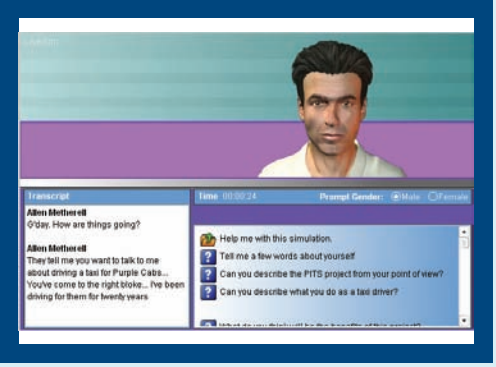

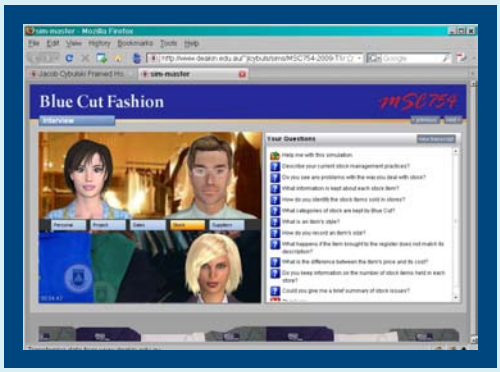

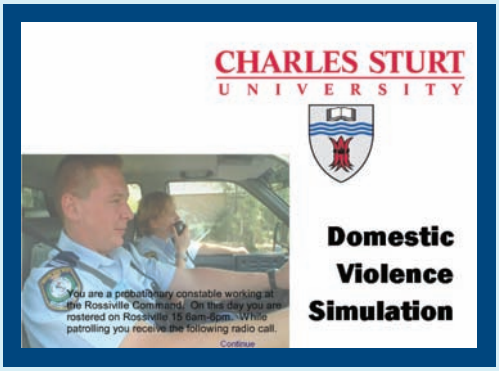

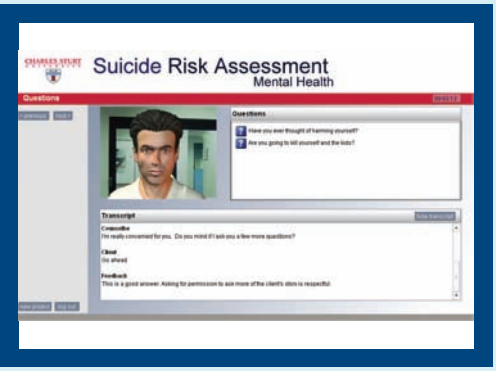

AUSTRALIAN LEARNING & TEACHING COUNCIL

Promoting excellence in higher education

Building academic staff capacity for using eSimulations in professional education for experience transfer

A Guide to Designing, Developing, Using and Evaluating eSimulations for Professional Learning in Australian Higher Education

2010

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2010

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1. Introduction

This Guide's aim is to contribute to the development of the capacities required by educational institutions to design, develop, implement, evaluate and research the impacts of eSimulations as an integral part of their e-learning, blended learning and distance education (where applicable) strategy. The Guide does this by presenting the range of eSimulations which were developed in the course of the ALTC project, and by reporting key findings which emerged in undertaking this work. The Guide, therefore, focuses on eSimulation intentions, processes and products, and ways in which organisational capacities can be established and sustained to enable such online learning environments to flourish in the sector. The Guide can be used in multiple ways by multiple audiences:

- **Academic teachers** who wish to adopt value adding e-learning strategies to enhance the education of their students in professional fields and disciplines offered in a range of different contexts (i.e. commencing and later level undergraduate programs, postgraduate coursework programs, continuing professional education and training programs; on-, cross- and off-campus teaching settings; online and face-to-face classrooms; diverse student cohorts) **(see sections 2, 3 and 4);**
- **Instructional designers** who wish to learn of new methodologies for the cost-effective development of eSimulations as an integral part of an institution's e-learning and blended learning approach **(see sections 2, 3, 4 and 5)**;
- **Media producers** interested in the skills and technologies involved in developing and delivering various types of role-based eSimulations **(see section 5)**;
- **Institutional leaders** wishing to make sound investments in learning, teaching and technologies to secure organisational effectiveness, efficiency and competitive advantage in online and blended learning **(see sections 8, 9 and 10)**;
- **Institutional managers** who must establish and maintain information technology infrastructures **(see section 6)**;
- **Evaluators and researchers** wishing to assess the impact on learning and teaching of eSimulations, and in advancing workable theories relating to these applications in online and blended learning **(see section 7)**;
- **Professional bodies and industry experts** wishing to see e-learning technologies applied in ways which will better prepare students for professional practice, and assist them in their continuing professional development **(see sections 2, 3, 4, 8 and 9)**;
- **Professional and corporate trainers** (who may be associated with university offerings) wishing to use eSimulations as a major method for the ongoing training and development of employees in distributed work environments **(see sections 2, 3, 4 and 5)**.

The Guide has been constructed by a number of members of the project team, each with their own experiences, expertise and points of view on eSimulations. The strength of the guide is in its eclectic nature. It represents the emerging diversity of perspectives on the field.

We have not attempted to construct a 'how to' manual on eSimulations that lays out the definitive approach and process to getting eSimulations 'right'. We do not want to argue that we have mastered every aspect of the entire field of activity through the ALTC project. There is still much work to be done in the field of eSimulations in higher education. Developing and using eSimulations effectively is a highly creative task, contingent upon local need and circumstances. There are no ready-made prescriptions or formulas for universal success. We hope that by sharing product outcomes, key findings and outstanding challenges, the Guide will be a stimulus for more parties to become more actively involved in the sector, realising the potential of eSimulations in university education.

2. Setting the context: eSimulations for blended, online, distance and offshore education

In the 21st century, higher education has a number of new (and continuing) teaching and learning challenges to meet. External pressures have forced institutions to focus more strongly on vocational courses at the expense of more scholarly classical studies. Reductions in finance available from governments have led to the constant need for finding alternative funding arrangements. Extra demands are placed on academic staff to do more with less in respect to their teaching and research. The nature of student cohorts has changed quite considerably, with respect to diversity in ability, cultural background, learning preferences, technology experience, levels of motivation, and the time they are able or willing to spend on their study (Biggs, 2003).You might like to consider whether you agree with the following types of observations which have been made by teachers on newer generations of students:

- They have less time for everything;
- They pay less attention (to authority?);
- They demonstrate less persistence and endurance;
- They see less need for deep knowledge;
- They have less fear of failure, and are always open to options;
- They see their new wealth as buying results and act like pragmatic customers or consumers of (educational) services;
- They undertake a critical rating of benefit for effort expended;
- They consistently value friends and networks.

If you see some merit in these observations, what implications do such observations have for fostering student learning? In relation to higher education, Oblinger and Oblinger (2005) highlighted the Net Generation's (or Generation Y, those born on or after 1982) learning preferences as:

- being strongly team and peer-to-peer based, i.e. seek out help from their friends and gravitate towards team approaches;
- demanding engagement and experience, i.e. they like to learn by discovery and doing things;
- being strongly visual and kinesthetic, i.e. they are visual communicators and like to be physically immersed in their work;
- wishing to learn things that matter, i.e. they switch off quickly from things that don't interest them and that don't seem relevant to their world.

What clues do these observations give us about designing and operating contemporary online-supported teaching and learning environments? If, as Oblinger and Oblinger (2005) argue, the Net Generation wishes their learning experience to be digital (while still valuing highly effective forms of interpersonal, face-to-face communication), connected, experiential, immediate and socially based, then what implications does this have for the appropriate development and use of technologies in higher education?

A further challenge for higher education has been the advent of e-learning that has seen a range of new technologies available for learning. It has now become such a firmly entrenched element in many higher education courses that e-learning environments are used in some form or another across almost all institutions, and in almost all discipline areas. Through a process of gradual development over several years, institutions have been implementing various types of digital environments that provide access to study materials and resources, and facilitate electronic communications. Concurrent with this shift has been greater emphases on the need for more effective teaching approaches to cater for the various ways students learn, and the various preferences they have for bringing about their own learning in respect to both content and media.

For decades, much university teaching has been based on a transmission model in which lecturers and tutors had the discipline knowledge and it was their responsibility to impart or transmit it in some way to their students. With the introduction of more powerful technologies over the years, and more particularly the use of e-learning, the expectation was that teaching and learning processes could be transformed. Multi-media and communication technologies have the potential to bring to life much university abstract learning. It was thought that online communities of inquiry would lead to more academic learning. However, as Garrison and Anderson (2003) argue, these advances have not led most students 'to approach learning in a critical manner and process information in a deep and meaningful way' (p. 5). Indeed, a number of authors have argued that in spite of new technologies, the transmission model is still a dominant paradigm in many courses that include e-learning, because there has been a tendency to simply move existing courses online rather than re-conceptualise the design of teaching, learning and assessment in order to maximise the potential offered by digital technologies. (See for example Biggs 2003; Garrison and Anderson, 2003; Laurillard, 2003.) These same authors argue the need for change that incorporates approaches that apply evidence from research into teaching practices, that is, evidence-based teaching. In particular, because teaching is personal, Biggs (2003, pp. 5–7) argues for the use of the scholarship of teaching brought about through reflection on teaching actions in a particular context.

This need for change has prompted a great deal of rethinking about university approaches to teaching and learning with technology, and has led to the publication of a number of seminal texts that argue the case for change and provide suitable frameworks or blueprints for doing so. (See Bates and Poole, 2003; Biggs, 2003; Garrison & Anderson, 2003; Jonassen, Peck & Wilson, 1999; Laurillard, 2003; Ramsden, 2003.) These texts and other key papers in the field present a clear consensus about what constitutes effective teaching and learning with technology.

The above-mentioned authors have articulated principles, values and beliefs that underpin effective teaching and learning in any environment, including e-learning environments. These principles are based on a clear understanding of the nature and breadth of academic knowledge, the ways in which knowledge is acquired and used, and approaches to teaching and assessment that bring about desired learning. We argue that the types of eSimulations developed in this ALTC project are best understood as one constructive response to the challenges outlined above. They have been well grounded both theoretically and practically. They represent a valuable field of development in contributing to the education of professionals, and to the sector's capacity to enact more valuable forms of e-learning environments. They complement and intersect well with other e-learning developments funded by the ALTC, most notably in role-play and 3D immersive worlds.

2.1 What is a simulation?

Simulations have become commonly used tools in contemporary society, having been used for decades to meet training needs for a number of human endeavours in fields such as the military, medicine, science and economics. As Klein and Herskovitcz (2005) point out, many simulations now are computer-based to take advantage of the increasingly sophisticated computational tools available in online environments. In the field of higher education, eSimulations are increasingly being used for teaching and learning purposes, particularly in areas related to the professions such as business, healthcare, public relations, journalism and law. Indeed, as Aldrich (2003, p. 8) points out, in fields such as medicine, nursing, pilot training or military training, simulation use is critical for practising skills before being required to do the real thing.

The nature of simulations is complex. They are defined in a number of different ways by different people. The general definition used by Wikipedia is: 'Simulation is the imitation of some real thing, state of affairs, or process. The act of simulating something generally entails representing certain key characteristics or behaviours of a selected physical or abstract system'. In simpler terms, Prensky (2004, p. 1) suggests that 'simulation is, *by definition*, pretending. ***All*** simulations are ***tools that give you ersatz*** (as opposed to real) ***experience***'. Aldrich (2004) states that simulations 'model reality', and more specifically, 'they can rigorously but selectively represent objects or situations' as well as 'user interactions'.

Aldrich (2004) identifies six criteria that he sees as critical in educational simulations. Three describe content elements, 'linear, systems, and cyclical', and three describe delivery elements, 'simulation, game, and pedagogy' (p. 1). In elaborating on these elements, Aldrich (2004) suggests that linear content involves sequencing, or step-by-step procedures; systems content includes 'the components of the system and how those components impact each other' (p. 1); and cyclical content relates to 'activities that can be infinitely combined to create an outcome' (p. 2). In respect to delivery, he believes simulation elements 'enable discovery, experimentation, concrete examples, practice, and active construction' of the three content elements (p. 6). Game elements can 'increase the enjoyment' of the experience, which means learners spend more time on it, resulting in increased learning. On the other hand, too many game elements 'distracts from or waters down the learning' (p. 7). Pedagogical elements help to focus students' attention on how to be productive, though too many of those elements can leave learners feeling as though they are using an instruction manual or 'mindlessly following directions' (p. 8). Aldrich (2004) claims that it is only through attending to all six elements that we obtain results that actually change people.

The critical question posed by Prensky (2004, p. 9) is: 'How close to life does the simulation have to be to do its job?'. He suggested that the higher the fidelity, the higher the cost of producing the simulation, so the degree of fidelity required for success should correlate closely with its purpose. In learning or training for the professions, he suggests fidelity requirements 'are more complicated and varied' (p. 10), therefore he cites a recommendation that low fidelity simulation should be used 'for learning concepts', and 'higher fidelity simulation for learning about things' (p. 10). Aldrich (2004, p. 102) suggests that simulations will become increasingly realistic but 'will never perfectly replicate reality'. Indeed, he argues that the environments provided by simulations may be better for learning than real life situations because they can remove distractions and focus attention on essential concepts.

2.2 Types of educational simulations

One way of categorising simulations is by their purpose, whether that be 'prediction, teaching, or entertainment' Prensky (2004, p. 3). The three purposes can often be seen in the same simulation, particularly in military and economic fields. Another way to categorise them, according to Prensky (2004), is by 'what they simulate', that is 'things, systems and people' (p. 4). He presents a useful 3x3 simulation matrix that aligns each of the purposes: prediction, teaching, and entertainment, with what is simulated: things, systems and people, and provides examples for each part of the matrix. In similar vein, Brozik and Zapalska (2005) discuss types of simulations and games. They argue that each must have purpose and a structure and different types of simulations and games emerge through varying combinations of purpose and structure.

Klabbers (2000) discussed three simulation modes based on closed and open models. In closed models, the connectivity occurs via an expert and there is no actor to address (zero action option), while in the one (or *n*) actor option, connectivity is via an expert and facilitator, and 'the expert is the go-between with the model' (p. 394). In open models currently available, connectivity can occur via an expert, via a single user, or via a number of users. Corresponding with each of these, interactivity occurs via zero actor, one actor, and *n* actors (p. 395). The key point is that users cannot change the structure, so 'the potential for experimenting is bounded by the structure of existing rules and resources'. Having considered the literature on notions of 'learning as acquisition' which he equates with artificial (allopoietic) systems structured by the external information it receives, and 'learning as interaction', which he equates with autopoietic environments structured 'by its system of interactions' (p. 399), Klabbers then suggested a third simulation mode, the participative interactive mode, where 'learners are given the opportunity to interactively build their own system of resources and rules'.

2.3 The types of eSimulations developed in the project

The focus of our ALTC project has been on the development and delivery of computer-based simulations with various articulations to other media and the physical environment. It is assumed that the eSimulations are 'delivered' increasingly and overwhelmingly now from a computer via a network ('e') but on various devices such as screens, including mobile screens. The eSimulations developed in the project are characterised by five common elements:

1. The learner is put in the role of a professional in a virtual professional context;
2. The learner is interacting with a virtual patient/client character(s) either represented in synthetic (avatar) forms or by video recorded actor(s) playing the patient/client role(s);
3. The learner selects questions from various pre-determined menus (or offline investigations) or interacts with certain programmed events to elicit information from the virtual characters on their professional needs, circumstances and requirements;
4. The learners, on the basis of information gathered, undertake diagnoses of patient/client problems and recommend appropriate courses of action or create appropriate professional documentation (which may happen through various online and offline means);
5. Formal assessment of learners' professional problem-solving capacities occurs through various artefacts created by them to address client/patient needs.

The advantages of these types of eSimulations are that they:

- are interactive, stimulating and enjoyable for learners;
- allow single-user or team interaction;
- provide realistic or real-world scenarios;
- enable controlled and predictable outcomes;
- promote trial-and-error learning in a risk-free setting;
- reduce face-to-face time and teaching resources;
- provide the basis for further discussion.

Possible disadvantages include:

- they can be expensive and time-consuming to build;
- they are often context and discipline specific;
- they may require extensive technical skills;
- as a result, it is best to focus on non-volatile concepts and ideas.

At this point it is important to acknowledge the commonalties between the types of role-based eSimulations developed in this project and those in the ALTC-funded project entitled 'Encouraging Role-based Online Learning Environments – EnRoLE project' (http://enrole.uow.edu.au/what.html). The EnRoLE project developed capacities to enhance the development and use of role-plays in Australian universities. The role-plays featured are designed to increase understanding of real life human interaction and dynamics by:

- having participants assume a role – being in someone else's shoes;
- asking participants to perform authentic tasks in an authentic context;
- involving substantial in-role human interaction such as collaboration, negotiation and debate;
- ensuring interaction between roles takes place mainly in an online environment;
- making learning outcomes assessable and generating opportunities for student reflection.

The point of difference we argue lies in the focus of our role-based eSimulations being on the student-as-professional interacting with virtual characters, rather than with fellow students playing various characters of relevance to the scenario as embodied as a key element of the EnRoLE project. Both broad categories can though develop valued capabilities of relevance to the educating of students in various professional fields.

2.4 Benefits of simulations for experiential and authentic learning

There is an abundance of literature on the experiential learning approach, incorporating scenario-based learning, case studies and role-play, all of which are commonly used in simulations. (See, for example, Bowen, 1987; Caffarella & Barnett, 1994; Cantor, 1997; Kolb, Rubin, & McIntyre, 1971; Kolb, 1981; Kolb, 1984; Kolb, Boyatzis & Mainemelis, 2001; Saunders, 1997.)

Experiential learning incorporates authentic activities that have particular characteristics in common. According to Reeves, Herrington and Oliver (2002), and Herrington, Oliver and Reeves (2003), authentic activities:

- have real world relevance;
- are ill-defined, requiring students to define the tasks and sub-tasks needed to complete the activity;
- comprise complex tasks to be investigated by students over a sustained period of time;
- create polished products valuable in their own right rather than as preparation for something else;
- provide the opportunity for students to examine the task from different perspectives, using a variety of resources;
- provide the opportunity to collaborate;
- provide the opportunity to reflect;
- can be integrated and applied across different subject areas and lead beyond domain-specific outcomes;
- are seamlessly integrated with assessment;
- create polished products valuable in their own right rather than as preparation for something else;
- allow competing solutions and diversity of outcome. (p. 63)

These characteristics indicate that the nature of authentic activities is consistent with notions of experiential learning and learning space as described by Kolb and Kolb (2005), as well as scenario-based learning described by Kindley (2002).

Hertel and Millis (2002) argued that simulations can further educational goals because they are a powerful tool for learning. In their book, they detail several reasons for this. For example, students are generally more highly motivated, they are able to acquire more usable, transferable knowledge, the active learning approach is more likely to lead to deep learning, therefore achievement of learning goals is made more possible through simulations. The environments created enable students to apply theory and practice skills to real world issues in their field. They allow teachers to integrate a number of objectives in the simulation process. These authors also argue that simulations can bridge gaps between disciplines and between academics and practising professionals.

Aldrich (2003, p. 3) cited Boston from Lucas Learning who says simulations are best when used in the following three ways. First, they can facilitate understanding of key concepts and practices that are usually only learnt through direct experience. Second, they can be used in situations where learners need ‘practice in decision-making before they’re faced with a dangerous or critical real-life situation’. Third, they can provide time and place

experiences that otherwise would not be available to learners. Similarly, Brozik and Zalpaska (2005) argued that simulations are beneficial because the experiential approach to learning is fundamentally different from traditional learning methods. Simulations are generally fun and provide stimulating experiences that motivate students. These authors also suggest that in simulations that have a 'trial and error' approach, there is a more open, shared learning experience and less anxiety about making mistakes.

The eSimulations developed in this project provide five important benefits as they relate to the provision of authentic teaching and learning experiences:

1. **Flexibility** in the use of such resources:
    - in the campus computer lab;
    - at home or at work;
    - either individually or in groups;
    - either informally or formally with teacher support.

2. **Quality** learning and teaching environments based on:
    - experiential learning;
    - problem-based learning;
    - active and reflective professional practice;
    - scaffolding from experts;
    - elements of cognitive apprenticeship theory;
    - employer validation of authentic workplace experience.

3. **Relevant** learning and teaching resources providing valued integrated treatments of professional matters applicable to:
    - pre-service undergraduate students;
    - internship preparation by students;
    - in-service and pre-service postgraduate students;
    - mid career practising professionals;
    - workplace trainees.

4. **Responsive** learning and teaching enactment of curriculum that responds to:
    - student requests for motivating and meaningful learning in relation to their planned career;
    - university and profession requests for the comprehensive integration of ethical, legal and other dimensions of professional practice into students' learning experiences in higher education;
    - pressures from employers, professional associations and trainees for more rigorously 'workplace-relevant' learning experiences signified by factors such as working under deadline pressures and having to negotiate management and personal dimensions of the workplace;
    - staff expressed needs such as relatively small staff numbers and limited work placement opportunities, signified by staff aiming to reduce intensive, face-to-face teaching that does not always provides appropriate experiences for the skills being developed.

5. **Innovative** learning and teaching technology that:
    - provides learners and teachers with a resource for use as a once only experience, multiple practice experiences or for tests and exams;
    - uses a flexible and extensible *simulations* model and database of media objects enabling rapid creation, revision and customisation of simulation resources;
    - maximises the benefits from synergies created by combining existing, but very recent digital, multimedia technologies;
    - has the underlying design for connection to support sites for downloading enhancements or variations to the existing eSimulations on published CDs;
    - motivates first year students, communicating to them that the institution and specifically that the eSimulation development and teaching teams place a high priority on engaging, interactive and contemporary educational technologies.

2.5 Contexts for the use of eSimulations

An important stance taken in the conceptualisation, design and use of eSimulations in this project is commonly termed 'blended learning'. Generally this term denotes an approach that 'blends' educational activities that occur in the physical environment with those taking place in the virtual learning environment (online). For eSimulations developed in this project this means that the eSimulation has been created for use in a university teaching and learning context involving a range of other critical activities in the wider learning environment. For example:

- Classroom introduction to the eSimulation involving orientation to the task (especially if it involves assessment);
- Practice on the task in a group;
- Rationale for the challenges in the eSimulation;
- Explanations of independent/individual learning applications such as for preparation for internships or exams;
- Debriefings and feedback about the roles and tasks undertaken by the student in the eSimulation;
- Collaborative work and discussions between students who have used the eSimulation;
- Individual feedback on any assessable component in the eSimulation.

The purpose of eSimulations in the curriculum and assessment of units, and the timing of their use in the progression of a normal study period, vary greatly, reflecting the 'embedded' and 'contextual' nature of the application of eSimulations in the educational intentions of university teachers. The following are further indications of ways to respond to the contextual demands of using eSimulations in the organisational environment:

Via a combination of delivery and support platforms:

- Stand-alone using CD only;
- Combination of CD and online eSimulation site;
- Combination of CD, online eSimulation site and Learning Management System;
- Combination of CD, online eSimulation site and a social software environment.

For different student groups:

- Pre-service undergraduate students;
- Internship preparation by students;
- In-service and pre-service postgraduate students;
- Mid career practising professionals;
- Workplace trainees.

In different physical locations:

- At home;
- At work;
- In student residences;
- In on-campus student computer labs;
- In off-shore campus environments.

In different human relationships:

- Alone, unsupervised by teachers;
- With fellow students, unsupervised by teachers;
- With fellow students in tutorials/computer labs, supervised by teachers;
- With work colleagues in the workplace.

In relation to actual workplace learning:

- In preparation for workplace learning;
- As a partial substitute for workplace learning;
- As a full substitute for workplace learning;
- As a form of reinforcement after workplace learning.

3. A typology for designing eSimulations

The field of simulations and games is represented by a diverse literature continuing to struggle with terminology, ontology, typology, and taxonomy. Narrowing the field to digital simulations, 'eSimulations' (web-based, digital simulations) used in the service of education, hardly simplifies the challenge of identifying and organising their characteristics and attributes in a taxonomy. One way of describing the eSimulations addressed in this project is through a typology that foregrounds the characteristics or traits they have in common. This section advocates a typology based on eSimulations used in 'blended learning' designs in the service of higher education in the professions.

For more than fifty years researchers have reported the benefits of simulations, but leaders with a long history of publishing and practice in the field, such as Dr Jan Klabbers (General secretary of the International Simulation and Gaming Association from 1976 to 2004), Dr Hugh Cannon (Dean of Fellows, Association for Business Simulation and Experiential Learning) and more recently innovators such as Clark Aldrich (co-founder of SimuLearn, independent consultant and practitioner working on educational simulations for professional skills training), recount that designing and researching simulations remains a problem, in part because 'scientific' methods rely on shared understandings, terminology and classification when dealing with simulation concepts, principles, rules, theories and models. Such understandings are struggling to keep pace with the advancing technologies and the reflexive practices of teachers and trainers. This situation will only become more problematic with the advent of networked and mobile simulations and games, particularly when their use is considered in blended learning environments.

When defining simulations, it is important to distinguish between *form* and *function*. To illustrate; while games often 'simulate' a system of relationships and events found in real or imagined settings, in the process of modelling these, games exhibit characteristics and attributes (e.g. winning) that non-game simulations may not. Clearly many simulations do not function as games, but it is not unusual for goal based, role based simulations to contain attributes of games (e.g. rules, chance, feedback); in fact it can be argued that it is important to retain such characteristics to support engagement and learning. Predominantly, this is the case with the eSimulations created and evaluated during this ALTC project.

The 90s was the decade of the 'e' – eLearning, email, eSimulations – and the past decade has seen the emergence of the 'i' with many products made famous by Apple – iPod, iTunes, iPhone, iPad. For digital simulations the 'eSim' term has persisted and has not been critiqued here. Rather than the 'e' denoting 'electronic', as was originally the case, terms carrying more appropriate connotations are '*emotional*', '*engaging*' and '*experiential*'.

