened the reach of the project.

Table 3. Major face-to-face and online engagement activities

Event	Date	Venue	Participants
OLT Conference	10-11 June 2014	Darling Harbour, Sydney	200
Southeast Queensland Joint Universities Symposium in Tourism and Hospitality	7 August 2014	Southern Cross University	17
Griffith University Celebrate Teaching Active Learning: Engaged and Engaging	5 November 2014	Griffith University	22
Griffith University Celebrate in Teaching Week 'Fire Up' Session	7 November 2014	Griffith University	76
Sydney Forum	10 November 2014	The University of Sydney	34
Melbourne Forum	11 November 2014	William Angliss Institute	55
Brisbane Forum	3 December 2014	Griffith University	25
ASCILITE	23-26 November 2014	Otago University, New Zealand	27
CAUTHE	2-5 February 2015	Southern Cross University	15
Webinar	4 March 2015	Transforming Assessment Series	27
Adelaide Forum	27 March 2015	University of South Australia	33
TOTAL PARTICIPANTS			531

Google Analytics was used to track engagement through our project website. Table 4 provides a summary of key web metrics. Likewise, engagement with the content (see YouTube views presented later) has been very positive.

Table 4. Google Analytics for www.bizsims.edu.au (at 4 June 2015)

Metric	Performance
Sessions	2,342
Users	1,630
Page views	8,237
Pages/Session	3.52
Avg. Session Duration	03:15
Repeat Users	30.4%
Top 5 Countries	Australia (70.0%), USA (6.9%), UK (3.3%), NZ (3.0%), Germany (1.0%)
Sources	Direct URL entry (67.7%), search engines (17.1%), referrals (10.5%), social media (4.7%)

Various strategies were used to drive traffic to the website, including flyers, presentations and posters at conferences, the national forums, social media announcements, Wikipedia entries and information posted on related websites. About half of all referrals were generated from our Wikipedia entries but websites such as acen.edu.au and transforming assessment.com were also important traffic generators. At the conclusion of the project the website was ranked 8th when searching Google for 'online business simulations' and 'business simulations'. This ranking is important because 17% of all traffic to the project website was generated from search engines. The website will continue to be hosted by the UQ Business School and will be maintained by the Project Leader until at least 2020 as required by the OLT.

A number of social media platforms were also used to engage with the project community. Engagement across most social media channels was disappointing with only seven followers on twitter, 10 members on Facebook and 17 members on LinkedIn and YouTube. A more effective social media strategy involved using existing social media interest groups (e.g. ACEN, CAUTHE, ASCILITE) to announce project activities. In total 4.7% of all website traffic originated from social media activities, with LinkedIn accounting for the bulk of social media referrals.

Although the traditional social media platforms were less effective at engaging stakeholders YouTube proved to be very effective in communicating various aspects of the project. We have found that online videos were an effective medium for sharing case studies, demonstrations and recordings of forums and webinars. Collectively, videos from the project's YouTube channel have received over 600 views, with 56% of these views generated from the YouTube channel and the remainder generated from the project website. This view count includes 98 views for the webinar video hosted on the *Transforming Assessment* Channel. More detailed statistics are presented in Table 5.

Table 5. YouTube Metrics (at 4 June 2015)

Metric	Performance
Videos	18
Views	650
Minutes watched	1,179 minutes
Average view duration	2:08
Top 5 countries	Australia (59%), USA (5.8%), UK (5.2%), Switzerland (4.6%), Germany (2.4%)

5.3 Project impact

The impact plan was developed around the seven main prompts of the IMPEL framework.

1. Indicators of readiness for change

New tertiary education quality standards frameworks have emphasised the need for innovative pedagogies that require learners to demonstrate the application of knowledge and skills and educators are increasingly looking for new ways to engage learners. The level of engagement and enthusiasm of participants from a broad section of the business education community was an indication of the climate of readiness to change. Some of the forum attendees were educators already using simulations with an interest in improving their pedagogy and assessment but many were new to online simulations. It is evident from participant feedback that many educators were surprised by how much the sophistication of business simulations has advanced in the last 5-10 years.

Forum attendees also included program directors and learning designers who guide and support educators to implement innovative pedagogies. Here too the feedback was that this project was very timely as many institutions were reviewing programs and considering the role of simulations, particularly in capstone courses. As noted in the original proposal, there was also an acknowledgement from several participants that Work Integrated Learning was not always a practical or desirable means for learners to acquire real world experience and simulations are seen as an alternative pedagogy for achieving some of the same outcomes.