All of the eSimulations created by the partner universities purport to simulate relations, challenges, communications and events that occur during the work practices of various professions. These digital media artefacts simulate or 'model' human communication in problem spaces represented in specific scenarios from legal, social, business settings, for example. The scenarios they present for students to engage with are generalised, epitomes of real events experienced over time in order to achieve specified educational goals. As such these web-based media artefacts are simulate a slice of professional life – they are 'eSimulations'.

Our attempt to classify the '**type**' of eSimulation being variously created in this project is strongly guided by the following observation of Jones (1998), a creator and researcher of simulations and games for more than thirty years:

> … my concern about categories is not about semantics. It is not about words as such, it is about *behavior*. In interactive events, behavior should determine the category. If everyone in an event referred to it as a game but behaved as if it were a simulation, then it would be a simulation, not a game. The actions, skills, motives, thoughts, and emotions are what matter in determining categories of human behavior. It is important, particularly for professionals, to describe clearly and/or define carefully what they are trying to communicate. In any field involving behavior, descriptions and examples are safer than definitions. Clear categories are important.

With this in mind, ***we propose a 'typology' of eSimulations*** determined by design variables that exert an impact on the learner experience and behaviour *inside* and *outside* the eSimulation, that is, the teacher/designer's intentions in the context of using the eSimulation in a blended learning environment. The eSimulation types vary in their *design* for the student 'experience' of a congruent unit of study, where eLearning is expressed in a blended learning design. The types of eSimulations reported in this project vary only in minor ways associated with the fidelity of the representations in the screen presentations of human interaction and in structural, timing and similar technical characteristics. These and other design elements determine the 'representational validity' (Feinstein & Cannon, 2002) of the eSimulation.

> **Representational validity:** The simulated representation of the chosen phenomenon in the profession is deemed to be a valid representation of the phenomenon for the defined educational purposes.

This is to be contrasted with the validity of the learning design in the eSimulation when considered in the context of the overall educational strategies used in the unit of study. This involves attending to the constructive alignments in the blended learning design for the unit as a whole. For the eSimulation to achieve satisfactory educational validity (Feinstein & Cannon, 2002), it must contribute to the constructive alignments.

> **Educational validity:** The students' experience of learning and assessment in the eSimulation is deemed to be in valid alignment supporting the defined educational purposes.

The constructive alignment of design elements both inside an eSimulation and outside an eSimulation is a core feature of the type of eSimulation designed and researched in this project. Students experience the eSimulations via a web browser for use in any location (including by individuals studying at a distance and by groups of students studying together on-campus). What happens in these specific locations and elsewhere, including elsewhere online, is important. In every case the students are invited to adopt a character role in a scenario that has been designed with specific educational goals and detailed objectives in mind that support the unit of study as a whole. (See the Design Table at the end of this section.) In broad terms, these eSimulations are:

- Single-person (student actor);
- Role-based;
- Goal-based;
- Blended learning designs;

- Assessment driven;
- Grounded in the professions.

We draw on the work of Biggs (2003) in considering the constructive alignment of design elements for eSimulations.

3.1 Constructive alignment of design elements for eSimulations

Biggs has long concerned himself with the way students learn, and has adhered to the premise that it's what the student does that matters. This is based on Marton's (1981) notion of 'phenomenography', which contends that it is the student's perspective that determines what is learned, not the teacher's intentions. Therefore, as Biggs (2003, p. 12) suggests, 'teaching is a matter of changing the learner's perspective, the way the learner sees the world'. Laurillard (2003, p. 70) explains that its empirical base is derived 'from discovery rather than hypothesis testing' so it is the nature of the action between student, learner and subject matter that is of interest rather than what the teacher does to the learner. Phenomenography is, to some extent, consistent with, (though not the same as), a constructivist view of learning, and has led Biggs (2003) to the view that the most appropriate way of helping students construct learning is by 'aligning teaching'. He refers to this as 'constructive alignment', whereby all the components in the learning environment are closely aligned. Apart from the learners and teachers, he notes that these include:

- The curriculum we teach;
- The teaching methods that we use;
- The assessment procedures that we use, and methods of reporting results;
- The climate that we create in our interactions with the students;
- The institutional climate, the rules and procedures we have to follow. (p. 26)

Biggs (2003) says the notion of 'constructive alignment' brings together a constructivist view of learning, and an 'aligned design for teaching' (p. 27). As he points out, this means that students do the work, the teacher 'acts as broker between the student and a learning environment that supports learning activities' (p. 27).

With Biggs' work in mind, eSimulations ought to represent a commitment to 'constructive alignment' of key elements in an educational design. These key design alignments are as follows:

Alignment of:

i	profession/discipline **N**eeds *with* the **C**urriculum goals;	**N&C**
ii	the **C**urriculum *with* 'kinds' of **L**earning (categories of learned capabilities);	**C&L**
iii	'kinds' of **L**earning *with* **T**eaching strategies (kinds of teaching);	**L&T**
iv	**T**eaching strategies (and all of the above) *with* the **A**ssessment strategies (methods of measuring the learning for which evidence is provided);	**T&A**
v	**A**ssessment (evidence of learning) *with* the identified **N**eeds of the profession/discipline.	**A&N**

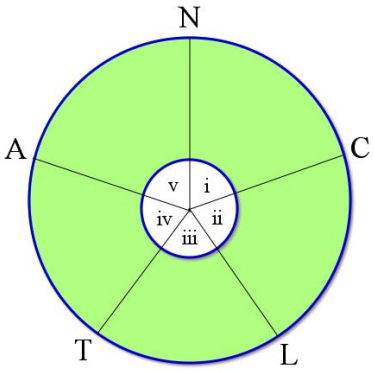


Figure 1 The N-C-L-T-A Cycle

Segment v in the closed cycle represents the domain of *assessment* and *evaluation* that aims to provide evidence of the extent to which the eSimulation delivers on its promise to develop expected forms of integrated professional capability. This form of student learning reflects a stage on the road to integrated expertise in professional practice that the profession (and employers) need. To achieve this, eSimulations are expected to deliver representational validity and educational validity.

Representational and educational validity are two key goals when completing an effective eSimulation 'learning design' that properly integrates an eSimulation into its intended broader designed learning environments and learning experiences. The alignment of representational and educational validity ensure the congruency of the asserted academic goals with the employee capability of the profession.

> ***Representational validity:*** is when the chosen real-world phenomenon as simulated is deemed to be a valid representation for the defined educational purposes (see Figure 2). This means that the eSimulation facilitates the 'transfer' of professional experience (in the real world) to the student learning experiences in a university setting (i.e. transfer from the profession to the: Curriculum, Teaching, Learning and Assessment in the unit, i.e. segments i–iv in Figure 1).

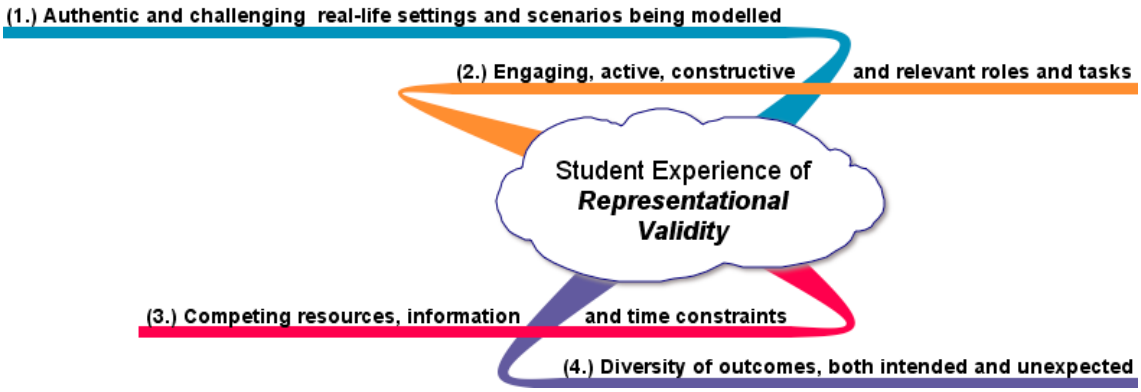


Figure 2 Elements of 'representational validity' designed by the teacher for students to experience as valid phenomena from the workplace in the profession

To achieve the desired level of 'representational validity' of the professional practice, the above four clusters of complexity in professional practice need to be addressed. They are central to designing a simulated professional experience with representational validity.

These four clusters typify the designs of eSimulations in the project. They are detailed in the Design Table at the end of this section and can be seen in evidence for each profile provided in a version of the table by simulation authors/teachers from the three institutions in Section 4.

> ***Educational validity:*** is to facilitate student learning experiences in a university setting via eSimulations to encourage the 'transfer' of learned professional experience and capabilities to the real world (see Figure 3) (i.e. transfer from the graduate of the university program to the Profession/Employer, being segment v in Figure 1).

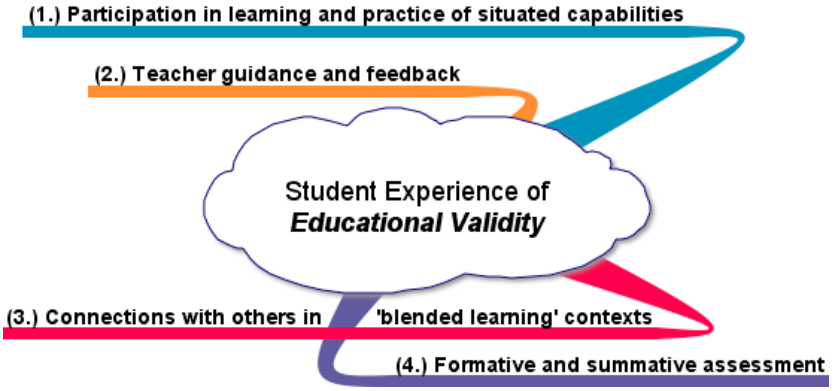


Figure 3 Elements of 'educational validity' designed by the teacher for students to experience as valid experiences aligned to support the defined educational purposes

When designing an eSimulation to achieve the desired level of 'educational validity'; meeting the requirements for a constructivist, active, participative and socially situated learning environment, the above four clusters of engagement need to be addressed. They are high value points of connection between the student and others, whether other learners, practitioners or their teachers. They are essential in any design of a simulated professional experience with educational validity.

These four clusters of 'intentional activities' designed by teachers typify the designs of eSimulations in the project:

Intentional elements in the design	Examples
1. Participation in learning and practice of situated capabilities	1. Role-play on interviewing skills inside and outside the eSimulation.
2. Teacher guidance and feedback	2. Light interventions by the teacher during the role experience, in order to guide and provide evaluative feedback inside and outside the eSimulation.
3. Connections with significant others in 'blended learning' contexts	3. Embedding the 'individual' role experience from the eSimulation into the social contexts of the unit, such as online discussion spaces provided in a Learning Management System or social software.
4. Formative and summative assessment	4. Using the eSimulation for formative practice and assessment with a small weighting for the final grade in the unit.

These four clusters of activity typically can occur both inside and outside the eSimulation to a large extent. This reflects the manner in which they are embedded in a blended learning design rather than what often occurs when using an 'off-the-shelf' commercial simulation.

3.2 Addressing eSimulations in blended learning environments

It is essential that the concept of 'blended learning environments' be understood as the result of proactive–reflexive 'teaching design' on the part of the 'teacher-as-agent' in the learning environment. It is also essential that the enacted (pre-planned) educational design is learner centred, that is, the ultimate performance by the learner in the learning events (both inside and outside the eSimulations) remain the responsibility of the learner. Only the learner can truly choose to engage and participate actively in any learning environment, playing their role, making use of the learning resources and the learning interactions. Only the learner can choose to engage, perform and achieve the praxis that is possible. The teacher is the 'agent' of learning, but ultimate power for learning resides with the student. The project team is aware and concerned about potential imbalances in this relationship, particularly in the light of heightened emphasis only on individual learner experiences in the educational environment. The teacher as broker, orchestrator and agent is critical for the success of eSimulations in a blended learning environment.

Therefore, when considering the total learning design of any eSimulation, attention should be given to the design of relevant experiences *outside* as well as *inside* the eSimulation. Quality 'blended learning' designs rate highly in regard to 'conceptual validity' and 'construct validity' being educationally sound for the intended learning outcomes. The previous clusters in 'representational validity' and 'educational validity' converge in the following conceptualisation of what constitutes the students' blended learning experiences inside and outside the eSimulation.

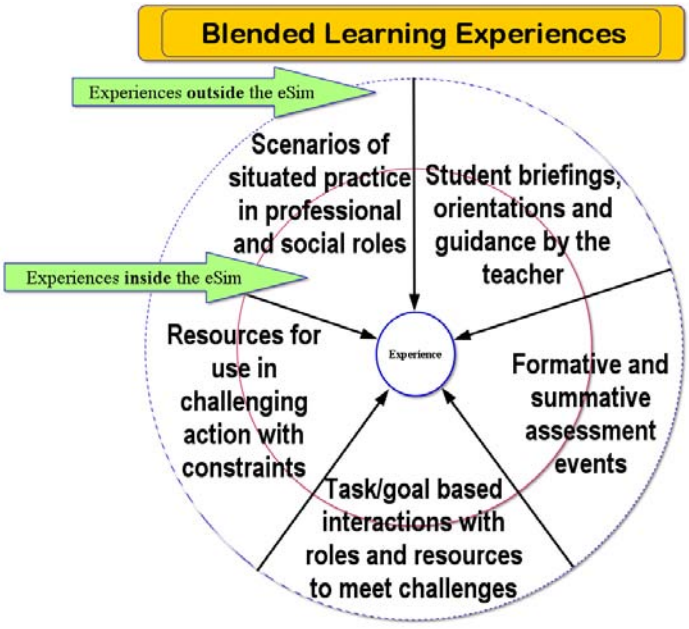


Figure 4 Achieving quality blended learning using eSimulations by aligning the representational and educational validity clusters of design elements that reflect the teacher's educational intentions

The five spheres of relationships that are represented in Figure 4 affect the learning relationships both inside and outside the eSimulation. The roles of students and teachers as they actively engage with resources and tasks in story/scenarios comprise the blended learning environment of a contemporary eSimulation. The quality of this experience seriously influences the quality of the learning.

Student experience inside the eSimulation

The following factors play key roles in the successful performance of any educational eSimulation:

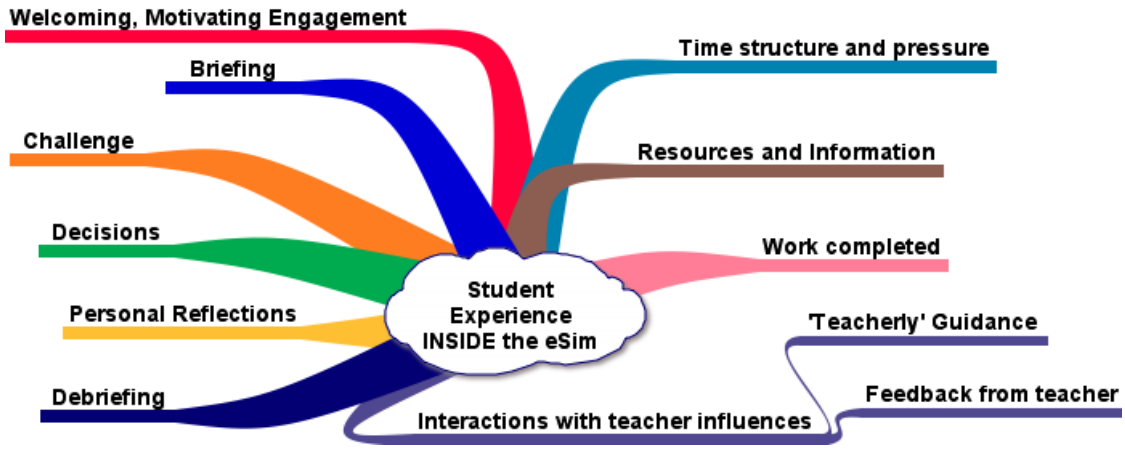


Figure 5 Student experience inside the eSimulation

Each segment represented in Figure 5 above is present in the structure and functions of an educational eSimulation. Indeed, most play key roles in a wide range of educational designs. They are detailed in the Design Table at the end of this section and can be variously seen in evidence for each profile provided in a version of the table by simulation authors/teachers from the three institutions in Section 4.

When conceptualising the meaning and use of an eSimulation for education in the professions, the significance of 'blended learning' means that every student (regardless of their location) will have specific learning needs associated with the embedding of the eSimulation as a congruent part of the 'outside' learning environment.

The Design Table at the end of this section details elements integral to the learner experience both inside and outside the eSimulation. They include 'engagement' methods and sequences such as the following:

a) Invitation to engage;
b) Briefing (on roles and purposes);
c) Support from teacher (assistance, guidance and feedback);
d) Resources/tools (for taking action simulated, virtual and real);
e) Tasks (work actively completed by students);
f) Time (structure and pressure);
g) Reflection (individual/group);
h) Debriefing;
i) Results (Formative/ summative assessment by the teacher/assessor).

An example is provided:

f) Time (structure and pressure)

- The student varies the pace of the interaction. The eSimulation tracks the time spent (for reporting to the teacher with other data), but the time is not limited;
- The eSimulation sets a fixed pace and the time is limited;
- The student varies the pace of the eSimulation interaction but the time is limited;
- The teacher varies the available time via individual and group parameters in the database;
- The teacher varies the availability of sessions: timing over days/weeks of a study period.

The eSimulation profiles provided in Section 4 by teacher designers (using the Design Table at the end of this Section), reflect their intentions as they attempt to create a congruent, blended learning environment incorporating their eSimulation. The goal is to address the needs of students and their professions in developing the capabilities inherent in complex professional expertise. (See Figure 1 – The N-C-L-T-A Cycle.)

To achieve congruent designs of the kind advocated in this typology and profiled in the table by simulation authors/teachers from the three institutions in Section 4, capacity in educational design needs to be complemented by the capacities in *scenario design*, *interaction design* and *experience design* (See the 'teaching and learning design capacity' sphere and the 'media technology production capacity' sphere in the capacity-building model in Section 9.1.)

Below is a brief explanation of the contributions expected in these three areas:

Scenario design

The academic staff representing the discipline/profession, in concert with expert media producers, particularly those in video and audio production, give coordinated attention. Script development workshops involve these experts and also an education designer, learning designer and interactive media designer. Scenario design and development is usually a team-based process when converting experience in the professions to learning experiences in an eSimulation.

Interaction design

Interactive Media Developers work in conjunction with Graphic Designers and Learning Designers. Aligning interaction designers with a Learning Systems Group (managing the Learning Management System) further strengthen their ability to support more sophisticated blended learning designs using eSimulations.

Experience design

Academic teaching staff and learning designers work closely with interaction designers for the eSimulation, but also with learning designers and other professionals involved in creating or maintaining other eLearning and physical environment services to ensure the eSimulation is delivered as intended as part of the blended learning environment and not as an unrelated 'off-the-shelf' product.

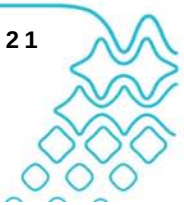
Creating eSimulations according to this typology can be seen in evidence in the table used by simulation authors/teachers from the three institutions in Section 4.

Design Table – Designing for the student *experience* in a blended learning environment: Alignment of elements in the design

Title of the eSim	**Academic:** Name of the teacher/designers
Elements	***Description / Example***
Learner profile	Key characteristics and attributes of learners that impact on the design of the eSim in the blended learning approach. E.g. maturity, experience, course level, study mode, cohort size.
Teacher's main aim	This is a 'high level' statement of the teacher's intentions or purposes in creating the eSim as a treatment for educating in specific areas of a specific profession. (teacher's perspective)
Teaching goals and strategy	This is a 'second order' statement of the teacher's intentions. It points to the expectations the teacher has for the student's final learning outcome and indicates the key strategy/method for reaching it.
Blended learning architecture (Pre-ordinate design structure)	This is a 'high level' description of the main elements in the designed (pre-planned) methods for achieving the blended learning. This includes elements in the digital eSim that link with other virtual/online elements as much as with those in the physical classroom, home or workplace environments.
Teaching strategies for using the eSimulation in the curriculum	The ultimate 'performance' of teaching as a reflexive, interactive process may be promoted in the pre-planned design and use of the eSimulation. For example, are there unresolved professional issues and practices that the eSimulation raises for varied treatments when teaching?
Role(s) assumed by students	This may be more than first expected. Consider the student's roles both inside and outside the eSim. Some eSims allow students to play different roles.
Key objectives for the learners	Highlight the most important learned capabilities in the profession that students learn from the eSim either alone or in conjunction with other elements of the blended design.
Challenge / Difficulty	Highlight the selected elements from the real world that are being set as a 'challenge' in the simulation. The type of challenge/difficulty portrays how well the eSim meets the demands that occur at the intersection of representational validity and educational validity of the eSim.

Methods and sequences	***Inside the eSimulation***	***Outside the eSimulation***
Invitation to engage	In what way in the eSim do users receive a motivational welcome and invitation to engage in the experiences offered?	Through what other means do students receive an invitation and rationale for participating in the approaches and activities both in the eSim and what surrounds it?
Briefing (on roles and purposes)	State where and how this occurs in the sequence of eSim screens.	State if and how this occurs before the eSim via other means online or in class.

Methods and sequences	***Inside the eSimulation***	***Outside the eSimulation***
Support from teacher (assistance, guidance and feedback)	List key screens or interaction events that support the student learning in the eSim. It may be important for these to be absent on occasions. Note the approach/timing.	State if this occurs before/during/after the eSim via other means online or in class. Only mention the key strategy for supporting students individually and/or as a group.
Resources/tools (for taking action simulated, virtual and real)	Identify the means by which students do the productive work – the active, participative 'learning' work for which the eSim provides the experiential framework.	Identify any other means online or in class, by which students receive the resources/tool for enacting the role in a productive manner for practice/assessment.
*Task*s (work actively completed by students)	State task(s) completed in the eSim whether assessed or not. Include key elements of a task that might occur during the eSim, with other elements done before, during or after the eSim using another method outside the eSim. Emphasise tasks completed, not activities that support the scenario experience.	A major task in a unit that is connected with the work completed in the eSim is often formally assessed and results in a mark that contributes to an overall grade for the unit. Describe any tasks outside the eSim that represent a 'blended approach to the assessment'.
Time (structure and pressure)	Indicate key methods for creating structured/pressured time on eSim users. Is time clocked and reported to the user? Do users control eSim time structure and pace?	<text-style> Name relevant elements or tools in the broader eLearning environment or the physical environment that may determine the timing of exposure to all or parts of the eSim.
Reflection (individual/group)	Indicate opportunities for students to reflect on the meaning of the experience and their performance, prompted or otherwise.	Indicate planned opportunities for reflecting and discussing progress with learning.
Debriefing	When/how do students receive feedback on the meaning of the eSim experience and their performance?	When/how do students receive analytical and explanatory feedback individually and as a class/group as needed?
Results (Formative/ summative assessment by the teacher/assessor)	Does the eSim facilitate assessable work generated by the student? Does it involve minor formative results or a major learning result to be assessed?	Does the eSim contribute to a more substantial piece of assessable work external to the eSim?
Unit outcomes (measured by the teacher/evaluator)	What evidence would you seek outside the eSim and perhaps outside the unit, that professional performances learned using the eSim contribute to graduate attributes transferable to (or transferred to) actual professional practice – therefore addressing needs of the profession?	



4. Profiling learning designs in a range of cross-institutional disciplines

4.1 eSimulations developed across institutions

A number of eSimulations have been developed and used in the unit curriculum across the partner institutions as follows:

Synthetic character eSimulations (i.e. Avatar, conversational characters from Media Semantics' Character Server)

eSimulation and place in curriculum	University and faculty	School
Blue Cut Fashion (Store) Business Analysis, first year students (individual project)	Deakin University, Faculty of Business and Law	Information Systems
Blue Cut Fashion (Chain) Requirements Engineering, masters level students (team work)	Deakin University, Faculty of Business and Law RMIT University	Information Systems School of Business Information Technology and Logistics
Suicide Risk Assessment Mental Health – interview techniques	Charles Sturt University, Faculty of Arts	School of Humanities and Social Sciences
Domestic Violence Simulation Domestic violence police response procedures	Charles Sturt University, Faculty of Arts	Policing Studies
Ringo Robotics Project Management	RMIT University, Faculty of Business	School of Business Information Technology and Logistics
Purple Integrated Taxi System (PITS) Systems Analysis and Design	RMIT University, Faculty of Business	School of Business Information Technology and Logistics

4.2 Deakin University experience

Blue Cut Fashion (Store and Chain)

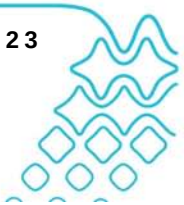
Excerpt adapted from a paper by Jacob Cybulski and Lemai Nguyen, 'Educating Business+IT Professionals: A New Alignment' (2010).

One of the ALTC program sub-components is the development of a series of eSimulations and an appropriate curriculum to provide business students with experience in business analysis (BA) – a starting point in understanding business context and its processes, determining difficulties and inefficiencies in day-to-day business operations, and offering recommendations on solving business problems. An important element of our ALTC sub-project was to create learning components that would appeal to the Generation Y business students, who in spite of their technological prowess and avid interests in a wide range of business topics are nevertheless (in our experience) prejudiced against formal teaching of IS/IT skills and knowledge. It was also not uncommon among the more mature off-campus students to meet their study with fear of technology and anticipation of elevated workload and task complexity. The reported study focuses on an evaluation of students' growing experience, gain in confidence, and their perceptions of the learning process.

Two eSimulations were developed as part of the ALTC program. Both eSimulations were based on the same case study of Blue Cut Fashion (BCF), a fictitious chain of BCF fashion stores. The first eSimulation aimed specifically at specifying a new IT solution for business – part of developing Requirements Engineering (RE) and Business/IT alignment skills. The second eSimulation was used in a business analysis project with an objective to analyse and improve the operation of the BCF fashion stores. BCF was deployed across several institutions and their campuses, as well as, allowing different educational objectives and methods of teaching and assessment. The BCF eSimulation design had reusable and configurable components. Case studies, story lines, characters and the visual environment were pliable and open to modifications. BCF was the first in the series of such eSimulations.

Students undertaking business analysis projects were involved in the collection and analysis of business data, making observations, presentation of insights and writing recommendations to management. Much of the knowledge and skills learnt through undertaking such a business analysis project are derivatives from the core of RE teaching which is considered as necessitating some prerequisite business and technical knowledge, as well as, maturity on behalf of participating students. However, we believe that some of these skills, especially the 'soft' skills, are essential in all aspects of IS training, and in studying Business in general. As such, we strive to teach these important skills not only to students taking our later years of IS study or specialist IS Masters, but more importantly to our first year Business and Law students specialising in Accounting, Finance, Economics, Management, Marketing and Law.

As business analysis is a process of learning and discovery in some business application domain, one of the important education objectives is to help future business analysts become effective learners. BCF was designed to provide an experiential learning environment based on a constructivist learning paradigm, where the learning process can be described as emergent, collaborative and domain specific. Generic and as well as domain specific creative thinking skills were included. Through BCF in



blended teaching, we encouraged the students to think outside the square, learn to relax and resolve business and technological constraints by applying various creativity techniques in tutorials.

BCF eSimulations were tailored to distinct student cohorts (first year undergraduate and Masters) and used in teaching over 1,500 on-campus and off-campus/online students. Two BCF case studies and accompanying eSimulations BCF Store and BCF Chain (and their variants for each semester) were created to support projects offered in the first year of undergraduate study and at Masters level. BCF was also adopted at other participating institutions to teach their third year students. BCF Store eSimulation supported first year students (considered 'naïve analysts') in using Excel to analyse business data and proposing a high-level business advice on organisational change management. The first year students used the BCF Store eSimulation as a sophisticated 'help desk' to seek advice on the problem area and on the functionality of Excel in completing a particular project objective. BCF Chain, on the other hand, is an eSimulation aimed at Masters students (considered 'professional analysts') learning requirements elicitation, analysis, specification and validation. Masters students treated the BCF Chain eSimulation as a 'field trip' and were asked to deal with multiple views of a business problem, reconcile these views, untangle conflicting information, deal with trust, and carry out research to fill in omissions.

While the two eSimulations were designed around the same case study, their role in students' learning was quite different. BCF Store aims at simplifying an assignment task; whereas, BCF Chain provides a set of challenges that needs to be overcome in students' assignment activities. In both eSimulations the objective statements were minimal, which forced the students to fully engage with the simulated characters which gave them a sense of self-sufficiency. Their analysis became a process of discovery. Because of the difference in the knowledge and experience base of the two student cohorts, as opposed to the more complex BCF Chain, BCF Store focused on the development of 'soft' communication, organisational and analytical skills, rather than on technical aspects of the problem, modelling of business processes or systems, or detailed specification of the problem solution.

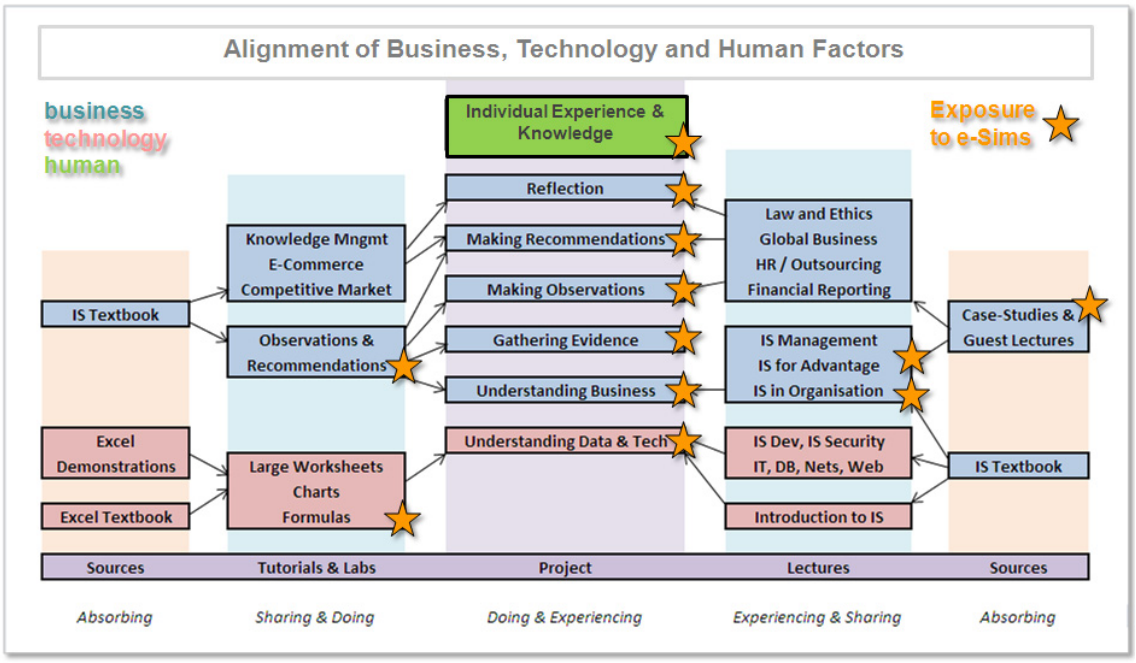


Figure 6 Blended learning to support business analysis with eSimulation

Blended learning was used in both cases. It allows fusion of reality and virtuality into a single and consistent world; first to create a sense of authenticity; and, second to provide educators with a degree of control over the eSimulation outcomes. To assist students in accepting the simulated people, mini-eSimulations interrupt face-to-face lectures and tutorials, the simulated characters appear on a student portal, and students can pose online queries to the simulated and real people alike. Access to teaching materials, RE and Business Analysis resources, methods and techniques, were made available online

Through our experience in teaching undergraduate and graduate students with the BCF eSimulations, we came to the conclusion that the success of teaching is not in any single facet of its contents or delivery, form of transferred knowledge, or the applicability of acquired skills. What is often more important, is the way in which all educational elements could be put together, in the way they could integrate, connect and complement each other. It is the skilful *blending* and seamless *alignment* of all teaching and learning aspects that have the greatest impact on students' *perception* of educational *value* and their enjoyment of the learning *experience*.

Achieving the cohesion of educational elements requires careful planning and the subsequent execution of teaching and facilitation of learning tasks (see Figure 6 above). In our approach, it can be achieved through integrating an experiential blended eSimulation to the curriculum contents. The curriculum contents should reflect an alignment of business and technology topics appropriate to the focus of business analysis and RE, as well as, human factors across lectures, tutorials, labs and projects. Different learning activities should occur in lecture venues, tutorial classes, online and in the virtual space of eSimulation. Such activities can support the 'doing and experiencing' as well as 'experiencing and sharing'. Blending and alignment should encourage and facilitate students' constructivist and deep learning – in our case it was the project that dictated the subject pathways to constructing individual knowledge and experience in students.

Designing for the student *experience* in a blended learning environment: Alignment of elements in the design

eSim: Blue Cut Fashion (Store)	Individual academic: Jacob Cybulski, Deakin University	
Elements	***Description / Example***	
Learner profile	A mix of first year university students, some undertaking Bachelor of Commerce, Bachelor of Management or Business Information Systems. Some of the student cohorts come from TAFE sector and MIBT. Students take the subject in both on-campus and off-campus mode. The number of participating students is over 1500 per semester.	
Teacher's main aim	Learn to use information technology as the means for understanding business	
Teaching goals and strategy	• Develop basic skills in using business IT tools (Microsoft Excel) • Learn to use IT tools to assist analysis of business data • Learn to interpret analysis results in business context • Learn to write business recommendations based on evidence • Reflect on the process Data > Evidence > Recommendations	
Blended learning architecture (pre-ordinate design structure)	• eSimulation • Online forum • Lectures and tutorials	
Strategies for employing the eSim in the curriculum (reflexive strategies)	• eSimulation supports project work • eSimulation is used as a project Help Desk • eSimulation explains business context • eSimulation assists students in the use of tools and methods (Excel)	
Roles assumed by students	• Naïve business analyst	
Key objectives for the learners	• Analyse business performance (given the data) and offer recommendations for business change based on evidence	
Challenge / Difficulty	• Business complexity (business context) • Communication complexity (three independent characters with distinct views) • Analytic tool complexity (use of Excel, its functions and presentation tools) • Data complexity (due to complex relationships and intentional errors)	
Methods and sequences	***Inside the eSimulation***	***Outside the eSimulation***
Invitation to engage	• Teacher welcome, motivational introduction	
Briefing (on roles and purposes)	• Students discover the main objectives of the project and its deliverables by engaging with the eSimulation	• Students meet eSimulation characters in class via mini-eSims • Students receive data and templates for data analysis and reporting

Methods and sequences	***Inside the eSimulation***	***Outside the eSimulation***
Support from teacher (assistance, guidance and feedback)	• Simple help is also provided inside the eSimulation • One of the eSimulation characters provides explicit hints on the methods to be used in the project • Interview transcripts are always available	• A project handout describing the objectives and methods of the simulation is provided before the assignment commences • A series of tutorials are designed to assist and mirror the project milestones
Resources/tools (for taking action simulated, virtual and real)	• Students use eSimulation to interview business and technical personnel of a company	• Follow up questions to simulated personnel can be posted via online forum (answered by teachers role-playing the characters) • Missing information is to be found by conducting research online
Tasks (work actively completed by students)	• Student's decisions: – Selection of interview questions • Understanding and reconciling information from multiple sources	• Analysis and report : – Data analysis (with Excel) – Data validation (with Excel) – Recommendation (written report)
Time (structure and pressure)	• There is no time limit imposed on the eSimulation	• 1 week to understand business context • 4 weeks to conduct analysis • 1 week to produce final report
Reflection (individual/group)		• Individual reflection is facilitated by undertaking a written report
Debriefing		• Discussion in class • Online discussions to determine students' learning, problems and emerging issues
Results (Formative/ summative assessment by the teacher/ assessor)		• Online quiz to test initial understanding • Online quiz to test understanding of results • Assessment in rubric and qualified by extensive comments
Unit outcomes (measured by the teacher/evaluator)	Student perception and experience are measured by applying an eSimulation specific survey. Students also take a Students Evaluation of Teaching and Units survey.	

Designing for the student *experience* in a blended learning environment: Alignment of elements in the design

eSim: Blue Cut Fashion (Chain)	Academic: Jacob Cybulski, Deakin University
Elements	***Description / Example***
Learner profile	Masters-level university students, undertaking business studies in Master of Commerce, Master of Business and Administration or Master of Business Information Systems. Students take the subject in both on-campus and off-campus mode. The total number of participating students is around 20 per semester.
Teacher's main aim	Gaining experience in interviewing clients – individually and in groups, developing skills in critical analysis of problems, and specification of solutions meeting user requirements
Teaching goals and strategy	• Engage students in one-on-one and group interviews • Gain experience in observing, listening and note taking during interviews • Learn to identify and analyse business problems, as well as, specify their solutions • Work individually and in teams
Blended learning architecture (Pre-ordinate design structure)	• Project with eSimulation leads the curriculum • Lectures, tutorials and online communication support project-based experience
Strategies for employing the eSim in the curriculum (Reflexive strategies)	• eSimulation supports project work and is used as a Field Trip • eSimulation explains business and technology context, as well as, encapsulates a data set • eSimulation sets problem-related and communication challenges
Roles assumed by students	• Professional business analyst
Key objectives for the learners	• In teams, use interviews to determine business problems, subsequently analyse the collected information and specify requirements for Business / IT solutions to these problems
Challenge / Difficulty	• Business and communication complexity • Multiple and conflicting viewpoints, incorrect information and omission of vital information • Team communication and coordination, time pressure and standard compliance

Methods and sequences	**Inside the eSimulation**	**Outside the eSimulation**
Invitation to engage	• Teacher welcome, motivational introduction	• The initial contact with the company representative is made in class (role-played by the teacher)
Briefing (on roles and purposes)	• Students discover the objectives of the project and its deliverables by engaging with the eSimulation	• In the absence of specific (interview) data, students are asked to brainstorm the possible problems and their solutions

Methods and sequences	Inside the eSimulation	Outside the eSimulation
Support from teacher (assistance, guidance and feedback)	• Simple help is also provided inside the eSimulation • Interview transcripts are available	• A project handout describing the objectives and methods of the simulation is provided before the assignment commences • A series of tutorials are designed to explain analysis and specification methods
Resources/tools (for taking action simulated, virtual and real)	• Students use eSimulation to interview business and technical personnel of a company	• Follow up questions to simulated personnel can be posted via online forum (answered by teachers role-playing the characters) • Missing information is to be found by conducting research online
Tasks (work actively completed by students)	• Student's decisions: – Judge interviewee expertise – Select interview questions – Observe body language – Observe interaction between interviewees (in group interviews)	• Analysis and report: – Requirements analysis for content, relevance, error, conflict and omission – Requirements specification (report written in compliance with standards) – Requirements validation with the client (role-played by the teacher)
Time (structure and pressure)	• Time limit of one hour is imposed on all interview tasks	• 2 weeks to interview business clients • 2 weeks to interview technology clients • 3 weeks to produce reports
Reflection (individual/group)		• Students write experience reports on their individual difficulties, solutions applied, and reflections on the experience gained
Debriefing		• Discussion in class • Online discussions to determine students' learning, problems and emerging issues
Results (Formative/ summative assessment by the teacher/ assessor)		• Assessment in rubric and qualified by extensive comments
Unit outcomes (measured by the teacher/evaluator)	Student perception and experience are measured by applying an eSimulation specific survey. Also students also take a Students Evaluation of Teaching and Units survey.	

Biographies, brochures and evaluation

Appendix A contains the biography of the eSimulation developer or academic, an informational brochure on the eSimulations developed and the interpretation of the student evaluation of each eSimulation.

4.3 Charles Sturt University (CSU) experience

Suicide Risk Assessment eSimulation

Distance education students in the Social Work program at Charles Sturt University attend a residential school partway through the session where they practise practical components of their subject. This eSimulation was developed to address a need for students to develop and practice skills in a safe learning environment that would help build confidence in a skill they would need to demonstrate in the residential school. As these students often don't have access to a place where they can practice clinical skills, except for the residential school, it was felt that developing an eSimulation where they do so would help bridge the gap.

The eSimulations used technology to assist in this in a blended mode of learning. The students learned content through a mix of print and online resources during the session which was complemented by the use of online media in the form of this eSimulation.

Knowledge and skills were further developed through the residential school. Using the mix of technologies helped to build confidence in professional skill acquisition.

Stephanie Johnson
Academic, School of Humanities and Social Sciences
Mental Health Simulation

I was attracted to eSimulations because it promised a capability to deliver teaching to Distance Education (DE) students in a way that I have never seen before. To be able to teach and role-play clinical counselling skills with a 'human' in a safe learning environment, a student's home, and to be able to give instant feedback was attractive. For too long I feel DE students have been disadvantaged in their practical skills development in Mental Health and I was looking for something more to give them. eSimulation answered this for me.

Designing for the student *experience* in a blended learning environment: Alignment of elements in the design

eSim: Suicide Risk Assessment	**Academics: Stephanie Johnson, Deb Murdoch**
Elements	***Description / Example***
Learner profile	A mix of undergraduate and postgraduate students studying Social Work in Mental Health. The students are a mix of young school-leavers and mature-aged students in professional practice. All delivery is in distance mode and the cohort numbers are small.
Teacher's main aim	Development of professional skills in interviewing high risk clients.
Teaching goals and strategy	• Engage students in one-on-one interviews • Gain experience in observing, listening and note taking during interviews • Developing skills in linking theory and practice • Documenting case notes and dispensing recommendations
Blended learning architecture (Pre-ordinate design structure)	• eSimulation • Online study materials delivered through an online learning management system • Online forum
Strategies for employing the eSim in the curriculum (Reflexive strategies)	• eSimulation supports skills development through practice • eSimulation demonstrates good practice • eSimulation prepares students for later role-play in residential school • eSimulation provides a 'safe' environment for high risk interviewing
Role(s) assumed by students	• Student assumes the role of interviewer.
Key objectives for the learners	• Interview skills in high risk situations • Note taking in interviews • Development of appropriate advice • Follow up case notes developed
Challenge / Difficulty	• High risk interview skills

Methods and sequences	***Inside the eSimulation***	***Outside the eSimulation***
Invitation to engage	• Welcome page, verbal introduction	• Introduction to the simulation through online study materials and encouragement through the learning management system announcements to complete the simulation
Briefing (on roles and purposes)	• The second screen in the simulation contains a text based page of instructions of how to progress through the simulation and the rationale for completing the simulation with the related assessment.	

Methods and sequences	***Inside the eSimulation***	***Outside the eSimulation***
Support from teacher (assistance, guidance and feedback)	• Feedback is returned to students with each question and response interaction.	• Online forum support is available throughout the simulation
Resources/tools (for taking action simulated, virtual and real)	• Students use the simulation to interview a mental health patient to determine his risk of suicide.	
Tasks (work actively completed by students)	• Students use the simulation to interview a mental health patient to determine his risk of suicide. • Students complete case notes from notes taken during the simulation.	• Case notes are developed for assessment.
Time (structure and pressure)	• There is no time pressure within the simulation but students are required to complete case notes for assessment. Students control their own progress through the simulation and may complete it many times.	• An assessment task related to the simulation must be completed within a set time during the semester.
Reflection (individual/group)	• Students are able to reflect on their experience via a student survey.	• Students may use the forum to discuss their experience.
Debriefing	• Feedback is delivered at the end of each question and answer sequence.	• Students receive assessment feedback after marking. Students also discuss and experience role-play simulations during a residential school.
Results (Formative/ summative assessment by the teacher/assessor)	• Students are aware of the assessment task related to the simulation and are expected to generate notes to base their case notes on during the interview.	• Case notes are developed for assessment.
Unit outcomes (measured by the teacher/evaluator)	• Student perception and experience are measure by a student experience survey. Feedback occurs during residential school which occurs after the simulation. Confidence shown through role-plays during residential school could also indicate professional abilities developed during the simulation.	

Domestic Violence Simulation

Chris Bushell
Year 2 Associate Degree of Policing Practice Session Coordinator
School of Policing Studies

I was looking for a way to deliver simulations online. Captivate gave me the tool to achieve this. The program enabled me to develop eSimulations designed to enhance 'pattern recognition' associated with the policing incidents students would attend on a regular basis as a police officer.

It has both learning and assessment capabilities in the Associate Degree of Policing Practice (ADPP).The learning capability gives students the opportunity to practice their 'pattern recognition' prior to undertaking formal assessment at the Simulated Police Assessment Centre (SPAC) in the first two sessions while at the Police College. The assessment capability allows for students who are serving police officers in their final session of the ADPP to be assessed on their pattern recognition associated with policing incidents encountered on a daily basis.

In mid 2010, the ADPP is moving to a problem-based learning (PBL) delivery format. The eSimulation as described will, in my view, enhance the course when delivered as PBL. It affords the student the opportunity to take in the knowledge and skills established through PBL enabling them to practice knowledge and skills online in a safe environment before being formally assessed and more importantly before encountering the incident in a 'real life' situation.

Designing for the student *experience* in a blended learning environment: Alignment of elements in the design

eSim: Domestic Violence Police Response	**Academics: Chris Bushell, Deb Murdoch**
Elements	***Description / Example***
Learner profile	Final session of a probationary period for policing students undertaking an Associate Diploma of Policing Practice. Mixed age students with a wide range of experience, studying in a distance mode, with a cohort size of 250 students
Teacher's main aim	The main aim of this simulation was to engage students with the recognition of patterns and development of best practice in policing.
Teaching goals and strategy	• Pattern recognition • Linking of theory to practice • Understanding of law • Developing best practice in police incident actions
Blended learning architecture (pre-ordinate design structure)	• eSimulation • Online study materials through a learning management system • Online forum • Education Development Officers support in local area commands • Academic support through email
Strategies for employing the eSim in the curriculum (reflexive strategies)	• Structured Order Learning Objects (SOLO) taxonomy to link all components • eSimulation guides professional practice in incident management • eSimulation acts as an information source • eSimulation acts as assessment of knowledge
Role(s) assumed by students	• practising professional police officer
Key objectives for the learners	• Best professional practice in each element of incidents that occur in daily life for police officers • Develops knowledge of higher level re-occurring incidents applicable in any policing environment and their associated practice and law.
Challenge / Difficulty	• Best practice skill development in high level incident procedure • Legal knowledge supporting actions

Methods and sequences	**Inside the eSimulation**	**Outside the eSimulation**
Invitation to engage	• Welcome page with instructions	• Students received instructions through the learning management system and online study materials.
Briefing (on roles and purposes)	• Instructions on how to progress through the simulation and the role of the students appear in the second and third pages of the simulation.	• Study materials instructions, sequence, support are detailed in online learning materials.

Methods and sequences	Inside the eSimulation	Outside the eSimulation
Support from teacher (assistance, guidance and feedback)	• Feedback response occurs when an incorrect response is chosen. Students are directed to alternative learning materials when incorrect responses are chosen more than twice.	• Support is available through an online forum and online study materials throughout the simulation.
Resources/tools (for taking action simulated, virtual and real)	• Students are provided with readings and resources for use during the simulation. Students use the simulation to identify the best process to deal with daily incidents in police life.	• Online study materials and on the job training support student learning in the simulation.
Tasks (work actively completed by students)	• Students decision of best practice response to scenario in consecutive progress throughout simulation, with justification of each choice required.	
Time (structure and pressure)	• Time released in three modules over a six week period, two weeks allowed for each module for completion then the material is withdrawn.	• Modules are released through the learning management system.
Reflection (individual/group)		• None required, optional to write a reflection for a second assessment
Debriefing	• Feedback is returned throughout the simulation as students progress through the scenario.	
Results (Formative/ summative assessment by the teacher/assessor)	• Assessable through simulation completion and evidence of acceptable level of knowledge through summative assessment.	
Unit outcomes (measured by the teacher/evaluator)	Student evaluation is measured by an eSimulation specific survey, an online student experience survey. Also, the education development officer in the local area command could indicate satisfaction with work based competence; Domestic Violence officer could show evidence of competence and less complaints in the workplace.	

Biographies, brochures and evaluation

Appendix B contains the biographies of the eSimulation educational technology designer or eSimulation developer and academics, an informational brochure on each eSimulation developed and the interpretation of the student evaluation of each eSimulation.

4.4 Royal Melbourne Institute of Technology (RMIT) experience

Purple Integrated Taxi System (PITS)

The Purple Integrated Taxi System (PITS) eSimulation is part of an undergraduate course in Business Information Systems Analysis and Design. The PITS project is conducted over the whole of the twelve week duration of the course and is designed to develop students' capabilities to build an appreciation of the business needs of a company, to construct business information systems models and to assess the feasibility of the system so specified to proceed to full scale implementation. An essential skill required by students graduating from such a course is the ability to design interviews with organisational clients and future system users for the purpose of determining system requirements and feasibility.

This eSimulation is built around a case study of the Purple Taxi Company, which requires a new computer-based information system (PITS) at its taxi dispatchers' desk. Students are supplied, in the first instance, with a text-based requirements brief, prepared by the company, to which they must respond. Students prepare initially a set of models of this information system, using techniques taught during the course. Subsequently they reflect on this work and prepare an assessment of the feasibility of proceeding to full scale implementation.

To support their assessment of feasibility to proceed with the PITS system implementation, students are provided with a, eSimulation of interviews, conducted with characters drawn from the initial brief. Students are provided with thirty to forty questions from which to choose, to put to a character in the eSimulation, spanning issues from business need, to functionality, technical issues, economic challenges, office politics, and the personal reactions of the character to the proposed project. In a two hour class, students work initially to design an interview with this character, to inform their assessment of PITS feasibility. They are challenged to choose typically 12 questions from the set provided, and to order them logically as they would propose such an interview should proceed. When happy with their design, the students 'run the interview' using the PITS eSimulation. They are then guided, in their teams, and subsequently in a plenary session, to reflect on how their planned interview 'played out', and to suggest improvements to their choices of questions and to the sequencing they proposed. These updated interview designs can also be played.

The plenary session in particular provides a valuable learning experience. In these sessions the instructor takes a selection of the interview designs from class groups and plays them to the full class. Students critique each other's designs, reflecting upon both question choice and sequencing. Proposed alternatives can be played immediately. In so doing, students get first-hand experience of the process of interview design, and feedback on the possible consequences of poor question choices or poor question sequencing.

Whilst the question choices and sets of question responses could have been provided in paper-based form, the immediacy of having the computer based eSimulation play the interview that has been designed encourages students to experiment, providing students with immediate feedback on the consequences of choices that are made when designing interviews.