2. Impact management planning and evaluation ladder (IMPEL)

This project will benefit stakeholders at multiple levels in a number of ways. Appendix H summarises the anticipated impact of the project using the IMPEL model. Note the time horizon has been extended from two years in the original IMPEL model to five years because of the nature of this project. Most public universities operate on 3-5 year curriculum review cycles and it is anticipated that many institutions will only enact changes when programs are reviewed as part of normal internal cycles. As part of the final project debrief each team member was asked to provide an impact statement describing how the project has impacted on their own

institution. Table 6 summarises the key changes that have been enacted already as a result of the project.

Table 6. Project impact at participating institutions

Institution	Impact
The University of Queensland	• Based on the project outcomes, Associate Professor Benckendorff has adjusted the pedagogy and assessment in his postgraduate course to improve the learning experience for students. • The success of this OLT project has generated other OLT grant opportunities. • Introduction of a bespoke simulation in the first year accounting course • Preparation underway to introduce a new simulation in a strategic tourism management unit.
Griffith University	• Based on the project outcomes, Dr Pratt has adjusted the pedagogy and assessment in her undergraduate graduate course to further improve the learning experience for students. • Dr Lohmann is extending his aviation management simulation to a corporate training environment. The first course is being developed for the Airport Council International (ACI), the world peak airport body, as part of their executive program delivered in November 2015.
La Trobe University	• After participating with the OLT project, Mr Strickland has made changes to the assessment in his undergraduate course to create a better blended learning experience for students.
University of South Australia	• Based on the project outcomes, Mr Reynolds has adjusted the pedagogy and assessment in her undergraduate graduate course to further improve the learning experience for students.
William Angliss Institute	• Currently developing an suite of integrated units of study based on an online hotel simulation.

In addition, several forum participants have emailed members of the project team seeking more information about various aspects of the project because they are planning to implement a simulations-based course at their institutions.

3. Stakeholder engagement

The project team coordinated a range of activities to engage with various stakeholders who might benefit from the project. These activities are described in more detail above (see Project Engagement) but in brief, engagement through face-to-face forums, conference presentations and social media discussions have been one of the highlights of the project. In some cases

participants have travelled from other states and countries to attend the forums. The project has brought together associate deans, educators and learning designers to share ideas about how simulations can enhance the learning outcomes of business programs. Engagement has occurred across a wide spectrum of institutions from private education providers to Go8 universities. Presentations at international conferences such as ASCILITE and CAUTHE have profiled the project with a wider audience, often outside the business field. Likewise, the webinar has attracted interest from as far afield as the UK. Individuals who could not attend face-to-face sessions have been provided with slides, video recordings and transcripts of the forum. The project team has also engaged positively with the ABDC Teaching and Learning Network. Finally, the project website has provided a critical repository for all project materials and resources and this will be maintained well after the conclusion of the project. Statistics and attendance numbers for these various engagement activities are detailed in other parts of this report.

4. Project transfer

A 'life beyond the project' legacy arrangement is currently being considered. We have initiated discussions with the Association for Business Simulation and Experiential Learning (ABSEL) based in the USA as well as Simulations Australasia about using the community of practice that has been created around the project to create a new network. The ABDC has also indicated an interest in profiling the project on its website and as noted earlier, the project website will continue to live on as a legacy of the project.

5. Barriers to change

A number of barriers to change have been identified throughout the project and as a result of formal and informal feedback. Table 7 summarises the barriers to change in teaching and learning practice and the strategies proposed by this project to reduce the barriers.

Table 7. Barriers to change

Barriers	Strategies
Difficulty embedding standards	Reduce the workload associated with embedding simulations by creating templates, case studies, easy to use guides and shared resources. Facilitate workshops to demonstrate how simulations can be mapped and embedded into programs to enhance graduates capabilities.
Resistance to change	Simplify the process of embedding simulations and convince stakeholders of their benefits through presentations, publications and networking.
Lack of awareness	Use social media tools, existing networks and open education resource repositories to build awareness.
Lack of funds	Develop arguments that educators can use to justify the value of funding simulations

6. Tracking impact

Both formative and summative indicators were used to monitor the impact of the project. An external evaluation team was engaged to help guide projects funded in the same cluster. The online engagement metrics and the number and type of participants at forums and workshops all provide indicators for tracking impact.

7. Availability of materials

The project website will remain in place for at least five years and will be linked to key organisations including the ABDC, ACEN and other organisations. Materials and resources will be maintained and updated by the Project Leader and the website will be hosted free of charge by the UQ Business School. These resources will include case studies, simulations index, the simulation learning barometer, benchmarking data, papers and reports.