Designing for the student *experience* in a blended learning environment: Alignment of elements in the design

eSim: Purple Integrated Taxi System (PITS)	Academics: Ross Smith, Martin Dick
Elements	**Description / Example**
Learner profile	The learners are primarily first year students in the Bachelor of Business (Business Information Systems. Approximately 70 students participated in the subject.
Teacher's main aim	To learn to design interviews with organisational clients and future system users for the purpose of determining system requirements and feasibility
Teaching goals and strategy	• Develop skills in understanding verbal communications from clients in order to input in to requirements documentation • Learn to design interviews to obtain the information most relevant to the system requirements • Reflect on the success/failure of the interview design
Blended learning architecture (pre-ordinate design structure)	• Tutorial exercises integrating the use of the eSimulation • Individual and group reflection on the success/failure of the interview design • On-going use of the eSimulation by students in their assignment
Strategies for employing the eSim in the curriculum (reflexive strategies)	• eSimulation exposes the students to real-world business analyst procedures • eSimulation supports their assignment work • eSimulation helps to explain the real-world context of their assignment work
Role(s) assumed by students	• Naïve business analyst
Key objectives for the learners	• Interview design • Developing analysis outputs that take into account verbal sources of information
Challenge / Difficulty	• Presenting information in a way that mirrors the chaotic nature of real-world business analysis • Highlighting the issue that information-seeking is a time-limited activity in the business context and efforts must be made to maximise the impact of the information-seeking

Methods and sequences	***Inside the eSimulation***	***Outside the eSimulation***
Invitation to engage	• Introduction by tutor in tutorial	• Presented in assignment documentation
Briefing (on roles and purposes)	• Students discover the main objectives of the project and its deliverables by engaging with the eSimulation	• Introduction by tutor in tutorial
Support from teacher (assistance, guidance and feedback)	• Simple help is also provided inside the eSimulation • Interview transcripts are always available	• Tutor actively assists in the tutorial exercise • Students can contact subject leader for additional help

Methods and sequences	***Inside the eSimulation***	***Outside the eSimulation***
Resources/tools (for taking action simulated, virtual and real)	• Students use eSimulation as a basis for designing their interview schedule and choose from a list of possible questions	• Subject notes and lectures support the outcomes of the process • Online subject forum available as a resource
Tasks (work actively completed by students)	• Students in small groups create an interview schedule and then run the interview schedule with the eSimulation and then reflect on its success/failure • Two sample interview schedules are then run for the whole tutorial class and the group as a whole then reflects on the success/failure of the two interview designs.	• Students have to develop in groups a feasibility analysis for the proposed information system and the document needs to take in to account information provided by the eSimulation
Time (structure and pressure)	• Tutorial exercise runs in a two hour period: 1 hour for small group work and reflection, 1 hour for class reflection • Assignment runs over a 4 week period, students have free access to the simulation over that period	• Assignment occurs over a 4 week period
Reflection (individual/group)		• Assignment occurs over a 4 week period
Debriefing		• All students are assessed by interview and extensive feedback is given at this stage for the assignment. Tutorial involves tutor-led debriefing
Results (Formative/ summative assessment by the teacher/assessor)		• Tutorial exercise involving whole class gives qualitative formative assessment • Assignment interview and feedback sheet includes summative assessment of use of the interview in the assignment
Unit outcomes (measured by the teacher/evaluator)	Student perception and experience are measured by applying an eSimulation-specific survey. Students also take a Course Experience Survey.	

Ringo Robotics

The Ringo Robotics simulation is part of a postgraduate course in Project Management. The simulation is conducted over the whole of the 12 week duration of the course and is designed to develop students' capabilities for managing projects using the Project Management Body of Knowledge (PMBOK) framework.

The simulation is based on a case study involving an Information Technology service provider (Ringo Robotics) and a client (The Shelf Company). The client has requested the service provider to build and install two industrial robotic systems: one to build custom-made office furniture; and one to pick and assemble materials for furniture assembly on demand.

The simulation involves three parts: the creation and presentation to the client of a commercial proposal, the development of a project plan, and the execution of the project over a six-week period.

The 'electronic' part of the simulation (eSimulation) is part of the third part of this simulation – the execution. During the six weeks of the project execution, various 'events' occur. These events are designed to alter the progress of the project. Project Managers (PMs) have to react to the events to keep the project on track. Each week, the project teams meet with their simulated clients (other groups in the course) and report on progress, including management of the 'events'.

The purpose of using eSimulations is to enhance the realism of the events and require students to observe and analyse. Students receive e-mail and voice-mail messages and view short animated sequences depicting events. For example, after the kick-off meeting, the project sponsor asks the PM for a scope variation: inclusion of a small Customer Relations Management system. The students have to manage the request for the variation in the appropriate manner – according to the procedures defined in their project plan. In another simulation, the PM learns through a news broadcast that bad weather has closed the Brisbane airport, with repercussions for the project.

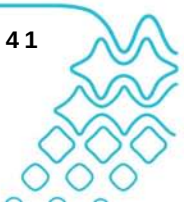
Information about events could have been provided at the start of each week by means of a briefing note. However, our experience is that the use of eSimulations increases the students' sense of realism and the challenge experienced. It also increases the sense of pressure experienced by students as they attempt to react in a timely fashion to the unfolding simulated events.

Designing for the student *experience* in a blended learning environment: Alignment of elements in the design

eSim: Ringo Robotics	Academics: Ian Searle, Hossein Zadeh
Elements	***Description / Example***
Learner profile	Users are students of the IT Project Management course which is part of the Master of Business In Information Technology program.
Teacher's main aim	To develop capabilities in project management through taking part in a simulated project.
Teaching goals and strategy	• Develop skills in communicating precise specifications (scope, budget, schedule) and legal requirements (terms and conditions) in a commercial proposal • Develop and practice skills in project management frameworks (Project Management Body of Knowledge (PMBOK)) to plan projects and communicate those plans to stakeholders • Develop and practice skills in executing a plan while coping with variations which require adaptation of the plan.
Blended learning architecture (pre-ordinate design structure)	• Ringo Robotics Case Study (essential information for the simulation) • Preparation of commercial proposal (hard copy document) • Preparation of project plan using PMBOK framework (using Wiki) • Simulated project execution (six workshops in which participants role-play project team and project steering committee during weekly project meeting. Also simulated events during the week influence the project execution) • Project close-out
Strategies for employing the eSim in the curriculum (reflexive strategies)	• eSimulations provide events which affect the execution of the project • Students react to events by: • Reporting to sponsor and steering committee • Documenting actions taken to manage events and communication with sponsor and project director • Updating project plan
Role(s) assumed by students	• Trainee project manager, project team and (in workshops) project steering committee
Key objectives for the learners	• Project planning and management
Challenge / Difficulty	• Presenting information in a way that mirrors the chaotic nature of project management • Highlighting issues which must be managed by project managers and teams • Providing a sense of realism and urgency

Methods and sequences	***Inside the eSimulation***	***Outside the eSimulation***
Invitation to engage	• Introduction by tutor in tutorial	• Presented in assignment and case study documentation
Briefing (on roles and purposes)	• Briefing provided by tutor and case study documentation. Tutor assists when required.	• Introduction by tutor in tutorial

Methods and sequences	***Inside the eSimulation***	***Outside the eSimulation***
Support from teacher (assistance, guidance and feedback)	• Tutor actively assists in the tutorial exercise • Tutors monitor simulated committee meetings	• Weekly lectures • Students can contact subject leader for additional help
Resources/tools (for taking action simulated, virtual and real)	• Wiki (on RMIT Leaning Hub • Animated sequences delivered as flash within an HTML page (on RMIT Learning Hub)	• Wiki (simulated company document management system / online project management tools)
Tasks (work actively completed by students)	• Commercial proposal • Project plan • Statements of work (SOW) for contractors • Weekly reports to steering committee • Weekly role-play meetings of steering committee and with project director • Reports of committee and project director as required by events • Project close-out documentation: • Sponsor sign-off • Project director sign-off • Post project review (lessons learnt)	• Weekly entries in reflective journal • Class tests weeks 6 and 12
Time (structure and pressure)	• Simulation takes all 12 weeks of semester: • Proposal – week 4 • Plan – week 6 • Events, reports and meetings – weeks 7–12	
Reflection (individual/group)		• Reflective journal
Debriefing	• Tutor-led debriefing after role-play meetings	• Discussion in lectures
Results (Formative/ summative assessment by the teacher/ assessor)	• Proposal – assessed by tutor • Plan – assess by tutor. Students apply corrective actions • Reports peer assessed at end of role-play meetings	• Reflective journal • Class tests (2) • Research assignment (3000 words)
Unit outcomes (measured by the teacher/ evaluator)	Student perception and experience are measured by applying an eSimulation-specific survey. Students also take a Course Experience Survey.	



Blue Cut Fashion (Store)

The Blue Cut Fashion (Store) eSimulation was reproduced from the Deakin LiveSim server to the RMIT installation and then used in a class in the undergraduate business analysis course operated as part of the Bachelor of Business (Business Information Systems) degree program.

The experience using the Blue Cut Fashion eSimulation, including its design and usage, at Deakin University, has been described in Appendix A. The RMIT experience is consistent with the observations drawn at Deakin University.

Biographies, brochures and evaluation

Appendix C contains the biographies of the academics or eSimulation developers, an informational brochure on each eSimulation developed and the interpretation of the student evaluation of each eSimulation.

4.5 Existing Deakin eSimulations used during the project

A number of eSimulations previously developed by Deakin were also used in the unit curriculum as follows:

LiveSims (i.e. video-based characters)

Interview profession eSims		
eSimulation	***University/Faculty***	***School***
Know Your Client **Scenario 1**. Financial Planning	Deakin University, Faculty of Business and Law	Accounting, Economics and Finance
UnReal Interviewing **Scenario 1.** Forensic interviewing of a child	Deakin University, Faculty of Health, Medicine, Nursing and Behavioural Sciences	Psychology7
ClientView (Company Law) Role-play a solicitor interviewing a client. Three separate sessions	Deakin University, Faculty of Business and Law	Law

Appendix A contains the biographies of the educational technology designer, the eSimulation developer and the academics, an informational brochure on the eSimulations used and the interpretation of the student evaluation of each eSimulation.

5. Developing and producing eSimulations

Producing an eSimulation largely depends on the educational environment, teaching and learning objectives, students' and teachers' technical prowess, as well as the hardware and software available to support the process of eSimulation design, deployment and eventual use. In this section, we will outline the architecture and design processes that were considered and used by the project team. Much of the detail provided in the following paragraphs describes the experience gained in developing eSimulations under the Deakin LiveSim simulation framework that was adopted for the ALTC project. See Appendix D for details on Deakin's LiveSim.

5.1 eSimulation architecture

There are many possible architectural designs that could support a typical eSimulation. The LiveSim architecture, depicted in Figure 7 below, features four modules responsible for the authoring (or design) and running (presentation, control and tracking) of eSimulations.

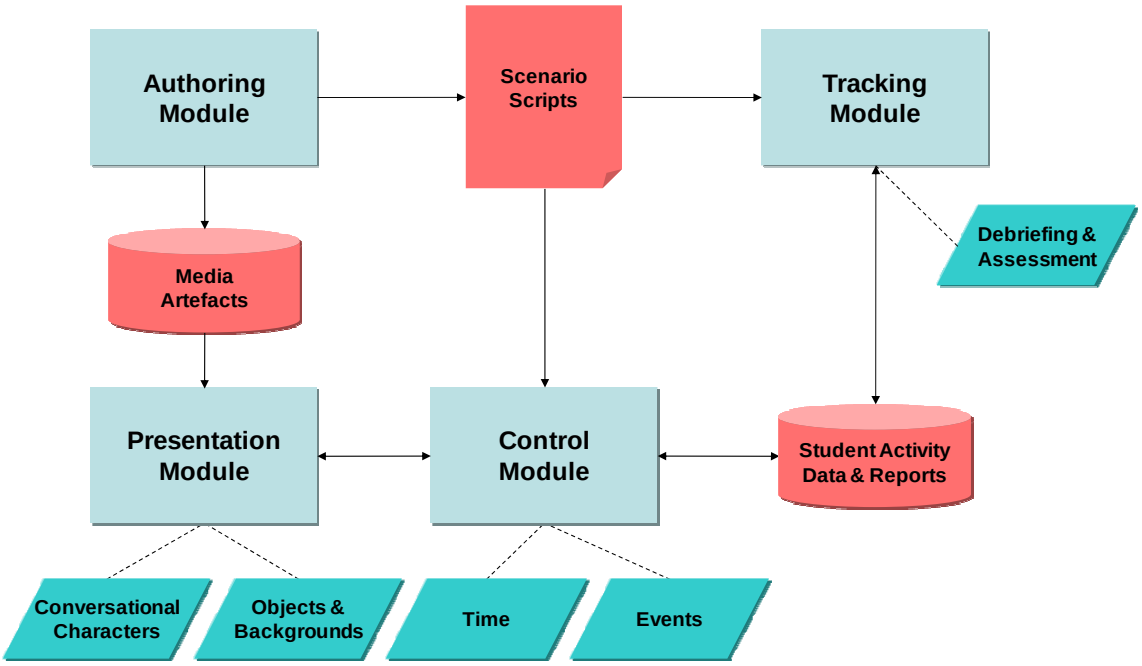


Figure 7 LiveSim architecture

The main role of the *Authoring Module* is to specify a number of eSimulation scenarios, which detail (often in XML scripts) the behaviour of the eSimulation system in response to user actions. Its second aim is to assist development and description of numerous media artefacts that could be stored for later use in the construction of the eSimulation environment – such artefacts would include conversational characters, components of interactive objects featured in the eSimulation (such as interactive phones and computers or simple buttons), as well as, images and sounds used as part of the background.

The *Presentation Module* is responsible for positioning and displaying images or playing sounds on request, as well as initiating built-in behaviour of interactive objects (such as movies or buttons).

The *Control Module* interprets the eSimulation script, sensing events triggered by the user or by clock (time) and in response selecting pre-planned actions which are normally invoked by sending requests to the *Presentation Module*.

All user generated events, as well as actions performed by the eSimulation may be logged by the *Tracking Module*. This information can be stored and later accessed for reporting purposes in user debriefing or student assessment.

5.2 Development process

Creation of a high quality LiveSim simulation requires an established educational approach, creative scenario design, attention to detail of simulated characters and their behaviour, and involvement in graphic and multimedia design, as well as extensive testing and evaluation of simulation scripts and their deployment in a teaching context. Such development would be focused on the experience of the *Learner* and typically involve an *Educator*, *Media Designer* and, in the current version of LiveSim which lacks an effective Authoring Module, also a *Developer*. See Figure 8 below.

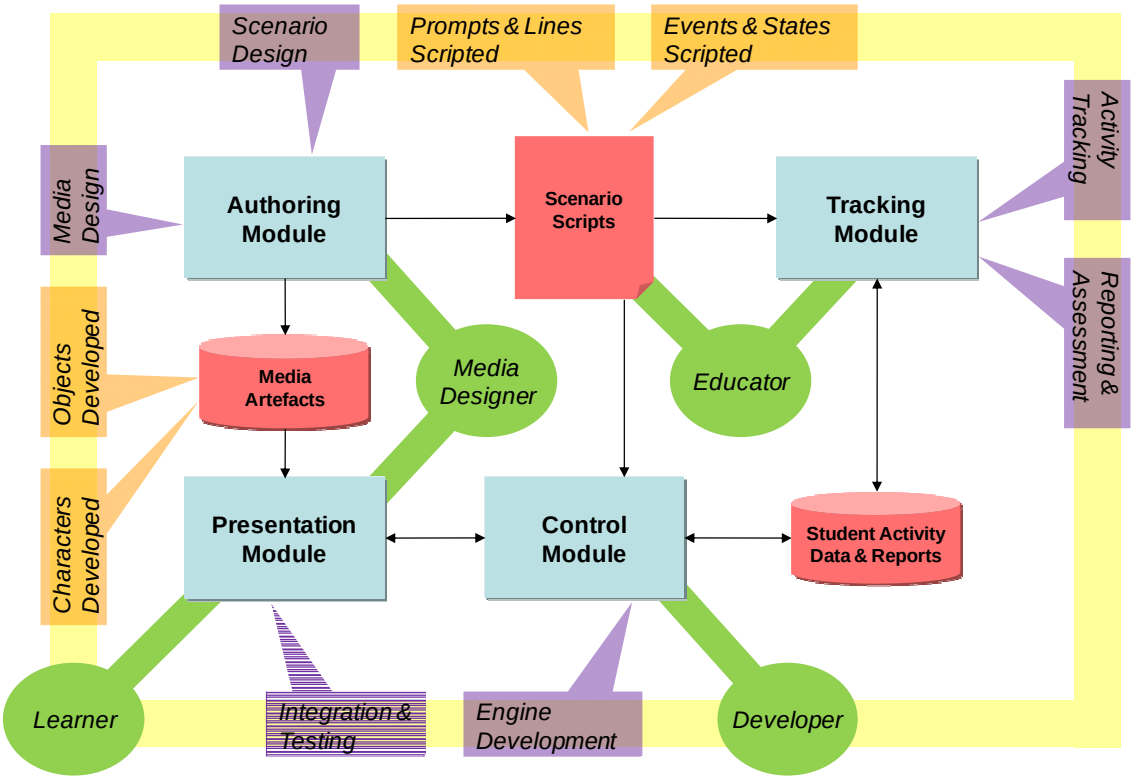


Figure 8 LiveSim development process

Typically, the eSimulation development process focuses on a *Scenario Design*, which results in a description of eSimulation characters, what they know and what they say, in response to what questions, and in what circumstances. Similar to the development of a script for a play or a movie, character prompts (questions) and lines (responses, gestures, fidgets and body language) are scripted in considerable detail. As the story line of an eSimulation unfolds dynamically, the script is not chronological but it rather depends on the states of the conversation and events (user actions and time) that trigger state changes, which both need to be scripted. *Media Design* assists visualisation, animation and puppeteering (provision of controls) of characters and objects featured in the

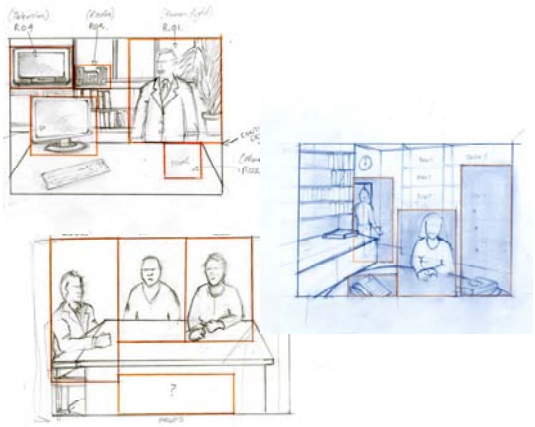
eSimulation. *Integration and Testing* of the eSimulation would normally involve both the Media Designer and the Educator; however, in the later stages of eSimulation development, it may also include a pilot study with the participation of Learners. Before releasing the eSimulation into production, the Educator will also need to design an assessment regime suitable for the tasks supported by the eSimulation. In some cases, such assessment would require automatic tracking of Learners' activities and reporting of these activities. On rare occasions, requirements for eSimulation features' customisation would necessitate changes to and redevelopment of the LiveSim Control or Presentation Modules.

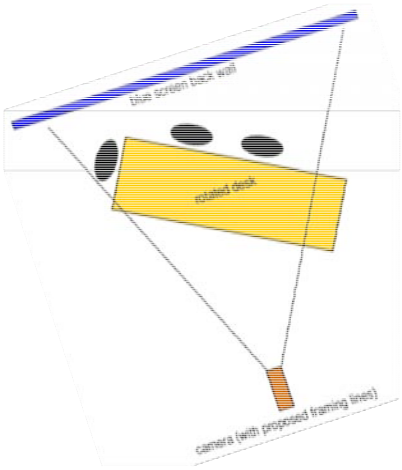
5.3 User interface design

User interface design is an important part of the complex process of experience design. All character interaction will occur in the simulated world that we refer to as a stage, and its manipulable objects referred to as props.

Designing the simulation stage and props to display believable properties enhances the learners' perception of immersion and encourages engagement in the simulation process.

During this phase in simulation design, we would encourage employing the services of graphic designers to envisage interaction spaces, placement of props and positioning of characters.



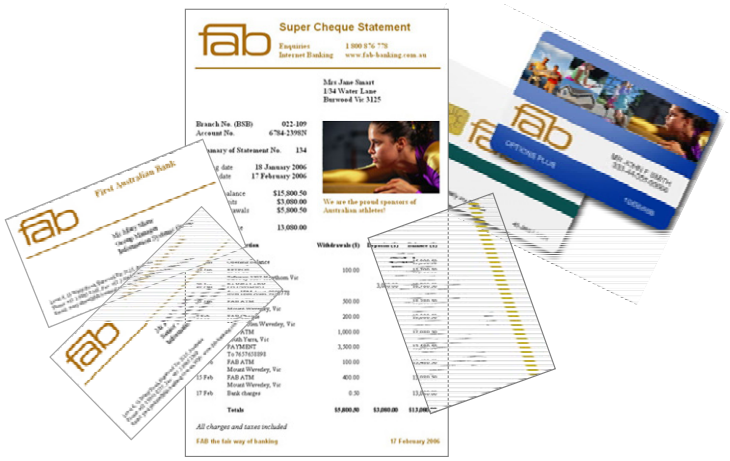


Stage (or stages) of simulated action need to be spatially designed and oriented in relationship to the future simulation user. This is especially important when acted characters are to be used and studio work is to ensue.

Studio trials may assist in sitting virtual characters around desks and tables.

Graphic designers may also collaborate with photographers to bring into the eSimulation images of authentic objects, judge their colour and size properties, match and arrange their characteristics to fit the stage and eventually select the best set of props from numerous alternatives.

In some cases new brands have to be created. Graphic designers may assist creating company logos, business stationery, documents, business cards and objects involved in business processes and interaction.



In the final phase of the interface design, simulation screens, forms, buttons and displays are designed and linked, and their flow defined.

5.4 Character design

A conversational character is a form of an interactive graphical user interface, which displays a human or animal body (head or torso) capable of engaging in a constrained form of conversation with the user.

Conversational characters are increasingly popular in various web applications. They are used to greet web site users, to deliver information via online help desks, and to facilitate interactive training and immersive experiential eSimulations.

Virtual characters that are designed to represent the user are usually referred to as Avatars. Avatars are commonly used in online forums, chat, blogs and some internet simulations (such as Second Life).

In LiveSim projects, we usually distinguish between animated conversational characters and acted (video based) characters constructed in a studio and based around situations involving real actors.

Examples of conversational characters

The simplest use of the conversational character is to convey a message to the user. This could be a web site greeting message, a simple menu-driven help desk to facilitate questioning-answering, or an oration-style continuous delivery of some content.

A more complex use of 'realistic' characters can be in conversational blogs and eSimulations involving one or more characters with near photographic facial features, and capable of complex user engagement and interaction. The 'cartoon' characters, which often lack reality, can be a preferred option in developing games and simulations for children.

Applications of conversational characters

Conversational characters are often used in computer and web systems where the users would prefer non-verbal visual indication of some communication, where additional verbal communication needs to be put in parallel to the existing communication channels, or where user satisfaction could be further improved by the presence of a virtual human character.

In view of the above-mentioned motivational factors, the commercial applications of conversational characters include (e.g. see Wikipedia on 'Conversational Agents'):

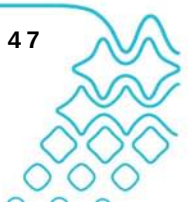
- Answering questions about products and services;
- Guiding customers to products;
- Help desk operation;
- Access to a knowledge base;
- Web site navigation;
- Technical support;
- Personalisation of interaction;
- Training and education.

Other applications which rely on the creation of a believable social environment include (see Wikipedia on 'Embodied Conversational Agents'):

- computer games;
- virtual training environments;
- portable personal navigation guides;
- interactive fiction and storytelling systems;
- automated presenters and commentators.

Development of conversational characters

There are many vendors of software specialising in delivery of virtual characters in commercial applications and over the web. The most popular include SitePal, Media Semantics and Poser. In the ALTC project, we predominantly relied on the use of Media Semantics products.



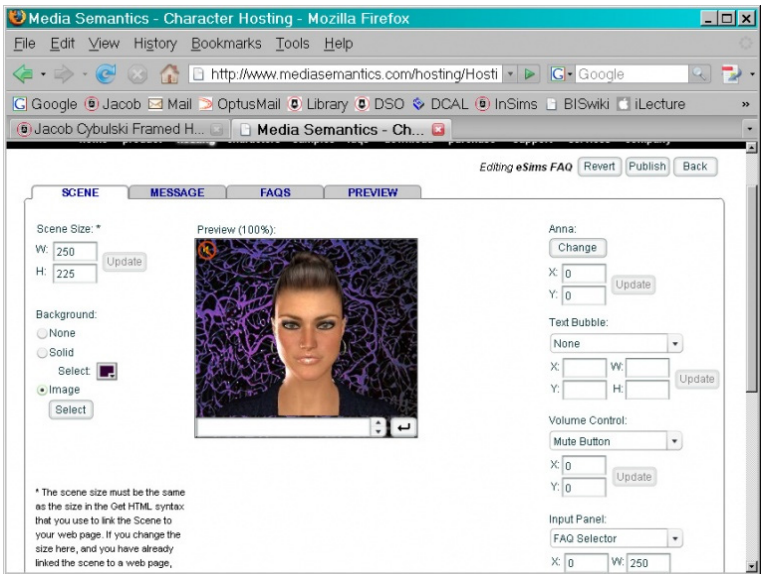
There are four major methods of delivering conversational characters to the end users, i.e.

1. *Acted characters*

   In the simplest form, character interaction can be partially scripted so that conversational characters can be played by actors and recorded in a 'blue' studio (with chroma-key technology to remove the background). Subsequently, the video fragments are post-edited by video engineers and multimedia programmers and stored for later access by an eSimulation and delivered to the user in response to questions.

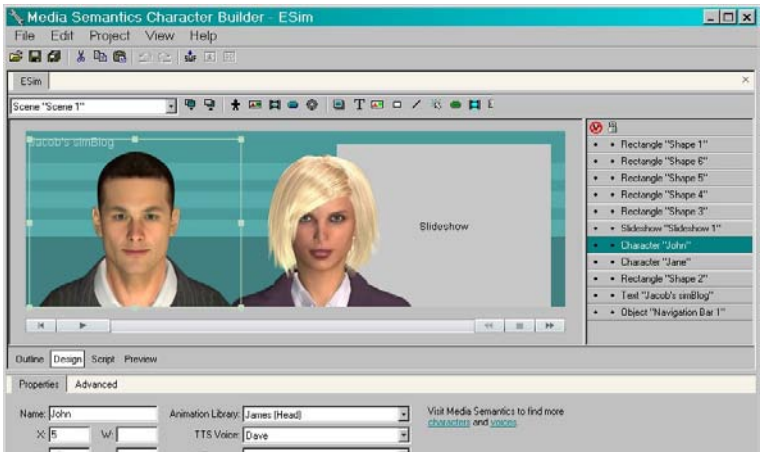
2. *Hosting service*

   Hosting – the characters can be hosted at the vendor's site. This approach has been taken by SitePal and is also available as one of the services available from Media Semantics. In a typical situation, developers (or even the end users) can purchase the hosting service, configure a number of conversational characters to say a range of phrases in different voice styles, and then include them on their web site. The main advantage of this approach is that developers do not require any IT infrastructure to use their characters, the upfront costs are small and the development of useful characters does not require sophisticated technical skills. Media Semantics hosted services are easily customisable online:



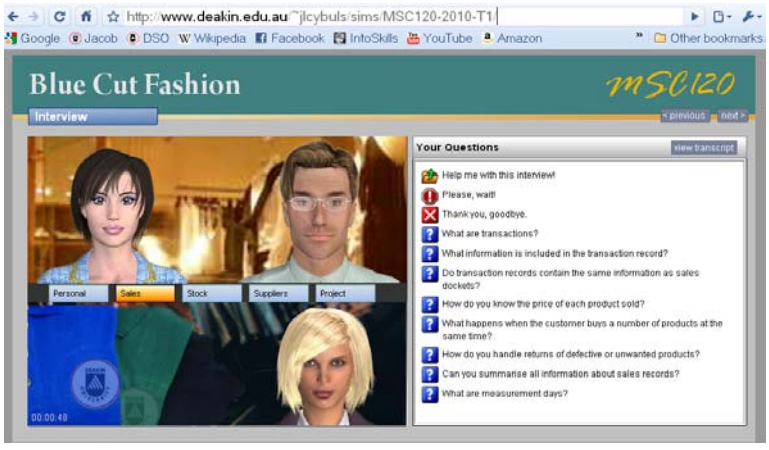
3. *Character builder*

Builder software or a video that includes conversational characters can be built using a specialist ‘character builder’ tool (e.g. Media Semantics). A development environment will require not only the character building software but also depending on user requirements, either voice recording software or a text-to-speech system capable of synthesising voices of acceptable quality. The main advantage of this approach is that the resulting multimedia products can be delivered – with the minimum of costs (re-distribution license may need to be purchased) – to end users either on the web or on a CD-ROM. Media Semantics Character Builder is a popular choice for building simple character applications:



4. *Applications using a character server*

An organisation that relies on large scale delivery of virtual characters across its web sites and online products may wish to set up its own character service (see Media Semantics). Commonly, a voice and character server needs to be purchased and setup as an extension of the standard web server. Quality voices (text-to-speech service) will require expensive ‘telephony’ licenses and a separate licensing for re-distribution of the character artwork may also be required. The main advantage of this approach is the attractive costs to volume ratio, the flexibility of service delivery and a high degree of control over different delivery channels. Blue Cut Fashion eSimulation is an example of a complex and dynamic character application utilising a character server:



In a typical scenario (see Figure 9 below), such as those encountered with Media Semantics characters, the character and voice servers have to communicate with a web server to deliver a believable animation (e.g. in Flash) to a web browser via a trusted web site.

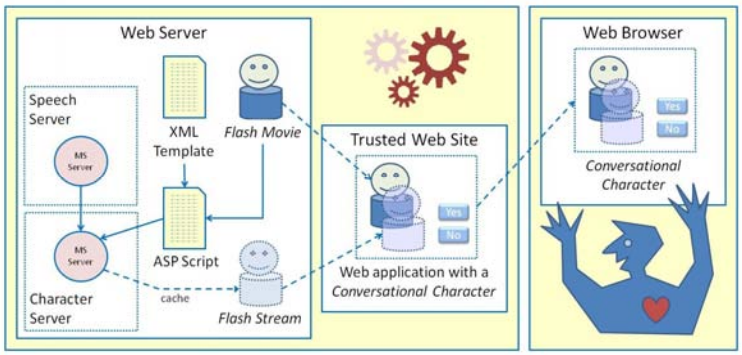


Figure 9 Communication between eSim elements

Some vendors also provide options for the characters to engage in intelligent question answering, use of artificial intelligence and facial motion tracking and mapping against a face model.

Conversational character resources

Sites that specialise in conversational character software include:

1. SitePal – service to stream conversational characters (US$10–50 per month);
2. Media Semantics – home for the Character Builder software (client at US$295 and server at US$995 both required);
3. Reallusion CrazyTalk – software capable of constructing a character from a single photo (US$150);
4. CodeBaby – software to create conversational agents (price on request);
5. Living Actor Avatars – avatar making kit with speech to video system;
6. Gizmos Web Characters – upload your photo and be a star;
7. Poser – packaged software for figure and facial expression design (US$250);
8. Reallusion iClone2 – 3D character construction and animation (US$200).

Use of character voices

Sites and products that provide text to speech software and services include:

1. ByteCool Links to speech packs, especially Microsoft Lernout and Hauspie TruVoices. Medium quality but free;
2. Loquendo High quality TTS engines and voices with emotive tags; price pretty steep as well;
3. NeoSpeech High quality voices but the license is uncertain;
4. Cepstral Good quality and not very expensive voices;
5. Nuance Realspeak Quality voices (expensive for media applications), featuring Australian accents.

5.5 Behavioural design

Support for learning styles

eSimulation educational scenarios engage students in simulated professional activities, which develop skills essential in planning, facilitating, controlling and reporting of individual and group meetings. An example of such meetings are requirements elicitation sessions (e.g. Blue Cut Fashion [Chain]).

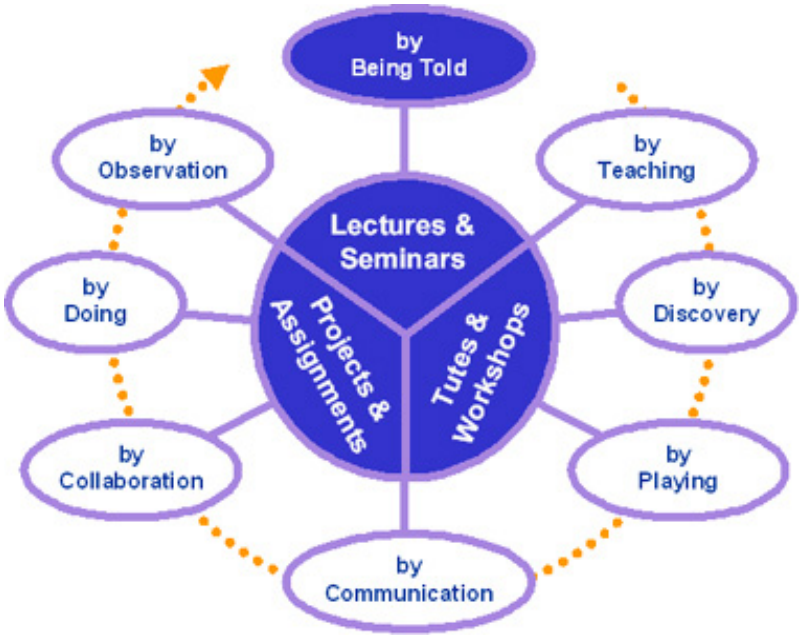


Figure 10 eSimulation models

A number of distinct eSimulation models can be deployed (see Figure 10), each capable of supporting different learning styles (e.g. by being told and by observation, by doing and discovery, playing, communication and collaboration). In the interview-style simulations, there are some distinct classes of sessions that can be delivered; that is, single person interviews, group interviews, brainstorms or quiz, for example. For each session, a number of variants are also possible and they can be invoked by scenario designers wishing to assess students' ability to employ a specific meeting strategy.

A single eSimulation may support several distinct learning styles and involve quite different kinds of interactions, e.g. one scenario may require students to listen, observe and take notes, one to involve selecting and asking questions of a character, and yet another responding to questions posed by the character. In complex eSimulation systems, such as LiveSim, all such scenarios can be designed to reflect these differing learning styles that can be embedded in a variety of interaction modes. The different eSimulation scenarios, however, can share data and may be 'aware' of students' activities performed prior to the commencement of the consecutive tasks (such as questions asked by a student and answers given).

Conversation design

In any eSimulation, to achieve a specific educational objective, it is necessary to design several scenarios consisting of a number of interacting characters and objects that could be viewed or manipulated. A simple model of each scenario's interaction is often the first stage of a conversation design (see Figure 11 below).

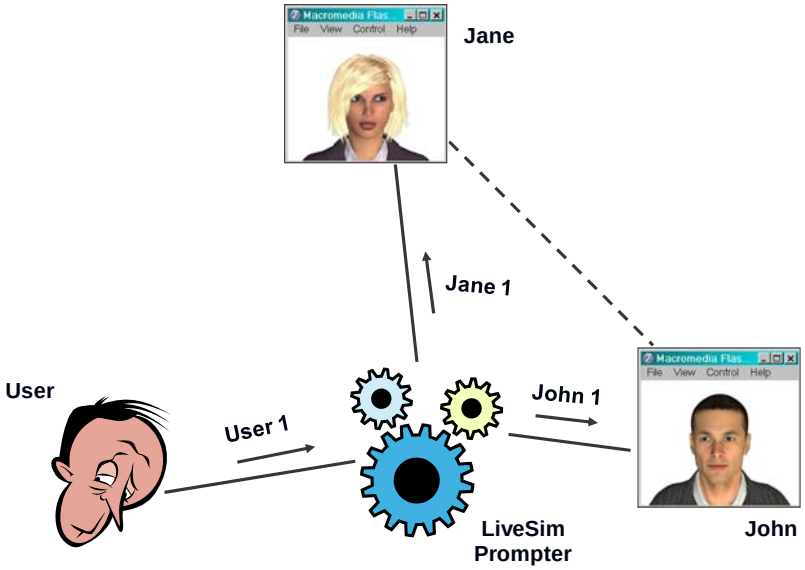


Figure 11 eSimulation conversation design

Such a model will commonly indicate the types and the number of characters engaged in the planned conversation (which may include the user's avatar) and the communication channels to be open between the characters.

The detailed sequence of the character communication may not be anticipated in advance as such sequence may be in complete user control via prompts and menu clicks. However, typical sequences of conversation flow are commonly drafted to identify all possible user prompts (questions to be asked) and characters' lines (answers).

Personality design

It may be important at this stage in the design not only to explicitly state the exact prompts and lines to be said by the characters but also the gestures to be displayed (e.g. head movement), body language projected (e.g. looking angry), actions taken by the characters (e.g. grasping a mobile phone), and props manipulated or changed in the process (e.g. documents placed on the table).

The personality of the character should be taken into account when writing the script and incorporating the gestures that portray the personality of the character. The tilt of the head, the eye expression or the movement of the character can all convey meaning. Characters are available in both male and female and portray a range of character types and the personality of the character in light of their visual appeal should be explored in the scenario and decisions made early before the script is written in order to design the gestures and attitudes into the script.

Although the next section on Script Design indicates the ability to synthesise the speech and body language of the server character it is before the script is completed that those movements and gestures need to be included. The human components of the character need to be incorporated into the technical aspects of the scenario design. The same questions can be asked in an interview, for example, by different characters with different gestures to convey different meanings. This may mean that multiple scripts, or multiple sets of questions, may need to written to get the correct sense or flow of the questions in the required character personality. When designing the state charts these components can be pencilled in to get a sense of how the flow will occur. However, the constraints of the software should be taken into consideration when designing gestures and movements into the script.

Script design

In this project, the scenario, its dialogue and behaviour of interacting characters were all planned in state charts. State charts are a design formalism commonly used in Software Engineering to design the behaviour of systems composed of multiple interacting objects. Each of the active objects can assume a number of distinct states in which the active object can perform specific activities. They can send events and receive messages from other objects in the system. In response to messages and time events, objects change their states and perform new activities. In eSimulations it is the conversational characters and multimedia objects (such as phones or desk top computers) that represent those active objects. The messages sent and received are prompting questions and activities performed are vocal responses designed in the lines of the dialogue. A state chart model is used to describe objects, their states and state transitions.

Before scripting any complex interaction with eSimulation characters, a state chart model should be developed (see Figure 12).

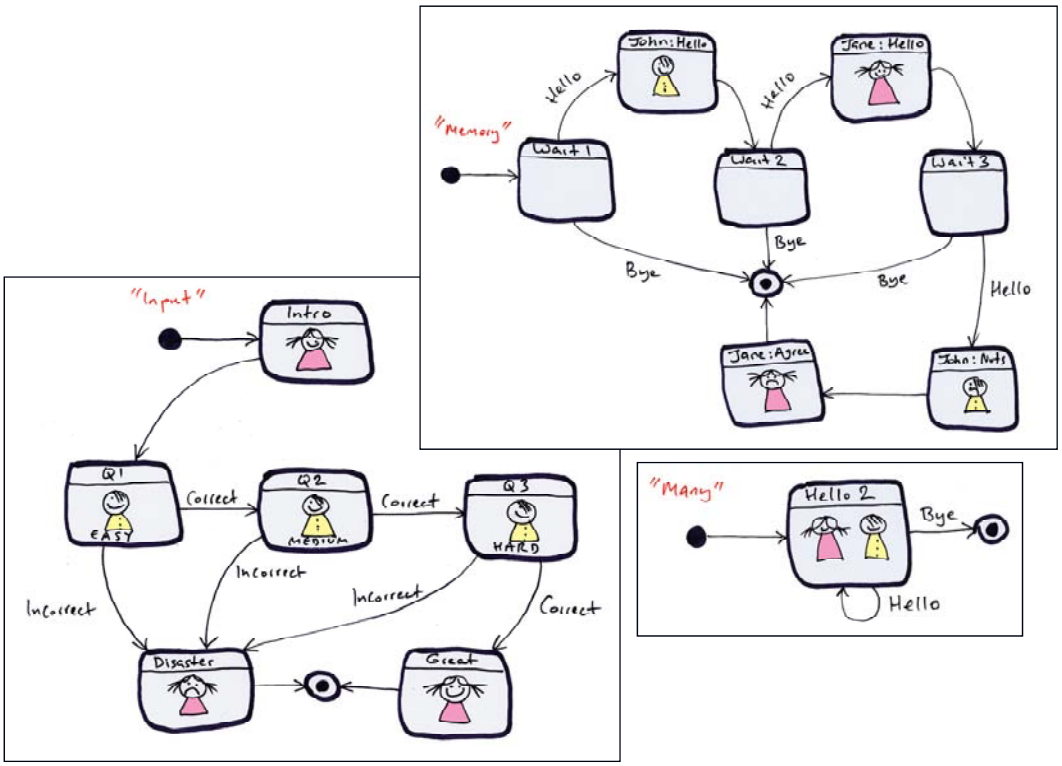


Figure 12 State chart model

The activities performed by character objects can be designed and implemented in a variety of ways. The script of the dialogue sequences can be used to determine the lines to be said by the characters. However, the lines will be delivered differently depending on the nature of these characters and they have to be developed differently depending on the characters.

Acted characters have to be captured in their entirety in the blue studio, where each line of their dialogue needs to be shot separately, post-processed by a multimedia designer and turned into a separate movie that will later be linked into a state model and played in response to a user selected question.

The speech and body language of server characters can be synthesised dynamically from the text of their dialogue at eSimulation run time. Additional codes for character behaviour and voice embellishments can be inserted into the XML of the dialogue itself and these codes can then be used at the time of speech production.

Hosted characters, as well as characters that are purpose built and later delivered as Flash animations, can be designed off line. Under the control of the authoring environment, the look and the voices can be selected, the question-responses pairs designed and tested (see Figure 13), and additional behaviour added and previewed, stage background designed and sophisticated logic and control provided, if so required.

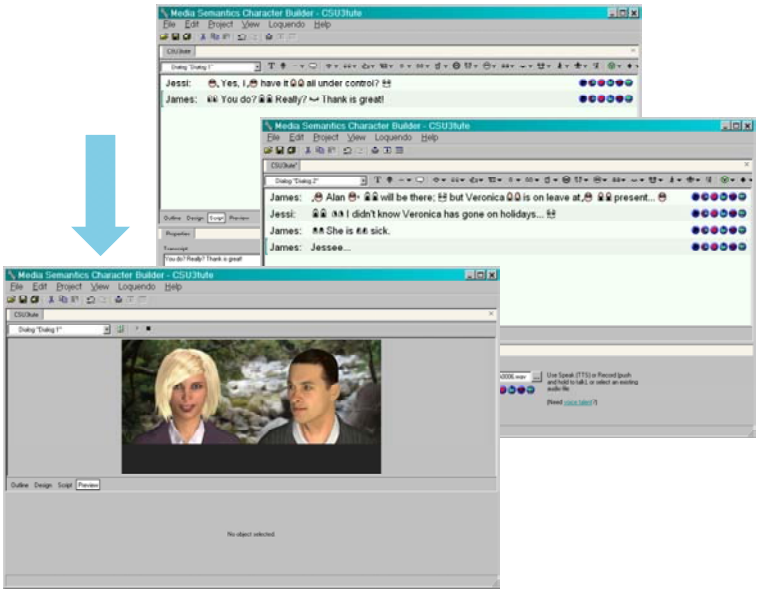


Figure 13 eSimulation character design

5.6 Deployment of eSimulations

Deployment of a technical infrastructure capable of supporting interview-style eSimulations in an educational environment is not straightforward and requires detailed technical knowledge and experience.

Depending on the technology used in the implementation of a particular eSimulation, different server software, server extensions, as well as characters and voices are required. These technology choices will create distinct challenges, each demanding unique solutions in the process of infrastructure deployment. In the following paragraphs, we describe a typical eSimulation installation and configuration. Our examples will reflect the software infrastructure that was adopted to support our project. These involved Media Semantics character technology and the Adobe Flash based integration environment (as that used in LiveSim). Our discussion will not cover some of the possible options and extensions that were specific to some of our eSimulations, but which were not uniformly applied across the entire eSimulation infrastructure, e.g. the use of an Oracle database to track students' performance.

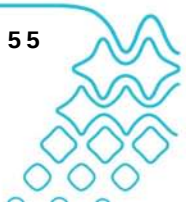
The key difficulty in the installation is the interaction between various technical components that must be properly configured for the server to work with the eSimulation integration framework (LiveSim). Typically the required components would include Microsoft Windows (Win server 2003, XP or Vista), Microsoft Internet Information Server (IIS) with ASP, Media Semantics Character Server (CS), Media Semantics Character Builder (CB), TTS voices (e.g. Cepstral), Media Semantics character packs, and optionally another web server to host eSimulations (to be called the eSimulation server, and be separate from the Character server), LiveSim simulation (on the eSimulation server) and its avatars (on the Character server). Other environments, such as those based on Linux and Apache web servers, would have similar challenges, though the particular technical solutions to these challenges would be quite different.

Any character server technology, such as Media Semantics software, needs high quality technical staff. These staff would be well versed in the Microsoft environment and experienced in installing internet software systems (ASP, PHP and Flash). Knowledge of the integration framework (such as LiveSim) is also needed to take full advantage of the installed systems and characters.

The installation process includes Internet Information Server (IIS) configuration, Media Semantics software setup, and LiveSim installation. The following tasks are required:

Installation of a server operating system

While for personal and home use Windows XP or Vista would be sufficient, institutional use of characters, by multiple concurrent users, requires a server version of the Microsoft operating systems. Installation of such a server is thus necessary and vendor recommendations need to be followed exactly.



Installation of a web server

Internet Information Server (IIS) is normally bundled as part of the Windows Server software suite. By default IIS also comes with the ASP scripting language that must be enabled. Should there be any changes to the IIS or ASP configuration, the IIS server must be restarted. Note that it is possible to run character server products on Linux machines with the Apache server and PHP scripting language. Should the character server and eSimulation server run on separate machines (advisable) then Windows Server, IIS and ASP must be installed and activated on both machines. As our eSimulation integration framework depended on Flash, the cross-server invocation of Flash must also be enabled.

Installation of the character server

A character server (such as Media Semantics Character Server) requires some specialist software (Media Semantics Character Builder [CB] and Media Semantics Character Server [CS]) to be installed on the server machine. The server (and any application and utility) software comes with the necessary libraries, as well as some base characters and voices. The server software comes with detailed installation instructions which must be closely followed. The installation will normally result in two Windows services being installed, i.e. the Character Server and the Speech Server, and you must ensure that both these services have been started. Should there be any changes to either of the server configurations, the services must be restarted.

Installation of conversational characters

Character packs (which will include characters that are not part of the standard distribution) must be purchased and installed, requiring that the server (not personal) licenses for these characters are obtained.

Installation of character voices

Text-to-Speech (TTS) voices also need to be installed and their licenses registered by following the steps explained in the vendor's documentation (e.g. that supplied by Cepstral or Loquendo).

Installation of the eSimulation integration framework

Now you are ready to install the eSimulation integration framework (such as LiveSim) and any of the eSimulations on their relevant server. It is important that each simulation (or the framework or both) clearly define the web location of the characters and voices, or the avatars based on these characters and voices.

Testing of the installation

When the eSimulation is loaded from the web browser, the browser will display the eSimulation Flash environment and when necessary it will load the avatars or characters from the character server and synthesise their speech as necessary. Should there be any problems, one should inspect the error logs in the Character, Speech and Web servers.

5.7 Planning for eSimulation development and implementation

The eSimulation Project Gantt Chart below has been developed to guide a typical eSimulation design, development and implementation.

The terminology in each section is explained more fully in the previous sub-sections of this guide. The importance of alignment, planning, and design of an eSimulation into the learning experience of students cannot be emphasised enough. Basing an eSimulation on pedagogy in the first instance will assist in the students' learning experience and understanding. These steps were developed to be worked through consecutively, although some areas will overlap.

Task	Role	Percentage of time allocated over the life of the project																						
			5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
Constructive alignment																								
Analyse subject and course and determine need for the project																								
Align eSimulation to: - learning objectives - learned capabilities desired - learning/ professional experience to be transferred - assessment																								
Determine type of eSimulation to be designed and developed																								
Blended learning environments																								
Determine delivery methods of eSimulation to students – web based or CD, server based or webpage delivery, LMS																								
Conceptualise student experiences in the blended learning environment: - motivating engagement - time pressures - challenges/ decisions - resources/ information - assessment - guidance and feedback - delivery methods over time/ immediate																								

Task	Role	Percentage of time allocated over the life of the project																						
			5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
Assign tasks to project team members																								
Identify what resource requirements are required: - software - hardware - human resources																								
Design and development																								
Determine architecture of the eSimulation																								
Project parameters discussed and determined - scenarios - presentation - interaction control - performance tracking for assessment																								
User interface determined: - colours - stage background - props - spatial design - images - branding - forms - buttons - displays																								
Character design - choice of character - choice of software for character development - determine personality characteristics for the character - determine character movements and gestures in all scenarios - voices determined and purchased for all characteristics																								

Task	Role	Percentage of time allocated over the life of the project																						
			5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
Script design - state chart development showing all interactions for all characters (storyboard) - gestures and movements integrated into script																								
Script development - multiple scripts written to capture all possible flows of conversations - feedback for questions or interaction developed - integrate gestures and movements into script																								
Production and delivery																								
Code project bringing together all interactions																								
Install/test architecture																								
Test code/project																								
Production																								
Proof/QA																								
Delivery																								
Evaluation																								

6. Establishing and maintaining technical infrastructure

A decision on the choice of the organisational infrastructure to support future eSimulations has to be taken early in the project life-cycle, often well before eSimulation and learning designers have a complete picture of what their educational and technological needs are. Typical questions posed at this difficult moment have to deal with the number and skills of eSimulation users (students and staff), the financial and technical support that might be available within the hosting organisation, the likely complexity of eSimulation design, the availability of different eSimulation options, etc. Having made a commitment as to the infrastructure choices, it is also necessary to occasionally reassess the decision options and diagnose the infrastructure options.

It was assumed that decision makers are experienced educators and education designers who have very clear objectives as to the potential use of the simulation technology in their teaching. They also have a good understanding of their financial position, their general teaching requirements (such as the number of students to be using eSimulations), and their position on technology ownership. Decision makers would not necessarily have the technical background to fully understand the complexity of the technology required to facilitate effective delivery of eSimulations to their students. They would therefore need some assistance in the selection of the technology options and need to be informed of the impact of these choices on their existing technical and educational support, as well as the necessary training they may need to undergo in the process.

At the conception of our project, the complexity of this decision-making and diagnostic process was not apparent to the project participants. It was clear that an analysis needed to be performed to assist decision makers in assessing and identifying their technology needs to support future eSimulations to be either acquired or developed in their organisations. The analysis captured the experience in the use of various eSimulation technologies (which were all falling into the scope of the ALTC project).

The analysis guides the decision makers by first exploring some of their pre-conditions and user requirements:

- **Budget**
  - Less than $1,000
  - Between $1,000 and $5,000
  - More than $5,000
- **Preferred payment options**
  - Once-off
  - Per volume or load is acceptable (annual license)
- **Number of concurrent users**
  - 10s of concurrent users
  - 100s of concurrent users
  - 1000s of concurrent users

- **Need for eSimulation ownership**
  - Need to own educational content and infrastructure
  - Need to own educational content but not the infrastructure
  - Need to just deliver curriculum but no need to own either the educational content or the infrastructure.

The preconditions need to be combined with the following three categories of infrastructure to determine the correct overall infrastructure for the situation:

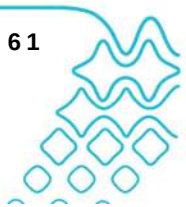
- **Character service**
  - Media Semantics Character Hosting
  - Media Semantics Character Builder
  - Media Semantics Character Server
  - Deakin LiveSim
  - Custom (DIY) solution
- **Voice services**
  - Free but poor quality voices
  - Medium quality voices
  - High quality voices
- **Training requirements**
  - Windows administration
  - Multimedia development
  - Linguistics skills.

Overall, it was determined that there were 6 probable methods of implementing an eSimulation for students and that the feasibility of each depended upon the options chosen above. The implementation methods are:

- Development of new simulations with limited upfront funding;
- Annual licensing;
- Run own Character Server;
- Adopt and run own LiveSim service;
- Use Deakin hosted LiveSim service;
- Use of existing Deakin eSimulations.