5.4 Project evaluation

Opportunities for both internal and external evaluation and formative and summative evaluation were embedded within the project's development. Internal formative evaluation of progress, content, design and deliverables occurred regularly via teleconferences. Three documents were generated for each meeting: an agenda, meeting minutes and post meeting actions (PMAs). The PMAs were reviewed at the start of the subsequent meeting to ensure that the project was progressing. Other formative evaluations have included:

- Continuous feedback from and reference panel;
- Feedback from project manager, who also has experience with other OLT projects; and
- Feedback from participants at conference presentations and forums.

An external evaluation team consisting of Professor Grace Lynch, Geoffrey Edlund and Dr Garry Allan was appointed by the OLT to evaluate the project. The evaluator's key tasks were to monitor the processes of the project and compare them against planned processes, to monitor the achievement of milestones as specified in the project plan, to continuously provide feedback that enabled the project team to make improvements (formative evaluation), and to provide a final written report to the OLT objectively assessing the merits of the project retrospectively. An evaluation framework was developed by the evaluation team in consultation with the Project Leader (see Appendix I). The external evaluators consulted with the project team by videoconference, email exchange and in person during the project, especially at milestone activities such as the national forums. The project team would like to thank the evaluators for their constructive engagement and the detailed and very helpful evaluation report presented in Appendix J.

Chapter 6: Conclusions

In concluding this report, the project team would like to draw attention to the challenges and success factors identified during the project as these may be of value to future projects. We have also identified links to other OLT projects and have suggested future opportunities both for simulations-based research and for the coordination of national teaching and learning projects. A final conclusion is provided to reiterate the key contributions of the project.

6.1 Challenges and success factors

The project team would like to highlight five challenges and lessons learned from the project:

1. *Timelines:* An initial challenge was the announcement of a successful grant outcome in early December. The search for a Project Manager commenced almost immediately in December but a capable and dedicated Project Manager was only appointed in early February. The timing of the project's commencement meant that it was difficult to get all of the team members together for the first face-to-face meeting and this resulted in a lack of momentum at the start of the project. The team overcame these timing issues by meeting in smaller teams to work on specific deliverables.

2. *Online presence:* The website was launched about four months later than originally planned and this delayed other activities because the website not only provides prompt dissemination of information, but also attracts early interest in the project. In hindsight, it would have been beneficial to prioritise the development of the website.

3. *Social Media:* We were disappointed by the lack of engagement through social media channels. In hindsight it would have been useful to establish a social media presence much earlier in the project but we were reluctant to do so before the website was launched. The key lesson is that a strategy is needed to drive traffic and engagement on social media. Given the traffic generated to our website by these different platforms we would suggest that future projects only consider LinkedIn and YouTube.

4. *Data Collection:* The initial response to the Simulation Learning Barometer in the second half of 2014 was poor. There were two reasons for this: (1) partner institutions offered fewer simulation-based courses during this time, and (2) although the barometer was available both online and in paper format most educators opted to use the online version. In order to improve the number of responses the project was extended and paper-based surveys were used more heavily, ensuring a higher response rate.

5. *Forums and conference presentations:* The single most important lesson is the need to network, to talk with colleagues, and to present ongoing work to generate momentum and build the project community. The national forums were an excellent way to generate case studies and learn about innovations and ideas but these were conducted towards the end of the project, creating many new leads to follow up in the final months.

There were also a number of factors critical to the success of the project including:

1. *Project Management:* An experienced Project Manager was appointed reasonably soon after the project commenced and this provided an opportunity for her to attend the OLT's Project Manager workshop to network with other Project Managers and OLT staff.

2. *Post Meeting Actions:* Accurate records of decisions and actions are useful for moving the project forward. The use of PMAs has been invaluable in keeping track of key tasks and responsibilities. This 'to do' list was an innovation of our Project Manager and was instrumental in holding various team members accountable for key tasks.

3. *Email Communications:* Setting up a dedicated project email using Gmail in January 2014 allowed us to contain and manage all project communications. The bizedsims@gmail.com address was used throughout the project to maintain consistency. The project inbox contained over 2,600 email messages by the conclusion of the project.

4. *Team Collaboration:* A shared Dropbox folder was used to share all documents between team members. This ensured that the most recent versions of documents were always available to everyone. The project generated over 1,600 files (30GB). Regular meetings with the project team, followed by less formal events helped to build camaraderie and respect which allowed the team to function effectively. The team also used virtual meetings and smaller face-to-face meetings to progress specific deliverables. After some trial and error *zoom.us* was selected as the virtual meeting platform.