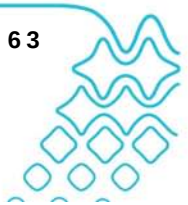
Each of these delivery methods not only directed the decision maker to the actionable infrastructure choices but also explained the implications of making these choices. The areas affected by the choices are:

- **Presentation method**
  - From teacher's laptop/PC
  - Mass distribution via CD-ROM
  - Mass distribution via the web



- **Available character choices**
  - Stock characters (e.g. illustrated or realistic)
  - Limited customisation (e.g. hair colour)
  - Complex customisation (e.g. facial features)
  - Custom character (e.g. looking like you)
  - Large range of characters with various looks
  - Human face (e.g. played by actors);
- **Communication method with the student**
  - By text (e.g. voice bubble)
  - Robotic voice (e.g. MS Sam)
  - Quality voice without expression (e.g. Cepstral)
  - Quality voice with expression (e.g. Loquendo)
  - Human voice (e.g. recorded in a studio)
- **Possible uses in teaching context**
  - Demonstrations in lectures and tutorials (e.g. entertainment)
  - Deliver a message (e.g. mini-lecture)
  - Question answering (e.g. help desk)
  - Interactive with a single eSimulation (e.g. interview)
  - Interaction with multiple eSimulations (e.g. meeting)
- **Technical skills required**
  - Can use a web form (e.g. eBay)
  - Can use an authoring tool (e.g. PowerPoint)
  - Can write web content (e.g. in HTML / XML)
  - Can write programs (e.g. in JavaScript)
  - Can install and maintain server software (e.g. Apache)
  - Can manage network security and load balancing
  - Can troubleshoot the system (i.e. Admin tools)
- **Educational skills required**
  - Can blend eSimulations with curriculum
  - Can design student learning with eSimulations
  - Can design student experience
- **Multimedia skills required**
  - Can produce and edit images (e.g. Photoshop)
  - Can produce and maintain multimedia (e.g. Flash)
  - Can process digital photos (e.g. Canon and Photoshop)
  - Can process sound (e.g. Audition).

As can be seen from the above choices and implications, the selection of an infrastructure to support the use of eSimulations for a particular context is both complex and has significant implications for an organisation. The viability of a particular implementation method has to be determined by the decision maker and their organisation. In order to assist potential users of eSimulations to assess the viability of a particular implementation method, the choices and implications for each of them are detailed in the following sections.



6.1 Development of new eSimulations with limited upfront funding

In this implementation method, the organisation would produce simple eSimulations using the Media Semantics Character Builder software.

Pre-conditions and requirements for the implementation method	Choices
Budget	< $1,000
Payment option	One-off
Number of concurrent users	10s of concurrent users
Ownership	Need to own educational content and infrastructure

Infrastructure category	Options
Character service	Media Semantics Character Builder
Voice services	Free but poor quality voices Medium quality voices
Training requirements	Multimedia development

Area affected by the implementation method	Implications
Possible presentation methods	From teacher's laptop/PC Mass distribution via CD-ROM
Available character choices	Stock characters (e.g. illustrated or realistic) Limited customisation (e.g. hair colour)
Possible communication methods with student	By text (e.g. voice bubble) Robotic voice (e.g. MS Sam) Quality voice without expression (e.g. Cepstral) Human voice (e.g. recorded in a studio)
Possible uses in teaching context	Demos in lectures and tutorials (e.g. entertainment) Deliver a message (e.g. mini-lecture)
Technical skills required	Can use an authoring tool (e.g. PowerPoint)
Educational skills required	Can blend eSimulations with curriculum Can design student learning with eSimulations Can design student experience
Multimedia skills required	None

6.2 Annual licensing

In this implementation method, the organisation would use the services provided at the Media Semantics web site to host eSimulations.

Pre-conditions and requirements for the implementation method	Choices
Budget	< $1,000
Payment option	Per volume or load is acceptable
Number of concurrent users	10s of concurrent users
Ownership	Need to own educational content and infrastructure

Infrastructure category	Options
Character service	Media Semantics Character Hosting
Voice services	Medium quality voices
Training requirements	Multimedia development

Area affected by the implementation method	Implications
Possible presentation methods	Mass distribution via the Web
Available character choices	Stock characters (e.g. illustrated or realistic)
Possible communication methods with student	By text (e.g. voice bubble) Robotic voice (e.g. MS Sam) Quality voice without expression (e.g. Cepstral) Human voice (e.g. recorded in a studio)
Possible uses in teaching context	Demos in lectures and tutorials (e.g. entertainment) Deliver a message (e.g. mini-lecture) Question answering (e.g. help desk) Interactive with a single eSimulation (e.g. interview)
Technical skills required	Can use a web form (e.g. eBay) Can use an authoring tool (e.g. PowerPoint) Can write web content (e.g. in HTML/XML) Can write programs (e.g. in JavaScript)
Educational skills required	Can blend eSimulations with curriculum Can design student learning with eSimulations Can design student experience
Multimedia skills required	Can produce and edit images (e.g. Photoshop)

6.3 Run own Character Server

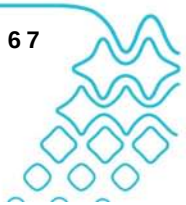
In this implementation method, the organisation would set up their own Media Semantics Character Server and use the services provided by that system on their own infrastructure.

Pre-conditions and requirements for the implementation method	Choices
Budget	> $5,000
Payment Option	One-off
Number of concurrent users	1000s of concurrent users
Ownership	Need to own educational content and infrastructure

Infrastructure category	Options
Character service	Media Semantics Character Builder Media Semantics Character Server Custom (DIY) solution
Voice services	Medium quality voices High quality voices
Training requirements	Windows administration Multimedia development Linguistic skills

Area affected by the implementation method	Implications
Possible presentation methods	Mass distribution via the Web
Available character choices	Stock characters (e.g. illustrated or realistic) Limited customisation (e.g. hair colour) Complex customisation (e.g. facial features) Custom character (e.g. looking like you) Large number of characters
Possible communication methods with student	By text (e.g. voice bubble) Robotic voice (e.g. MS Sam) Quality voice without expression (e.g. Cepstral) Quality voice with expression (e.g. Loquendo) Human voice (e.g. recorded in a studio)
Possible uses in teaching context	Demos in lectures and tutorials (e.g. entertainment) Deliver a message (e.g. mini-lecture) Question answering (e.g. help desk) Interactive with a single eSimulation (e.g. interview) Interactive with multiple eSimulations (e.g. meeting)

Area affected by the implementation method	Implications
Technical skills required	Can use a web form (e.g. eBay) Can use an authoring tool (e.g. PowerPoint) Can write web content (e.g. in HTML/XML) Can write programs (e.g. in JavaScript) Can install and maintain server software (e.g. Apache) Can manage network security and load balancing Can troubleshoot the system (e.g. Admin tools)
Educational skills required	Can blend eSimulations with curriculum Can design student learning with eSimulations Can design student experience
Multimedia skills required	Can produce and edit images (e.g. Photoshop) Can produce and maintain multimedia (e.g. Flash) Can process digital photos (e.g. Canon and Photoshop) Can process sound (e.g. Audition)



6.4 Adopt and run own LiveSim Service

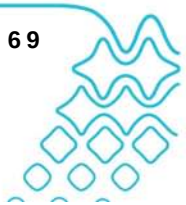
In this implementation method, the organisation would set up their own Media Semantics Character Server and extend it with the services provided by LiveSim on their own infrastructure.

Pre-conditions and requirements for the implementation method	Choices
Budget	> $5,000
Payment option	One-off
Number of concurrent users	1000s of concurrent users
Ownership	Need to own educational content and infrastructure

Infrastructure category	Options
Character service	Media Semantics Character Builder Media Semantics Character Server Deakin LiveSim
Voice services	Medium quality voices High quality voices
Training requirements	Windows administration Multimedia development Linguistics skills

Area affected by the implementation method	Implications
Possible presentation methods	Mass distribution via the Web
Available character choices	Stock characters (e.g. illustrated or realistic) Limited customisation (e.g. hair colour) Complex customisation (e.g. facial features) Custom character (e.g. looking like you) Large number of characters Human face (e.g. played by actors)
Possible communication methods with student	By text (e.g. voice bubble) Robotic voice (e.g. MS Sam) Quality voice without expression (e.g. Cepstral) Quality voice with expression (e.g. Loquendo) Human voice (e.g. recorded in studio)
Possible uses in teaching context	Demos in lectures and tutorials (e.g. entertainment) Deliver a message (e.g. mini-lecture) Question answering (e.g. help desk) Interactive with a single eSimulation (e.g. interview) Interactive with multiple eSimulations (e.g. meeting)

Area affected by the implementation method	Implications
Technical skills required	Can use a web form (e.g. eBay) Can use an authoring tool (e.g. PowerPoint) Can write web content (e.g. in HTML/XML) Can install and maintain server software (e.g. Apache) Can manage network security and load balancing Can troubleshoot the system (e.g. Admin tools)
Educational skills required	Can blend eSimulations with curriculum Can design student learning with eSimulations Can design student experience
Multimedia skills required	Can produce and edit images (e.g. Photoshop) Can produce and maintain multimedia (e.g. Flash) Can process digital photos (e.g. Canon and Photoshop) Can process sound (e.g. Audition)



6.5 Use Deakin hosted LiveSim Service

In this implementation method, the organisation would use the Deakin LiveSim service and infrastructure to host their own eSimulations.

Pre-conditions and requirements for the implementation method	Choices
Budget	Between $1,000 and $5,000
Payment option	One-off
Number of concurrent users	100s of concurrent users
Ownership	Need to own educational content but not infrastructure

Infrastructure category	Options
Character types	Deakin LiveSim Custom (DIY) solution
Voice services	Medium quality voices High quality voices
Training requirements	Multimedia development Linguistics skills

Area affected by the implementation method	Implications
Possible presentation methods	From teacher's laptop/PC Mass distribution via CD-ROM Mass distribution via the Web
Available character choices	Stock characters (e.g. illustrated or realistic) Limited customisation (e.g. hair colour) Complex customisation (e.g. facial features) Custom character (e.g. looking like you) Large number of characters Human face (e.g. played by actors)
Possible communication methods with student	By text (e.g. voice bubble) Robotic voice (e.g. MS Sam) Quality voice without expression (e.g. Cepstral) Quality voice with expression (e.g. Loquendo) Human voice (e.g. recorded in studio)
Possible uses in teaching context	Demos in lectures and tutorials (e.g. entertainment) Deliver a message (e.g. mini-lecture) Question answering (e.g. help desk) Interactive with a single eSimulation (e.g. interview) Interactive with multiple eSimulations (e.g. meeting)
Technical skills required	Can use a web form (e.g. eBay) Can use an authoring tool (e.g. PowerPoint) Can write web content (e.g. in HTML/XML)

Area affected by the implementation method	Implications
Educational skills required	Can blend eSimulations with curriculum Can design student learning with eSimulations Can design student experience
Multimedia skills required	Can produce and edit images (e.g. Photoshop) Can produce and maintain multimedia (e.g. Flash) Can process digital photos (e.g. Canon and Photoshop) Can process sound (e.g. Audition)

6.6 Use existing Deakin eSimulations

In this implementation method, the organisation would use eSimulations that have already been produced by Deakin University and which are hosted on Deakin's infrastructure.

Pre-conditions and requirements for the implementation method	Choices
Budget	< $1,000
Payment option	One-off
Number of concurrent users	100s of concurrent users (using Web distribution) 1000s of concurrent users (using CD distribution)
Ownership	No need to own either the educational content or the infrastructure

Infrastructure category	Options
Character types	Deakin LiveSim
Voice services	Medium quality voices High quality voices
Training requirements	None required

Area affected by the implementation method	Implications
Possible presentation methods	From teacher's laptop/PC Mass distribution via CD-ROM Mass distribution via the Web
Available character choices	Stock characters (e.g. illustrated or realistic) Limited Customisation (e.g. hair colour) Large number of characters Human face (e.g. played by actors)
Possible communication methods with student	Robotic voice (e.g. MS) Quality voice without expression (e.g. Cepstral) Quality voice with expression (e.g. Loquendo) Human voice (e.g. recorded in studio)
Possible uses in teaching context	Interactive with a single eSimulation (e.g. interview) Interactive with multiple eSimulations (e.g. meeting)
Technical skills required	None required
Educational skills required	Can blend eSimulations with curriculum Can design student learning with eSimulations Can design student experience
Multimedia skills required	None required

7. Researching and evaluating student responses to eSimulations

7.1 Overview

The project adopted a formalised approach to researching and evaluating students' experiences of using eSimulations. The principal method for doing this was the use of a general purpose survey. The team committed to survey the use of each eSimulation for each offering over the duration of the project for all partners. The Ethics Application – Student Survey can be found on the project web site at www.deakin.edu.au/itl/insims/altc-project/evaluation.php

This section outlines the research rationale for the survey design and the genesis of the survey. Key findings from the various survey administrations are presented. Consistent with the action learning approach, the survey instrument was independently reviewed and the findings of this exercise are also presented. In response, an alternative survey instrument has been developed. It is argued that both survey instruments have their merits for different types of student cohorts and contexts.

7.2 Student survey design rationale

The ***overarching research question*** to be asked in the project is:

Do the eSimulations provide opportunities to practice (for assessable tasks) the learning and performance of the key professional capabilities identified in the curricula as requirements of the respective professions?

The survey instrument was developed to provide evidence of students' perceived responses and experiences related to this question. The survey was developed from an investigation conducted at Deakin University of university teachers' conceptions of the nature and value of digital simulations in higher education. The investigation aimed to discern what teaching staff members' thought about eSimulations being used as a serious method for teaching specific elements of their curricula and of assessing various types of student learning required by the curricula. The research was based on a Delphi-like process of enquiry aimed at refining research questions through collaboration with the staff involved in creating the initial eSimulations. A series of structured interviews were conducted with the academic staff, firstly about their intentions and the purposes behind the eSimulations for use in their professionally-oriented courses.

Interview questions were initially framed using a 'closed loop' of five pairs of education design elements, for which congruencies were expected. These were expressed in the matching of:

1. profession/discipline needs with the curriculum goals;
2. the curriculum with 'kinds' of learning (categories of learned capabilities);
3. 'kinds' of learning with teaching strategies (kinds of teaching);
4. teaching strategies (and all of the above) with the assessment strategies (methods of measuring the learning for which evidence is provided).
5. assessment (evidence of learning) with the identified needs of the profession/ discipline.

The data gathered from the transcribed interviews were analysed and reported (Segrave & Rice, 2007) under three key headings:

a) Desired **learning** (eight findings/issues were expressed in the report);

b) **Teaching** strategies (17 findings/issues expressed in the report);

c) **Assessment** matters (six findings/issues were expressed in the report).

Drawing on this report, a survey instrument was then designed. A goal in the chosen phrasing of questions was to create a *generic* survey for all eSimulations. This generic survey was deemed appropriate to use across all of the eSimulations developed and delivered under the umbrella of the ALTC project. In making this decision it was appreciated that student cohorts would vary considerably, and span undergraduate years, honours and masters students, large groups of on-campus students, many off-campus students (some interstate and overseas) and a number of students from remote campuses taking subjects fully online. Some students were also working professionals. Moreover, the generic survey design had to apply to eSimulations with different educational objectives, which are embedded differently into units, which have distinct interactive functions, and which present students with unique challenges and opportunities to experientially practice elements of their chosen profession. Without specifically identifying the differences in each eSimulation, the survey examines 'perceived experiences and responses' of students using the eSimulations.

For the full Student Survey Rationale document visit:
www.deakin.edu.au/itl/insims/altc-project/evaluation.php

7.3 Student survey eSimulation evaluation

A Student eSimulation Evaluation Survey Instrument (via Opinio software) was used to collect students' opinions and experiences of using eSimulations immediately following student exposure to the eSimulations in the relevant units/modules. The survey instrument is available at Appendix E.

For an interpretation of evaluation results by the academic see appendices A, B and C.

For a full collection of Summary Survey Report statistics on each individual eSimulation visit our project web site at www.deakin.edu.au/itl/insims/altc-project/evaluation.php

Throughout the ALTC eSimulations project a number of eSimulations were developed as follows:

eSimulation	University/Faculty/School	Professional skill focus
Blue Cut Fashion (Store)	Deakin University, Business and Law, Information Systems	Business Analysis, first year students (individual project)
Blue Cut Fashion (Chain)	Deakin University, Business and Law, Information Systems	Requirements Engineering, Masters level students (team work)
Ringo Robotics	RMIT University, Business Information Technology and Logistics	Project Management
Suicide Risk Assessment	Charles Sturt University, Arts, Humanities and Social Sciences	Interviewing / Counselling
Purple Integrated Taxi System (PITS)	RMIT University, Business Information Technology and Logistics	Systems Analysis and Design
Domestic Violence Simulation	Charles Sturt University, Arts, Policing Studies	Domestic violence police response procedures

In addition to this, a number of existing Deakin eSimulations were further utilised during the project:

eSimulation	Faculty	Curriculum focus
Know Your Client	Deakin University, Business and Law	Financial Planning
ClientView	Deakin University, Business and Law	Taxation Law
UnReal Interviewing	Deakin University, Health, Medicine, Nursing and Behavioural Sciences	Forensic Interviewing of a Child

At the completion of the use of each eSimulation, the students in each of the units were surveyed. The survey adopted by our project aimed at measuring students' perception of effectiveness of teaching and learning in a blended learning environment with the use of eSimulations.

The survey was administered at the three partner universities in several subjects that involved some elements of blended learning and eSimulation. A combination of online and paper-based methods was used in data collection at different sites.

The following eSimulations were employed in the course of the project and had the following survey responses:

Trimester / Semester 1, 2009

	eSimulation	Survey method	Respondents
KYC1	Know Your Client	Opinio Online Survey Tool	Number of invitees: 480 Number of responses: 100 Invitee response rate: 21%
BCFS1	**Blue Cut Fashion (Store)**	Opinio Online Survey Tool	Number of invitees: 1504 Number of responses: 439 Invitee response rate: 29%
BCFC1	**Blue Cut Fashion (Chain)**	Opinio Online Survey Tool	Number of invitees: 26 Number of responses: 11 Invitee response rate: 42%
RR1	**Ringo Robotics**	Paper based	Number of invitees: 82 Number of responses: 22 Invitee response rate: 27%
SRA1	**Suicide Risk Assessment**	PDF	Number of invitees: 20 Number of responses: 3 Invitee response rate: 15%

Trimester / Semester 2, 2009

	eSimulation	Survey method	Respondents
CV2	**ClientView**	Opinio Online Survey Tool	Number of invitees: 189 Number of responses: 35 Invitee response rate: 19%
RR2	**Ringo Robotics**	Paper based	Number of invitees: 80 Number of responses: 42 Invitee response rate: 53%
PITS2	**Purple Integrated Taxi System (PITS)**	Paper based	Number of invitees: 70 Number of responses: 60 Invitee response rate: 86%
SRA2	**Suicide Risk Assessment**	PDF	Number of invitees: 20 Number of responses: 2 Invitee response rate: 10%

Trimester / Semester 3, 2009

	eSimulation	Faculty	Respondents
BCFS3	**Blue Cut Fashion (Store)**	Opinio Online Survey Tool	Number of invitees: 182 Number of responses: 30 Invitee response rate: 16%
UI3	**UnReal Interviewing**	Opinio Online Survey Tool	Number of invitees: 8 Number of responses: 4 Invitee response rate: 50%
DVS3	**Domestic Violence Simulation**	PDF	Number of invitees: 16 Number of responses: 15 Invitee response rate: 94%

Student experiences and perceptions

The following analysis is based on the framework used in the paper by Cybulski and Nguyen (2010).

The survey results made inroads into understanding the perceptions of students in a blended learning environment with eSimulations and we have highlighted results of 12 key items.

Students generally praised the eSimulation's ability of bringing to life abstract topics that could easily be related to the professional practice to be learnt.

	Trimester / Semester 1		Trimester / Semester 2		Trimester / Semester 3	
eSim	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**
KYC	13%	75%				
BCFS	19%	63%			12%	75%
BCFC	0%	77%				
RR	23%	76%	28%	69%		
SRA	0%	100%	50%	50%		
CV			7%	57%		
PITS			6%	71%		
UI					33%	66%
DVS					26%	66%

They emphasised that eSimulations provided them with access to experiences that they may not otherwise have had in a university context.

	Trimester / Semester 1		Trimester / Semester 2		Trimester / Semester 3	
eSim	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**
KYC	40%	41%				
BCFS	27%	46%			25%	45%
BCFC	44%	44%				
RR	19%	61%	28%	61%		
SRA	0%	50%	0%	100%		
CV			10%	57%		
PITS			8%	54%		
UI					66%	0%
DVS					13%	66%

Interestingly, in spite of learning professional skills needed outside the university context, students still believed that without the assistance of simulation and blended learning, some of the concepts and skills they acquired would be difficult to learn in a real work place.

	Trimester / Semester 1		Trimester / Semester 2		Trimester / Semester 3	
eSim	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**
KYC	18%	45%				
BCFS	20%	46%			18%	50%
BCFC	44%	33%				
RR	9%	76%	26%	57%		
SRA	0%	0%	0%	100%		
CV			20%	30%		
PITS			13%	51%		
UI					66%	33%
DVS					13%	80%

Overall, students believed that the blended environment allowed them to engage in valuable practice of the profession and in particular learning the specific skills required to act in that role; …

	Trimester / Semester 1		Trimester / Semester 2		Trimester / Semester 3	
eSim	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**
KYC	15%	46%				
BCFS	34%	51%			29%	62%
BCFC	22%	77%				
RR	15%	70%	24%	65%		
SRA	100%	0%	100%	0%		
CV			7%	46%		
PITS			8%	71%		
UI					66%	33%
DVS					26%	73%

… and assisted them to develop confidence in their present capabilities in the area.

	Trimester / Semester 1		Trimester / Semester 2		Trimester / Semester 3	
eSim	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**
KYC	5%	48%				
BCFS	20%	46%			13%	63%
BCFC	11%	44%				
RR	9%	80%	16%	64%		
SRA	0%	100%	0%	100%		
CV			4%	30%		
PITS			8%	30%		
UI					0%	66%
DVS					26%	53%

They conceded that all learning gained in the process would be useful later in an actual workplace.

	Trimester / Semester 1		Trimester / Semester 2		Trimester / Semester 3	
eSim	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**
KYC	23%	51%				
BCFS	30%	40%			31%	31%
BCFC	33%	55%				
RR	23%	57%	33%	50%		
SRA	0%	50%	50%	50%		
CV			13%	43%		
PITS			8%	57%		
UI					66%	0%
DVS					20%	46%

It was rewarding to note that the end of semester surveys revealed students' recognition and understanding of the actual role on which the unit focused; …

	Trimester / Semester 1		Trimester / Semester 2		Trimester / Semester 3	
eSim	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**
KYC	32%	56%				
BCFS	23%	51%			18%	54%
BCFC	33%	55%				
RR	23%	61%	26%	69%		
SRA	100%	0%	50%	50%		
CV			18%	54%		
PITS			11%	56%		
UI					33%	66%
DVS					20%	73%

… and their readiness to undertake such a professional role in the future.

	Trimester / Semester 1		Trimester / Semester 2		Trimester / Semester 3	
eSim	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**
KYC	23%	47%				
BCFS	15%	51%			22%	50%
BCFC	22%	44%				
RR	33%	47%	16%	66%		
SRA	0%	100%	0%	100%		
CV			4%	34%		
PITS			8%	41%		
UI					66%	33%
DVS					26%	53%

Being representatives, in the large majority, of Generation Y, it was not surprising to note that the interactivity, engagement and 'gaminess' of the professional role projects sustained students' interest throughout the semester; …

	Trimester / Semester 1		Trimester / Semester 2		Trimester / Semester 3	
eSim	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**
KYC	14%	61%				
BCFS	17%	46%			22%	50%
BCFC	0%	75%				
RR	23%	76%	13%	63%		
SRA	100%	0%	50%	50%		
CV			10%	52%		
PITS			7%	44%		
UI					33%	66%
DVS					28%	42%

… they felt positively engaged in the projects; …

	Trimester / Semester 1		Trimester / Semester 2		Trimester / Semester 3	
eSim	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**
KYC	17%	61%				
BCFS	17%	47%			18%	50%
BCFC	12%	75%				
RR	33%	57%	31%	60%		
SRA	100%	0%	50%	50%		
CV			10%	57%		
PITS			5%	59%		
UI					33%	66%
DVS					35%	35%

… and their motivation to succeed in their assessment tasks was increasing with the level of engagement.

	Trimester / Semester 1		Trimester / Semester 2		Trimester / Semester 3	
eSim	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**
KYC	14%	57%				
BCFS	19%	36%			22%	36%
BCFC	12%	50%				
RR	23%	61%	25%	55%		
SRA	–	–	0%	50%		
CV			10%	31%		
PITS			5%	41%		
UI					33%	33%
DVS					14%	50%

Learning professional skills via a simulation, rather than having the actual experience in the physical world, was considered by students as beneficial in a number of ways. eSimulations were viewed as offering safety and permitting unpunished experimentation, trial and error whilst at the same time retaining acceptable authenticity of learning experience, giving flexibility in learning methods and accessibility of tools and environment as per the following student statements:

- Easier, can do in own time, can revisit things (KYC1);
- Non-threatening and safe (KYC1);
- People with little confidence are unafraid to express themselves more and ask the wrong questions because ultimately nobody knows if you're asking the wrong questions. Freedom for mistakes. Confidence builder (KYC1);
- You can get it wrong, compare with peers and learn the process (BCFS1);
- Not penalised for mistakes. Feel free to experiment and learn! (BCFS1);
- One can conduct interview any number of times if anything was missed before, Interviews can be conducted at one's convenience (anytime of the day!!) (BCFC1);
- Low risk, an opportunity to allow us to fail and improve (RR1);
- Practice, reflection, safe (you can learn from not providing the best answer) (SRA1);
- It is more structured, guided and helps alleviate the stress that would come if you were to experience this for the first time whilst in the real world (CV2);
- Limited risk, supportive environment, opportunity to learn from other people's perspective and experience (RR2);
- More control over the response and information received (PITS2);
- You are more relaxed and less self conscience – which enables you to learn better and not be afraid to try (SRA2);

- Less stress was a huge factor. Questions were predetermined and it could be repeated if needed without the risk of sounding ignorant or inexperienced (BCFS3);
- …there was no pressure and you could make several attempts (UI3);
- Learn in a safe controlled environment (DVS3);
- Not hazardous (DVS3).

One of the important factors in this positive reception of blended learning and eSimulation was that learning work-related realities was considered by students as non-threatening (e.g. low risk).

	Trimester / Semester 1		Trimester / Semester 2		Trimester / Semester 3	
eSim	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**	**Strongly agree**	**Agree**
KYC	35%	42%				
BCFS	24%	54%			22%	50%
BCFC	22%	77%				
RR	35%	45%	19%	58%		
SRA	100%	0%	50%	50%		
CV			26%	47%		
PITS			24%	55%		
UI					66%	33%
DVS					28%	71%

However, this perception of safety should not be construed as a perceived lack of realism. In fact, authenticity of experience was an important aspect readily recognised by students. They particularly valued the real-life feel of the project, reality of handled data, reality of skills gained and the reality of the roles they could potentially play in their future work.

The following student statements in regard to authenticity provide best insight into students' perceptions of the realism of the confronted tasks:

- It helped me understand and get a clear view on what interviewing a client is really like (KYC1);
- The questions we had to work through made us sift through and make sense of data, which I would expect to do as a business analyst. It gave a small taste of the profession. (BCFS1);
- Being able to apply the theory into an actual scenario was beneficial in learning (BCFS1);
- It provides the possible events that may happen during a real project (RR1);
- It provides an opportunity to improve skills and questioning techniques, it is also an area of study that you cannot have too much of (SRA1);
- The need to probe for further information and the tendency for clients to get sidetracked was realistic (CV2);

- The frequent events really let me realise the complex[ity] of a real work environment, which is more complicated than what the textbook says (RR2);
- Lets you see if the interviewee is becoming agitated (PITS2);
- Yes as already working in a business environment these types of analysis are what is done every day in the real world (BCFS3);
- It felt very real and gave me a chance to really practice these skills (UI3);
- Realistic scenarios, questions knowledge of legislation (DVS3).

As can be seen from these statements, the majority of students across all eSimulations recognised realism of their 'whole experience'; they appreciated the means of interaction with the eSimulation; they acknowledged authenticity of the business cases/scenarios complete with their complexity and imperfections, as well as the realism of analytic tasks and their challenges.

Most importantly, they enjoyed the entire experience and indicated they would recommend it to fellow students.

	Trimester / Semester 1		Trimester / Semester 2		Trimester / Semester 3	
eSim	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
KYC	91%	9%				
BCFS	82%	18%			90%	10%
BCFC	75%	25%				
RR	100%	0%	97%	3%		
SRA	100%	0%	100%	0%		
CV			94%	6%		
PITS			83%	17%		
UI					100%	0%
DVS					100%	0%

However, on the negative, these comments were recorded:

- I have learnt nothing from this simulation (BCFS1);
- It was such a waste of time (BCFS1);
- Whilst it might look like an interview, it does not require a student to do any actual interviewing and therefore doesn't teach us any skills which can be related to dealing with clients in person or the actual practice of law (CV2);
- A bit slow and dull. Doesn't feel like a real interview (PITS2);
- Real experience differs. Expectation to think without the answers/references in front of you is harder (DVS3).

Conclusion

One of the most interesting aspects is that the range of results is quite large. Given that the case studies varied quite widely on a range of attributes including university, discipline, student level (postgraduate/undergraduate), level of integration with the curriculum, level of use of the eSimulation within the course and student body, this is not too surprising. The issues with the survey instrument also could have caused some of the variation. However, even examining the survey results at a qualitative level, we can see some trends as to what benefits the use of eSimulations can generally bring.

Three questions in particular gave a strong indication that these aspects were perceived positively by the students. They were:

- Bringing to life abstract topics and relating them to the practice of profession;
- Practising the kinds of learning expected in the unit/subject;
- Reflecting more on the role that I will undertake in my profession.

The results to these three questions give us an indication that the use of eSimulations in the case studies are good at presenting practical topics to students and putting them into the practice of their professional role.

A second set of questions provided quite a strong indication. The questions were:

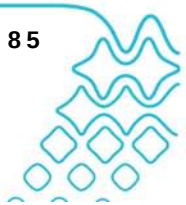
- Providing access to experiences that were outside the normal university teaching environment;
- Using simulations was a valuable way of learning concepts and skills that would be difficult to experience in a real work place;
- Providing learning that will be useful in an actual workplace;
- The simulation sustained the student's interest;
- The student was engaged with the simulation experience.

These questions support the result that students perceive the eSimulation as placing them in their professional role in a way that normal university educational experiences do not. It also indicates that overall, students found the use of eSimulations to be engaging and interesting, which is a necessary pre-condition for them to use them as a learning tool.

7.4 Survey critique

The Australian Consortium for Social and Political Research Inc (ACSPRI) (ACSPRI, 2009) was commissioned to perform a critique of the Student eSimulation Evaluation Survey Instrument (see Appendix E) used to collect student responses, with the following findings:

- In reviewing the questionnaire items, it was found that the questions are generally too complex, not salient to the respondents, and require too much effort to interpret and are biased. It is inferred that this has led respondents to respond in a way that reflects how they think they ought to respond, rather than accurately measuring their experience.



- The fundamental problem that was identified was a confusion between the educational strategies on which the project is based and the survey objectives. The questionnaire appears to have been designed with the intent of assessing whether the participants' responses provide confirmation of the merits of those strategies, rather than directly evaluating their effects on the experience.
- It was suggested that the project goals vis-à-vis evaluation of the project be modified to enable the first wave to be treated as a pilot that provides for a more useful evaluation framework. It was recommended that the questionnaire be re-designed.

7.5 Towards a revised student survey instrument

Dr Scott Salzman and Dr Bardo Fraunholz, Deakin University, were commissioned to provide a method for constructing a new survey instrument.

Their findings suggested there were three possible ways forward:

1. Adjust our original questionnaire so that the original theme of each question is retained, ensuring each question is presented in a way that conforms to our current understanding of behavioural research, and to the use and applicability of statistical methodologies.
2. Reduce the complexity of our hypotheses and rewrite questions accordingly.
3. Consider the development of a new questionnaire, to allow for semantic differentiation of paired responses on a variety of predetermined educational constructs, providing possible evidence of the existence of these constructs, as well as good data regarding attributes of behaviour and attitude towards eSims.

The team believed that option 2 would be the suitable option to progress and recognised that, ideally, question redevelopment should be an iterative process, and incorporate the entire research team. As the same questionnaire should be delivered to both control and treatment participants, questions should be constructed so that they are meaningful to both groups of students.

In line with Option 2 the reworded research question proposed was:

'Do eSims enhance student ability to learn, practise and perform professional skills (with respect to other methods) that can be identified in our curricula, and are requirements of particular professions?'

In order to control the complexity of the focus questions and to allow for some measurement it was suggested, for example, the eSimulations should:

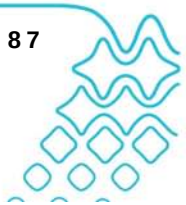
1. Allow practise in the use of a professional skill;
2. Assess the student's perceived usefulness of the professional skill;
3. Provide a different experience (better or worse), that is, alters the educational experience for the student or the educator;
4. Could be embedded in a course differently, if at all;
5. Indicate that educators should be trained differently (or retrained).

Therefore, the following new research hypotheses proposed are:

1. Do eSims affect learning?
2. Do eSims provide a practical learning experience?
3. Do eSims affect online engagement (where that educational institution offers this method of interaction)?
4. Do eSims affect overall educational experience?
5. Do eSims affect assessment?
6. What proportion of their educational experience in that unit did the respondent consider the eSim to comprise?
7. eSims should comprise what proportion (if any) of a/any Unit? (Also a surrogate question which inadvertently implies importance).

The hypotheses proposed could form the thematic basis for banks of possible questions; however, the number of questions presented should be kept to a minimum. Perhaps two pages with seven to ten questions per page.

Possible redesigned student eSimulation survey question examples, which are much shorter and simpler to respond to, are reported in Appendix F.



8. Knowledge transfer experience

8.1 Overview

All project team members of the ALTC eSimulations project, in the three partner universities, were asked to describe their experiences with the aim of establishing the basis for the knowledge capture mechanism. These experiences were considered to be significant in the building of a knowledge base for the project. Blogs, captured via a Knowledge Transfer and eSimulation Development Experience Capture tool, via Opinio (see Appendix G), was the medium deemed appropriate for the purpose.

A set of relevant issues were included as part of thematic topics to encourage and offer directions to project members to reflect upon various aspects of the project they had been involved in and narrate their experiences accordingly. This section provides a phenomenological discussion of such reflections of the project members.

Ethics approval was sought and received. Visit the project web site www.deakin.edu.au/itl/insims/altc-project/evaluation.php for Ethics Application – eSimulation developer experience

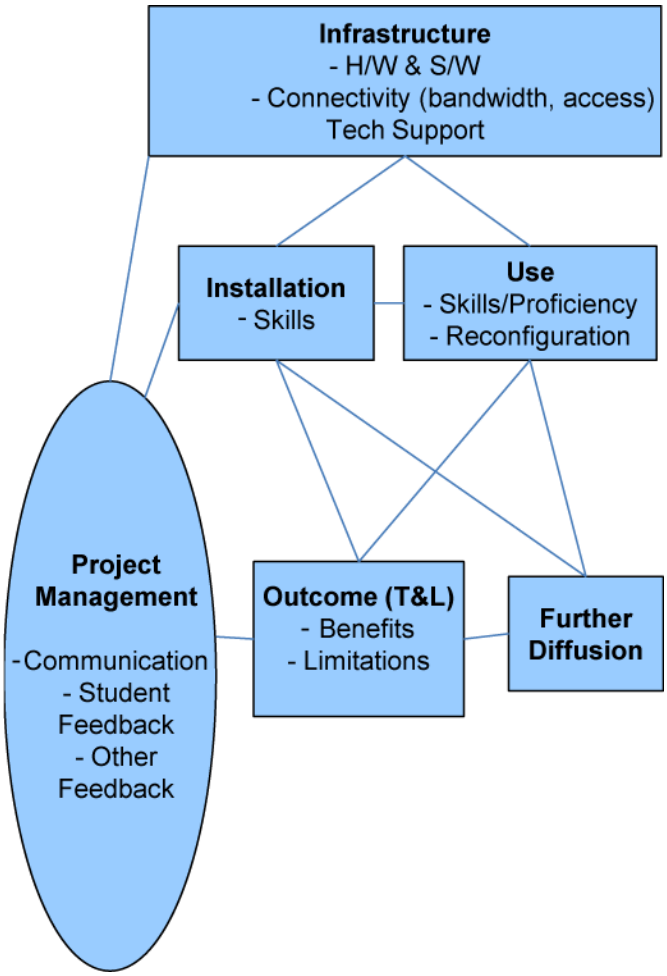
8.2 Phenomenological study of the blog entries

Data was collected from blog entries posted by nine ALTC members, involved with various aspects of eSimulations, in the three participating universities – Deakin, RMIT, and Charles Sturt University. The postings were made in a time period of 2 weeks and participants articulated their own experiences with various aspects of the projects (refer to Appendix G for the set of blog questions to which responses were made). The postings were in response to 27 questions that were included in the blog.

The analysis of the blog entries was supplemented by a team focus group session that took place during Project Conference 2 held at Deakin Waterfront in November, 2009.

To analyse the experiences of project members, phenomenology was employed, as it is geared towards a qualitative examination of narratives from project participants with the aim of generating meaning and relationships between the statements made by team members while articulating their experiences (Moustakis, 1994; van Manen, 1990).

The key issues identified from the blog entries can be categorised according to the following codes:



Infrastructure

Responses related to the infrastructure required to support eSimulations in the participating institutions, spanned issues including the requirements for hardware and software, connectivity, the availability of technical support and the development of a repository of knowledge (or an experience base).

The eSimulation infrastructure was first established at Deakin University through the acquisition of character builders, characters, and voices, which required dedicated servers. The Information Technology Services Division at Deakin provided server support and 'standard' network services. Project members found software features (at the back-end) complex and these were discarded from the final version of the eSimulation application. At Deakin, the project team members were able to gain the support of the central IT division, but this was not the case at RMIT and CSU. At RMIT, in particular, project team members encountered obstacles, due to the institute's risk-averse policy, enforced by the IT division. In the earlier stages of eSimulations, RMIT students were unable to access the simulations off-campus.

The eSimulation application also called for relatively high-powered PCs that were capable of handling the enhanced graphical requirements associated with reconfiguration. Reflecting upon the implementation of the actual eSimulation software, there were problems with implementing eSimulations within Deakin's partner institutes in the ALTC project. Various aspects of the simulations, such as the characters and voices, needed re-tweaking in order to be launched and used at the partner institutions.

The project team members at CSU and RMIT also held the view that there was a need for a dedicated team of personnel, with the required expertise, to provide technical support in all the stages of eSimulation adoption, from installation to continued reconfiguration. Such a level of technical support was gradually made available at Deakin University, including eSimulation experts, drawn from the faculty and IT support, all of whom were project team members. One of the suggestions was the establishment of an independent consulting body to assist academics in participating institutions in the installation and use of the applications.

The establishment of a knowledge repository for the capture and dissemination of project experiences was considered to be of significant importance for the future diffusion of eSimulations. An attempt at generating some form of 'benchmarking' was also deemed essential for knowledge transfer and exchange. This was also expressed through the apparent lack of documentation surrounding the set up of the technical infrastructure and installation of eSimulation software for use by instructors. One of the obstacles standing in the way of effective knowledge transfer was the relatively high level of technical skills that are required of participant instructors to install and use eSimulations. It was suggested that the repository should be designed to capture the state chart transition models and XML scripts that were mastered by project team members at RMIT. There is an intention to write a handbook of instructions and tips and hint to this effect by Deakin project team members, pending the allocation of adequate resources.

Installation of eSimulations

Installation was cumbersome for some of the project team members as a consequence of the non-availability of adequate resources (see Infrastructure). The possession of a significant level of technical skills was considered important in the installation of eSimulation applications. The software suite was tied to a particular computer, which prevented the possibility of joint reconfiguration of the application by project team members at a particular university. It was difficult to get the applications running seamlessly when they were installed on servers at RMIT. Extra time and effort had to be devoted into getting the applications up and running. Installation in partner universities was also hindered by licensing issues pertaining to the characters.

eSimulation use

The actual use of eSimulations was similarly constrained by the availability of adequate resources and the possession of technical skills by individual project team members. In addition, project team members also viewed the ease of reconfiguring the various aspects of the eSimulation (characters, voices, scenarios, look-and-feel) as a highly important issue in the continued use of eSimulations in teaching and learning.

To be used as a teaching and learning tool, the eSimulation applications need to be fine-tuned to meet the objectives of a course, which requires a relatively high level of technical skills in understanding and modifying the XML scripts. Script development was cited as the 'hardest' part of eSimulation reconfiguration. In addition, the limitations of the Media Semantics character builder, in terms of the ability to manipulate the physical movements of the characters, were highlighted by a project team member intimately involved with writing scenarios and redeveloping the eSimulation application. Flexibility to use naturally recorded voices as an alternative to simulated voices and use of other languages in the dialogue (for use in off-shore campuses) were suggested.

Indeed, according to a project team member at RMIT:

> The software to be used to implement simulations poses major problems if it is to be promulgated as a means by which the individual academic can be empowered to produce their own simulations. The products are fantastic, but the technical overhead, for academics other than those with significant prior IT proficiency, prohibits academics generally coming to grips with the development tools and environment.

Most project team members believed that there was a need for a user-friendly authoring tool to manipulate the characters, change the script, alter the scenario, and implement other modifications, without having to employ a sophisticated level of XML scripting skills. In fact, without such an authoring tool, the diffusion of eSimulations, particularly to non-IT academic departments, was thought to be difficult. Furthermore, the absence of such a tool would prove to be cumbersome for future evolution of eSimulations amongst current participants as the continued need for considerable time and effort in modifying and fine-tuning the various aspects of eSimulations would put a strain on the use of the application. The other alternative, it was suggested, was to put in place a team of dedicated personnel with the required expertise, as was undertaken at Deakin University, to assist academics with modifications and enhancements, which would necessitate larger budgetary allocations from the universities (see Infrastructure). The ability to make changes to the eSimulations, with relative ease, was also deemed important in view of presenting new scenarios, reflecting events in the real world, to students each semester.

Outcomes (Teaching and Learning)

The ALTC project outcome was viewed as largely favourable in that the primary Teaching and Learning (T&L) objectives were met. The simulations were used together with more conventional modes of T&L. The simulations largely enhanced the learning experiences of students as was intended as part of the project objectives. The simulations enabled instructors to present their students with scenarios emulating real-life situations they are likely to confront in their professional careers. Despite the inherent difficulties associated with installing and reconfiguring the applications, most project team members highlighted positive outcomes in the T&L environment. The use of simulations also revealed new and alternative approaches to teaching and assessing students. The use of eSimulations at CSU in training police personnel also proved to be effective.

However, there were issues with students not being able to access the eSimulations off campus (or with a delay between sound and lip movement), inability of RMIT-Vietnam students to follow the dialogue, and the inflexibility of movement with some of the characters. It was believed that by overcoming some of the limitations of eSimulations in terms of physical movements of the characters and dialogue, the learning experience of the students could be further enhanced. There was also a need for the characters to develop a ‘memory’ based on the sequence of events taking place within the simulation and beyond, which necessitates the ease of reconfiguration. One project team member recorded live voices and used them as speech for the characters. Students at RMIT-Vietnam had difficulties with following the ‘synthetic’ speech of the animated characters. Others indicated that the questions were predefined and not representing the spontaneity with which an interviewer should ideally engage a subject/client.

Further diffusion of eSimulations

Some of the difficulties associated with installation and use could affect the further diffusion of eSimulations to include new academics. The required level of technical skills and proficiency could discourage the uptake. In terms of infrastructure, the availability of adequate technical support and a comprehensive knowledge repository was considered essential for an expanded user base to be established amongst the academic community. However, the project team members expressed satisfaction in their promotion of eSimulations in various forums and events at their respective universities.

Project management

Communication amongst project team members has been satisfactory, despite the failure to initially participate in the blogs. As well as the formal fortnightly teleconferences and the meeting in Geelong, project team members stayed in touch informally and updated each other.

Regarding student surveys, some project team members were of the view that the instrument provided adequate feedback, whilst others complained about misinterpretation and survey fatigue from students. Also, the need for a formal knowledge repository (or 'experience base') was called for as part of the future infrastructure development to support eSimulations.

Student feedback was gathered by means of standard survey questionnaires administered to students who used eSimulations as part of their assessment. The survey confirmed the positive experiences with their learning, though misinterpretation of survey questions and survey fatigue were cited as factors behind some of the less-positive feedback. Of course, the positive feedback was focused on their learning experience, but not at their enthusiasm with the state of the eSimulation technology (i.e. they were not excited by the animations or aesthetics of the graphics). Other qualitative modes of feedback elicitation, such as focus group sessions, observations, and blogs entries have been cited as possible ways of gaining additional sound feedback from students.

8.3 Key findings and recommendations

Support infrastructure for new adopters

One of the major recommendations regarding the future course of action with regards to eSimulations is the establishment of a formalised support infrastructure, aimed at assisting new adopters with a range of issues and services, from licensing and installation, to reconfiguration of the simulations and training. This could also be pointing at the setting up of a quasi-helpdesk service.

Institutional support for eSimulation development

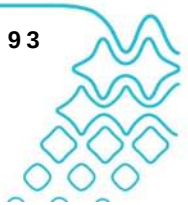
The development of eSimulations first at Deakin University and its customisation at RMIT was enabled by the high level of technical skills and expertise of some project members, who devoted effort beyond their allocated workload to writing XML scripts and customising the software. Their continued involvement in the further development of eSimulations would require support at the institutional level.

Knowledge transfer repository

Deakin University has been at the forefront of the ALTC eSimulations project, and considerable know-how resides in the organisation. The capture and dissemination of this knowledge is a prerequisite to the establishment of the Support Infrastructure. Furthermore, all project members should continue to capture their experiences with subsequent eSimulations. The contents of the repository should not, however, be confined to project member experiences with infrastructure issues only. Experiences of project members related to actual teaching through eSimulations needs to be included. Feedback from students also forms an essential component of this repository. The blog was considered a first step in the process of setting up this mechanism.

Alternate applications

The urgency of the need for a dedicated support infrastructure can be reduced through the deployment of alternate simulations software that offer a smooth learning curve and minimal requirements for technical skills and expertise from project members. Such software can be deployed, used and reconfigured with relative ease.



9. Organisational capability and capacity building

9.1 Overview

When asked in surveys, organisations identify people as their most important asset. The 'expertise' of the people in an organisation is ranked highly and the expertise of senior leadership not only sets the strategic directions of the organisation, but it also creates the supportive culture for its people.

When considering the alchemy of 'capacity-building' in the area of innovation and change, strategic leadership and operational leadership need to be viewed in concert as 'foundational' – forging the energies and alignments of the spheres and forces at its disposal.

Foundational leadership needs to be attuned to innovation and be responsive while maintaining and reflecting back to the total organisation, a cohesive and congruent vision from which it drives its strategic action. But this needs to take explicit and tangible form. There must not be gross inconsistencies when one examines the operational leadership and the manner in which supposed strategic projects are structured and funded.

We propose a model that places both strategic and operational leadership at the feet of the spheres and forces that create the more local capacities – where the 'rubber hits the road'.

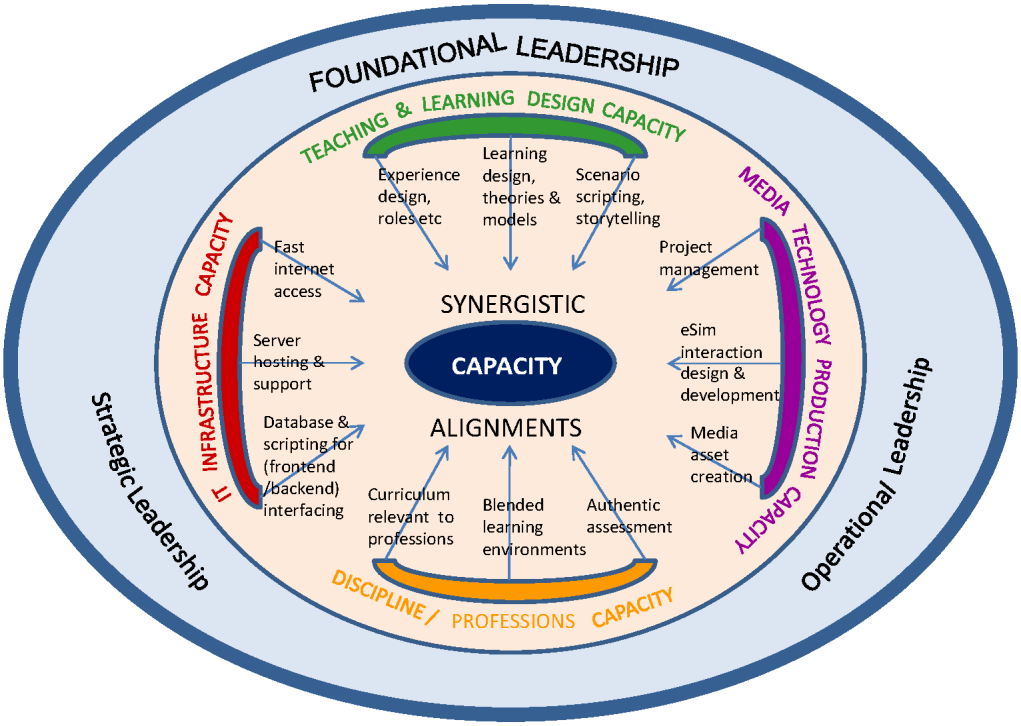
The core capacities in the spheres of (1) Teaching and Learning Design; (2) Discipline / Professions; (3) IT Infrastructure, and (4) Media Technology Production must be properly aligned and cooperatively supported by:

- Rational structures;
- Rational funding;
- Collaborative projects;
- Joint investment;
- Evaluation and improvement;
- Staff development.

The issue of control is frequently raised in organisations. Senior management feels pressured, middle operational management feels pressured as the 'meat in the sandwich' and staff at the coal face feel pressured by those above and also their 'clients'. In our project we have observed a critical lack of alignment of the spheres and forces of capacity.

Our experience has shown that improvements, of a satisfactory kind and speed, can only occur with SYNERGISTIC ALIGNMENTS of the four capacities facilitated by a conscious and concerted effort by management: leading by building the capacity from the foundations.

The model below is proposed as a window into capacity building.



Capacity building has been conceptualised and expressed in this 'abstract' model of 'spheres and forces'. Several assertions underpin the messages highlighted for communication through the model:

1. Functions and activities are portrayed rather than organisational entities or groups, not only to be generalisable across universities, but to focus on purposeful contributions to capacity in producing eSimulations;
2. A bird's eye view is adopted; hence there is no 'top' as such for the diagram. This ensures two spheres of leadership, both strategic and operational, are seen as 'foundational' – underpinning the building of capacity in the spheres that execute action;
3. The listed elements within the strategic and operational leadership must be aligned for congruent action to be possible in the spheres of capacity;
4. The four spheres of *capacity* in key functional areas require strong collaborative/communicative bonds and the support of leadership if they are to be drawn into active capacity-building to reach synergistic, productive alignments;
5. In each of the four spheres of capacity, several vital activities are non-exclusively foregrounded to highlight the activities involved in creating digital, web-based simulations in blended learning environments.

True capacity building is a joint investment. It is achieved with a clear view of the mutual benefits for the parties and the collective benefit of the organisation. If universities are to reap the benefits of eSimulations supporting their variously defined educational missions, there must be a congruent vision that forges the alignments. If universities remain 'stuck' in last century concepts of learning online, on campus and at a distance, eSimulations won't receive the strategic traction. Equally, if the four spheres of capacity fail to share a new vision – fail to cooperate in making joint investments – the capacity for innovation and progress is undermined. The building of congruent capacity creates the conditions for

lively, competitive advancement in knowhow and results when pursuing mature and sophisticated blended learning environments that use eSimulations for education in the professions.

9.2 Deakin

Foundational leadership

Strategic leadership

The Director of Deakin University's Institute of Teaching and Learning observes that like many institutions across the globe, Deakin is seeking to confirm its mission and identity in a world market place that is both shrinking, as technology and communications continue to reduce geographical distance between providers, and expanding, as more diverse groups of students, external to the country of origin of the provider, seek to enrol in its programs. Deakin's intention is to confirm its position as a national and international leader in flexible education. In this, paradoxically, shrinking *and* expanding market, what does this mean? Deakin is currently developing a three year plan for a revised definition of flexible education at the University, where academic provision is delivered through four academic Faculties (Arts and Education; Business and Law; Health, Medicine, Nursing and Behavioural Science; and Science and Technology).