5. *Stakeholder awareness:* Investing time in building a database of contacts that would later be used to promote the project and engagement activities. Presenting the project to the Australian Business Deans Council Teaching and Learning Network at an early stage helped in building awareness at senior levels.

6.2 Links with other OLT projects

Past ALTC/OLT projects focussing 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. However, a number of less obvious links with other OLT projects and fellowships have become evident during the course of the project. These include:

1. PP10-1646 Capstone courses in undergraduate business degrees: better course design, better learning activities, better assessment (2010). Simulations are often used in capstone courses and there are clear parallels between the findings of this project and some of our own findings.

2. SD12-2578 Reforming banking pedagogy with online simulation (2012). Dr Jean-Pierre Fenech's Seed Project provides a useful case in the implementation of a business simulation with a banking and finance focus.

3. Capstone curriculum across disciplines: synthesising theory, practice and policy to provide practical tools for curriculum design (2015). Associate Professor Nicolette Lee's fellowship on capstone courses also links with this project for the reasons discussed above.

4. Rethinking Assessment in the Participatory Digital World: Assessment 2.0 (2011). Professor Geoff Crisp's fellowship provides much of the justification for the current project and the resources generated by this fellowship have been invaluable in supporting our activities.

The current project also links with various efforts to develop Threshold Learning Outcomes for the business fields. Based on our findings, simulations can play a critical role in developing some of the learning outcomes that are difficult to achieve with traditional pedagogies.

6.3 Future opportunities

A number of future opportunities and ideas have arisen from the current project:

1. The interest and momentum surrounding online business simulations continues to build. This project has generated a community of almost 200 interested stakeholders and there is scope to build on this by forming a network to act as a custodian for the project website and to continue the legacy of the project.

2. It is suggested that simulations and other technology enhanced learning pedagogies continue to be included and supported through future grant programs.

3. Considerable efficiencies could be realised through a more coordinated approach to national teaching and learning projects. The OLT conference, held for the first time in 2014 was a very useful activity but most projects operate in isolation. A simple online calendar listing various project events would be useful when scheduling workshops and forums to (a) avoid clashes and (b) leverage existing events. A database of experienced Project Managers would also assist in ensuring that talented individuals are not lost from the system when their projects are concluded.

6.4 Conclusion

The aims of this project were to map the features and characteristics of online business simulations; assess the challenges associated with the integration of online simulations into sustainable teaching practice in business education; evaluate the contribution of online simulations and related pedagogies to student learning outcomes; and identify and promote innovative pedagogies and strategies associated with the use of online business simulations in universities. In the process of achieving these aims the project has made several key contributions regarding the learning outcomes, adoption, pedagogy, assessment and evaluation of online business simulations. These five areas form the basis for the 'Framework for Simulation-based Pedagogy'.

1. **Learning outcomes:** Simulations are particularly effective in helping learners to integrate and apply business knowledge and skills. Our findings also indicate that simulations allow students to practise analysis, evaluation, creation and collaboration skills.

2. **Simulation adoption:** Simulation-based pedagogies require tactful management of the institutional constraints and challenges that have been identified. A champion is needed to promote and sustain the use of a simulation. Active engagement with supportive program directors, senior managers and decisions makers is a necessity. The background and needs of students should also be considered. The Good Practice Guide and companion website attempt to address the complex landscape of online business simulations by providing an online toolkit to support adoption and implementation.

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.

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 included assessing team interaction; using reports and presentations to communicate proposals, plans, company performance and competitor analyses; asking students to reflect on their learning experience; or requiring students to complete a viva.

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.

Overall, this project has been an extremely positive experience. The project has brought together a team of like-minded educators who have formed strong relationships that will ensure ongoing work in this area.

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Appendices

Please refer to the following link <http://www.olt.gov.au/project-enhancing-student-learning-outcomes-simulation-based-pedagogies-2013.>for the project's other deliverables and appendices:

1. Online Business Simulations Good Practice Guide
2. All final report appendices (Part B)
   - Appendix A: Student Focus Group Questions
   - Appendix B: Simulation Learning Barometer
   - Appendix C: Educator Interview Questions
   - Appendix D: Graduate Capabilities Forum Flyer
   - Appendix E: Graduate Capabilities Forum Slides
   - Appendix F: Forum & Workshop Evaluations
   - Appendix G: Webinar Evaluation
   - Appendix H: Anticipated Impact using the IMPEL Model
   - Appendix I: Evaluation Framework
   - Appendix J: Evaluation Panel Report
   - Appendix K: Certification by Deputy Vice-Chancellor Academic