The Institute of Teaching and Learning (ITL) at Deakin has, and similar institutes and centres in other institutions could have, or perhaps should have, a key role in drawing together not only a contemporary view based upon the available literature but also a role in initiating the reframing of such debate. This includes ensuring that what flexible education means in the context of the distinctiveness and differentiation of 'disciplines' is integrated in any emergent or nascent re-interpretation of flexible higher education for the future. Since 2000, through collaboration between academic staff in ITL and in specific academic Schools in several faculties, Deakin has been establishing a significant reputation in the development of eSimulations as an innovative approach to teaching. The importance of such developments as part of a strategic and contemporary view of how 'active learning' may be sequestered as Deakin's re-interpretation of flexible higher education is presented in full in our Flexible Education Framework.

Operational leadership

Deakin has invested strongly in central divisions which house the three capacities of:

- teaching and learning design (Institute of Teaching and Learning);
- media technology production (Knowledge Media Division);
- IT infrastructure (Information Technology Services Division).

The organisational capacity building framework emphasises the importance of synergistic alignments between these operational capacities, which in turn need to be strategically framed. Such arrangements can also be complicated by the advent of local faculty-based capacities in same or similar areas. Understandably, capacities across these functional and organisational groupings can be overlapping. Indeed, key areas of service delivery may be missed or under-resourced in these operational arrangements. There is no easy solution to best organising the capacities required for eSimulations or any other educational technology development for that matter. Hence, the continuing management interventions relating to the review, restructuring and realignment of the various capacities required to

carry strategic courses of action in online, distance and flexible education. Developing stronger and more trusting arrangements have been aided by the ALTC project.

Teaching and learning design capacity

The capacity in Deakin University for creating quality eSimulations based on sound educational design (comprehensive teaching and learning design), is in part the result of effective embedding of learning design activity at the interface of the academic teaching staff (representing the disciplines/professions) and the media technology staff (representing the eSimulation production capability in the university). This is to be contrasted with approaches that are linear and try to place teaching and learning design exclusively at the front-end of the design processes.

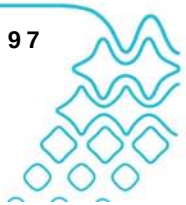
A philosophy of design that underpins the approach at Deakin, is that once the preliminary concerns of educational design have been considered in regard to 'constructive alignments' in the 'learning system' of interest (e.g. authentic assessment as a concern), then the three spheres of (1) discipline/profession, (2) T&L design and (3) technology/ production work closely to rapidly prototype a design for shared, formative evaluation (preferably including student testers in the evaluation).

The need for such flexible and open interfacing between the central project parties is best understood in terms of the prominence given to building capacity in the following four foci of design:

1. Learning design: Instructional Design Theories and Models – e.g. Experiential Learning, Situated Learning, in conjunction with constructive alignments and blended learning design incorporating the eSimulation online – may include online information design.
2. Scenario design: pertaining to the representational validity of expertise in the professional workplace being represented in the storytelling and scripting of the eSimulation.
3. Interaction design: stated simplistically, this might include user interface design, computer application design and usability design.
4. Experience design: encompassing more than the sense of 'role' immersion in scenario fidelity/realism, this focus of design attends to the students' experiences of the eSimulation in the blended learning environment, hence involves interfacing with other computer applications used in e-learning and teaching and learning events and activities in the physical learning environment.

To create a quality learning experience for students when using eSimulations, capacity has been developed to support the design and development of:

- the online eSimulation framework in the Flash interface with APIs to other online services;
- the tracking database for collecting and reporting data for student *assessment*, eSimulation and unit *evaluation* and *research* into teaching and learning using eSimulations;
- the complementary elements in the blended learning design;
- the conduct of the assessment tasks to which the eSimulation contributes;
- professional development and training.



Discipline and profession capacity

Deakin has a major commitment to offering professional and vocationally oriented courses in flexible education modes and by nurturing strategic partnerships. The University has recently expanded its professional offerings particularly in the heath care field through, for example, the establishment of a graduate school of medicine. eSimulation development has now commenced in this school. Teaching staff are supported from faculty through to University and national level with awards and grants recognising and providing additional resourcing for innovative educational developments. The University continues to invest in its staff to meet the University's aspiration of being a progressive higher education provider in the sector. This involves the institution to be relevant, responsive and innovative. This aspiration has and will continue to shape eSimulation developments.

Media technology production capacity

Deakin has developed multimedia and web-based development and production capacities through its central Knowledge Media Division (KMD) over the last half decade. KMD supports academic course and unit teams to implement new teaching strategies and pedagogies using virtual worlds, eSimulations and other teaching technologies by:

- developing strong collaborative links with Deakin University course and unit teams using or expressing an interest in the benefits of these emerging teaching strategies;
- supporting academic course and unit teams with design and production services to implement eSimulations, situational and scenario-based learning, role-play and immersive environments;
- participating in a communities of practices committed to information sharing and knowledge building;
- evidence based practice in the use of virtual worlds;
- promoting achievements through involvement in industry conferences and award programs.

KMD's new media development service supports academic leaders with logic design, scripting, filming or avatar programming, and visual design. KMD has been organised into major development teams allocated to work on particular faculty/client work programs. In recent times, multimedia development expertise has been located across these client service development groups. This expertise is now being consolidated into a separate media innovation group, also including technical expertise related to the University's learning management system and associated technologies. This will give the overall group more focus on institution-wide educational technology innovation, and new e-learning systems deployments. This re-organisation of existing capacity will assist with future eSimulation developments. The challenges, though, remain:

> Complexity, scalability and the user experience are the key issues. Complexity comes from the need to design the learning experience, including the logical pathways, and the dramatic quality of the production: dialogue, visuals and the interaction of theses. Authoring and other tools are rudimentary, and often require skilled resources to assemble and produce the simulation. Advancements in technology and skill has improved time to market, for example, we now prototype the simulation with programmable avatars in place of story boards to reduce risk before filming scenarios with paid actors. From a technical perspective, there are performance challenges that limit quality, particularly to areas with broadband limitations to be addressed
>
> (Deakin KMD Director).

IT infrastructure capacity

The broad capacity in Deakin University for Information Technology Services is largely constituted in that division (ITSD), with pockets of local, specialist, server hosting and IT support staff in some schools. Quite recently, Deakin has invested significant funding in the eSimulations program through several grants awarded competitively by the DVC (A) Strategic Teaching And Learning Grants Scheme (STALGS) and recurrent funding from the Institute of Teaching and Learning (ITL). While eSimulation development can be traced over 10 years, from 2000, more direct involvement of ITSD began in 2007 with the hosting and support of an avatar-type 'Character-Server' (Media Semantics inc.) with Text-to-speech (TTS) engines and synthetic voices (from *Loquendo*, S.p.A.Torino, Italy and *Cepstral* Pittsburgh, Pa USA).

The building of IT capacity for eSimulation delivery has continued during the two-year period (July 2008–June 2010) of the ALTC project, having commenced in earnest during 2007 with STALGS funding being directed to synthetic character and speech technology. This was followed in 2008 with a further injection of STALGS funding for the templating of a web front-end and a back-end Oracle database. The ALTC project has coincided with the steady formalisation of IT service and service level agreements associated with several servers on which the eSimulation architecture now relies:

- Character server (2D Avatar Character hosting);
- Speech server (Text-to-speech hosting);
- Database server (Oracle), for eSimulation student tracking;
- Web servers for (a) Development, (b) User-acceptance Testing and (c) Production (several production servers host the 'Flash application', the 'Web administration application' front-end interface for the database used for student enrolment for eSimulation, and the PHP interface between the eSimulations and the database).

The eSimulation architecture delivers the simulated learning environment. Students login to the application and interact with 'Flash' animations. Students select their set project, preferences, view videos, ask questions and take notes etc. The eSimulation database at the back-end enhances the value of the eSimulations by capturing and storing a record of the student activities and responses thereby gathering evidence for authentic student assessment, evaluation and research. The IT infrastructure clearly adds critical capacity to the eSimulation educational technology program.

To properly deliver this service ITSD provides various services and Service Level Agreements (SLAs) to ensure the quality of service. The following groups comprise ITSD capacity:

- Service Planning and Development;
- Operational Services Provision;
- Service Control.

When developing the capacity to offer eSimulations, ITSD followed the 'Prince-2' Project Management methodology and therefore offered project requirements analysis and critical project documentation associated with outputs during 2007–2010.

There has been a significant achievement in the degree of alignment and support from ITSD in delivering the DeakinSims. Indicative services contributing to the capacity of the university to deliver eSimulations include:

Service planning and development

- Through the group's projects office, user requirements analysis determined the design specifications for the integrated database;
- Project managers steered projects.

Operational services provision

- The Systems Unit installed, tested and maintained the Character-Server technology;
- The Systems Unit installed, tested and maintained the TTS engines and voices;
- The 'Technical Services Unit' developed through to production, the back-end Oracle Database that manages the eSimulations, students and tracks the student's use of the eSimulations which are delivered by the Knowledge Media Division (KMD) in the 'Flash' front end;
- The Performance Management Unit (PMU) conducted a performance test on the Character-server and TTS engines to produce a report;
- The 'Technical Services Unit' developed the Support Manual for the eSimulation database. This document includes the following: (a) Database schema design, (b) Database objects, (c) Web-Interface, (d) php scripts.

Service control

- Through the Service Level Managers, provided service coverage during and after the ensuing projects;
- 'Help Desk' via phone, email and web.

The server performance testing remains critical in maintaining quality of service and the PMU report provides analysis of results of server and network load testing for the eSimulation scenarios for the Character Server implementation. This involved a detailed technical analysis in the technical section of the report and also a guide to the interpretation of performance test results in relation to the behaviours of caching regimes, for example.

Since the ITSD load testing, ITL has requested an upgrade and expansion of TTS voices from two to three ports on the production server. There are now 13 licensed voices available (seven female and six male).

Loquendo voices	Cepstral voices
USA English: 2 females, 2 males	USA English: 1 female, 1 male
UK English: 2 females, 1 male	UK English: 1 female, 1 male
Australian English: 1 female, 1 male	

This is to ensure the serving of TTS synchronised with animated characters at the speed and frequency required by the number of concurrent student users.

While most of the code and media-asset contents of ‘Flash’ animated eSimulation are controlled by KMD, the database objects are, to a certain extent, ‘referred’ by the ‘Flash’ application (the Learning Object/Framework) to generate an eSimulation and the delivery of eSimulation is dependent on the support of ITSD. The ‘Flash’ application uses php scripts to read reference data for the eSimulation from the database and also to store the activities and responses into the database. These php scripts along with web-interface are maintained by ITSD.

If the program of eSimulations is to continue strongly with possible enhancements (e.g. further Oracle Db functions, possible LMS interfacing and Callista Student management system interfacing), strong alignments need to be maintained with each of the three groups in ITSD. While the ‘service’ orientation of the division has, thus far, delivered a strong result for the University, as a key stakeholder in Deakin’s eSimulations, ITSD could take a stronger leadership role in forging the necessary alignments in the university to build better capacity to deliver and advance eSimulations.

9.3 Charles Sturt University

Foundational leadership

Charles Sturt University (CSU) has a vision for e-learning that encompasses a broad use of eSimulations that provides an array of learning and teaching experiences and opportunities. This vision includes the use of a selection of media, environment and technologies to offer a variety of methods and modes for learning. eSimulations form part of that array of educational technologies. Accordingly, in late 2008 a team was set up at CSU to explore the possibilities of eSimulation use. A trial was run with an eSimulation developed by Deakin University, called UnReal Interviewing, with a Social Work subject at CSU and a survey completed by students to assess its possibilities. On the strength of that trial an eSimulation was commissioned and developed on behalf of a Mental Health subject, Mental Health and Mental Disorder within the eSimulations project. As CSU’s mission is to ‘lead in the quality provision of flexible learning and teaching’ and to ‘use research and feedback to be flexible and responsive to student needs’ (CSU University Strategy 2007–2011, 2007) surveys were conducted within each iteration of the eSimulation and feedback evaluated to improve practice.

Research projects have been carried out throughout the implementation of eSimulations at CSU and continue to be employed with each iteration to gain the greatest knowledge to be applied to improvement in design, development and delivery of eSimulations. An overarching research project is also being carried out to determine the academics’ view of the efficacy of eSimulation use at CSU. Feedback from this project is being applied to the next iteration of the eSimulations for constant improvement. Supported scholarship of teaching research by the Division of Learning and Teaching Services and other university senior management should promote further development and implementation of eSimulations at Charles Sturt University.

Teaching and learning design capacity

Through the eSimulations project, participating staff have developed greater capability and capacity in eSimulation design, learning design, eSimulation development and technical skills. A follow on effect has occurred in the School of Policing where two other academics have seen the eSimulation and its effect on learning and have gained capabilities in eSimulation development through the educational designer in the school and the academic developing eSimulations through this project.

Further eSimulations were developed in Policing to teach police procedures and a vision developed for further eSimulations from the initial project to create a library of eSimulations that can be rotated in alternating sessions. Within both of these projects a greater capacity has developed in both academics involved in the design and development of eSimulations, best suited to their individual disciplines. In particular, the development of script writing skills has been greatly developed in both academics involved in eSimulation development and in consequence, has caused them to transfer knowledge to other academics in their schools in this area.

A greater sense of learning design has been developed with an understanding of pedagogical design for blended learning, in particular for the needs of rural and remote students. One academic has experienced a strong understanding of learning theories and strategies to base further analysis and design of courses on the whole and in particular, the integration of eSimulations to teach best practice of his profession in a blended learning environment.

Skill development in planning and developing scripts and assessment design related to the eSimulations has been further developed in the educational technologist and academics.

Strategies for further staff development include professional development sessions for educational designers including hands-on workshops; professional development demonstrations, workshops and seminars for academics by educational designers; distribution of knowledge through the ICT-enabled learning community of practice and other communities of practice; training of support staff trainers who are then able to use eSimulations in training other staff; provision of support through training for software; and scriptwriting workshops to develop stronger skills in a fundamental component of eSimulation development and design.

Discipline, professions capacity

Capacity building increased throughout the project, more so in one discipline than the other. Through the development of academic skills in the technology and in the ability to share that knowledge to others, one discipline has increased the capacity for eSimulation development with a much stronger understanding of the design process required. A much greater development of eSimulation use is occurring consequently with the dissemination of the knowledge surrounding eSimulations to more teaching staff.

IT infrastructure capacity

Exploration of support through the Service Desk via the Division of Information Technology (DIT) and the Division of Learning and Teaching Services (DLTS) will occur throughout 2010 and beyond. A possibility of centrally hosted eSimulations is also being explored. At a local level, educational designers are situated in schools and can be expected to provide leadership, professional development, project management, technical knowledge and affordances of educational technology. A much stronger understanding of the infrastructure will need to be developed before further implementation of eSimulations can be expected.

Media technology production capacity

Technical skills in several types of software have been developed in both an academic and the educational technologist allowing us to build one complete eSimulation and plan for up to fifteen more.

The eSimulations project has demonstrated innovation in using educational technologies to improve learning outcomes for students in professional practice. eSimulations have been developed in two different disciplines and have been used in an additional teaching area. Research into the use of the eSimulations is being carried out to support future development across all disciplines for teaching and learning and administrative training. Determination of future needs will be supported through research by the investigation team set up to establish eSimulation use, both current and prospective, at CSU. Already from the development of the Policing eSimulation, the academic involved is involved in a Flexible Learning Institute.

Alignments

From these initial projects a major investigation into eSimulation use and needs at CSU will be carried out and will examine the possibility of a federated approach to maximise the benefits of centralised support resources.

At present, the team developing eSimulations at CSU has been small but organisational capacity for support is being developed further in 2010. Senior management is supportive of eSimulation development at CSU and will look to changes in production and development support through professional development in multimedia production and educational design staff. Professional development may take place through central internal professional development programs and the ICT enabled learning community of practice hosted regularly within the university.

9.4 RMIT University

Foundational leadership

Strategic leadership

RMIT was founded in 1887 as a technical institute dedicated to the provision of professional and vocational education. While its beginnings were modest, the university has now grown to be the largest dual sector (i.e. higher education and vocational education and training) provider in Australia, currently providing programs to approximately 60,000 students.

Strategic leadership of the learning and teaching undertakings of the university is vested in the Deputy Vice Chancellor (Academic), who has observed that the aim of the university is to 'create and disseminate knowledge to meet the needs of industry and the community and foster in students the skills and passion to contribute to and engage with the world'.

The RMIT Learning and Teaching Strategy 2007–2010 has, at its core, four defining objectives: to produce work-ready graduates with a hunger for lifelong learning; to ensure student satisfaction; to provide a 'global passport' for graduates; and to maximise the university's existing dual-sector advantage. In explicating these objectives, the action plan lists, among many actions, two which might be seen as relevant to the establishment of centralised eSimulation capabilities: strengthen support services for learning and teaching; and improve e-learning. At the time of writing, however, these two have not been realised as explicit actions to establish a centralised service to support eSimulation technologies of the type addressed in the eSimulations project. As will be reported below, however (see Operational leadership), seeded by the outcomes of the present ALTC-funded research, some possible steps in this direction have surfaced.

Operational leadership

Operational leadership is vested in the Educational Technology Advisory Group (eTAG), established by the DVC (Academic) to provide informed advice and direction in the use and development of information, communication and 'creation' technologies that lead to the achievement of goals set out in the Academic Plan. Specifically, eTAG supports the DVC (Academic) in determining priorities for the adoption and improvement of educational technology to support the University's strategic priorities.

Of particular relevance to the ongoing development of eSimulation capabilities, responding to the initiatives undertaken as part of the present ALTC-funded project, the university's Project Manager, Academic ICT Integration (a member of eTAG), has raised the prospect of seeking funding from the University's Learning and Teaching Investment Fund (LTIF) to establish a small centralised capability to produce eSimulations. At the time of writing this application is in its formative stages.

Teaching and learning design capacity

Centralised teaching and learning design capacity resides in the University's Educational Media Group. The Educational Media Group is part of the Teaching and Learning Portfolio and is committed to supporting and enhancing teaching and learning within the university. They assist and advise schools and educators across the university in the production of innovative and high quality teaching and learning materials, with expertise in multimedia production, graphic design, web development, video production, photography, and research and innovation. In addition, academic development groups exist in each of the University's colleges to provide direct support to the staff of those colleges.

The Educational Media Group has the capability to produce 'animations, interactive activities and simulations'. The complexity of these can vary from a simple animation to an interactive activity with complex action script programming and can be uploaded into the University's Blackboard system, built into a web site or demonstrated in a lecture. It should be noted, however, that these are most commonly developed in Flash, and this capability does not include the facility to produce simulations of the type explored in the present ALTC-funded project.

Given that RMIT had no established infrastructure to provide the specific capabilities required to develop the types of eSimulations developed originally at Deakin University, in the present project the approach taken was to establish an explicit 'eSims' capability within the RMIT School of Business IT and Logistics (BITL). As such, the teaching and learning design capacity, and the required IT infrastructure capacity were established within that school and resided with the BITL teaching academics. The steps taken to establish these capacities are discussed below (see IT infrastructure capacity).

Discipline and profession capacity

RMIT has a commitment to the production of 'work-ready' graduates. Specifically this involves all higher education degree programs including courses with components of work-integrated and/or work-based learning. To support this, RMIT has placed a premium on attracting staff with industry experience. Further, RMIT schools operate 'Industry Advisory Committees' and actively seek accreditation of its degree programs with relevant professional societies. As such, the university academics are well-placed to situate the use of simulations in their teaching in ways which recognise discipline and professional imperatives.

Media technology capacity

RMIT's Educational Media Group (and the Academic Development Group in the College of Business) have the capability to produce and integrate video, photographs, drawings, text and animations to suit the needs of staff and the student body. These can be delivered online or by DVD or CD-ROM. While these capabilities have not been used in the eSimulations project, future applications of eSimulations might be able to take advantage of these capabilities.

IT infrastructure capacity

RMIT has adopted a centralised approach to the establishment, maintenance and control of IT infrastructure. Specifically, Information Technology Services (ITS) provides RMIT University with information and communication technology systems and services. It should be noted, however, that ITS was deemed to not have the flexibility to service a specialised, localised IT development as required by the eSimulations project.

In the present project, therefore, the approach taken was to establish an explicit eSims capability in the RMIT School of Business IT and Logistics (BITL). The approach taken can be appreciated as follows:

- BITL staff attended training workshops at Deakin University (Burwood campus);
- Deakin provided LiveSim templates for developing simulated interviews;
- Licenses for Media Semantics Character Server were purchased. Two virtual servers were installed on the BITL server cluster. Applications for access to the LiveSim server, and subsequently the Character Server, through the RMIT firewall were lodged with RMIT IT Services. (Note: The granting of this access took several months);
- Character Server and LiveSim were installed on the servers – one server for Character Server and the other for LiveSim. Substantial on-site assistance from Deakin University was required to establish correct operation;
- Using the LiveSim development environment the PITS simulation (reported elsewhere) was developed.

In parallel with the above, using Character Builder, the Ringo Robotics eSimulation (reported elsewhere) was developed. Animations built with Character Builder were exported as ‘Flash’ files, with an associated HTML file used to display the ‘Flash’. The animation and its associated page and other files were then uploaded to the RMIT Learning Hub (Blackboard) for use by students.

10. Future of eSimulations in higher education

eSimulations can, should and are playing an increasingly important role on the world of online, blended, distance and flexible education. They support active, experiential learning and can contribute significantly to the development of generic attributes of students being educating in professional fields and disciplines. The benefits of eSimulations draw upon a long history of development in simulations and games; they relate well to a number of other national educational technology projects funded by the ALTC. Universities have enduring interests in the education of the professions which represents a substantial component of their core teaching work and staff members' community and professional associations.

Future developments, however, will be dependent on significant new organisational capacity building initiatives nationally and internationally. Future potential will only be realised through proactive leadership in the sector, both strategic and operational. Simulation technologies will further advance, with greater technical affordances offered in relation to the behaviours of synthetic characters. Currently, universities lag well behind breaking technology developments in the commercial world. Moreover, simulations will overwhelmingly be delivered online, with extended opportunities for their development and use on mobile devices. Various capacities will be required within and possibly shared between institutions to deliver fully on eSimulations' potentials. This project has attempted to expand the number of eSimulations to demonstrate what is achievable and to illuminate what is required for institutions to develop the agenda further. University resources are limited and there are many competing claims on budgets for various sorts of teaching and learning developments in general, and educational technology systems and applications in particular. As observed by the Director of Deakin's Knowledge Media Division:

> At a young, growing university like Deakin, there are many competing priorities for ICT investment, and while we support the eSimulations concept, we have held back from an institutional-wide commitment to eSimulations as part of our teaching and learning strategy. The investment required to scale up the approach has been a significant hurdle. The challenges of complexity, scalability and user experience can only be met through a collaborative approach developing shared resources and infrastructure, lessening the investment required by any single institution to use eSimulations to their full potential. The ALTC-funded 'Building academic staff capacity for using eSimulations in professional education for experience transfer' project is a great start.

eSimulations will need to compete for institutional attention, and prove they can be delivered cost-effectively and make a real difference to the quality of the student learning experience. We believe this can occur.

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Appendix A: Deakin University experience (eSimulation profile)

eSimulations developed during the project

Blue Cut Fashion (Store) and Blue Cut Fashion (Chain)

Biography of the eSimulation developer/academic

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Associate Professor Jacob Cybulski is a member of the School of Information Systems at Deakin University (Australia). His research interests include information systems theory and research methodology, as well as IS strategy. Jacob works as a consultant to organisations willing to investigate their business processes, develop an information systems strategy or align their IT and business practices. Jacob's past projects range from engineering and telecommunications applications to developing software productivity environments and toolkits. His recently commissioned work includes work on e-commerce, web development and contents management, educational video and simulation. In his free time Jacob engages in competitive fencing and fine arts.

Biography of the academic who adopted the eSimulation into the curriculum

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Dr Pradipta Sarkar holds the position of Lecturer and is Deputy Director of the Bachelor of Business (Business Information Systems) degree program in the School of Business Information Technology and Logistics, RMIT University, Australia. He holds a Bachelor of Business Administration and a Master of Science in Computer Information Systems from Assumption University, Bangkok, Thailand. He also holds a PhD from Deakin University, Australia. Pradipta teaches widely, in particular in business analysis and information systems analysis and design. His primary research areas include green IT; evolutionary developments on the web and in digital business; socio-technical and cultural issues in e-business and e-government applications development; digital media and mobile technologies; and post-modernism, technology, and society.

Blue Cut Fashion (Store) student evaluation interpretation

The Blue Cut Fashion (BCF Store) eSimulation has been used in 2008–2009 in teaching first year business students studying Business Information Systems, with a project focussing on developing their Business Analysis skills. The initial pilot was run in 2008 and collected students' informal feedback via the university standard quality questionnaire. This feedback was used to improve the eSimulation and the methods of its blending in the curriculum. The 2009 survey was administered in trimesters T1 (with a large cohort of 1504 students) and T3 (with a smaller cohort of 182 students). Both surveys were used to gain better understanding of the views and perceptions held by students using the BCF Store eSimulation, which was embedded in a rich interactive environment combining class and online activities. In spite of the difference in the cohort size, the results of both surveys show striking alignment of students' views in terms of measured opinions.

We found that learning professional Business Analysis skills via an eSimulation, rather than having the actual experience in class, was considered by students as beneficial in a number of ways. First, eSimulation was generally viewed as offering safety and permitting unpunished experimentation, trial and error, while at the same retaining acceptable authenticity of learning experience, giving flexibility in learning methods and accessibility of tools and environments.

Students valued the BCF Store's ability of relating the theory learnt in class to the practice of business analysis (T1 – 19% strongly agreed and 64% agreed; T3 – 12% strongly agreed and 75% agreed). Students recognised that the eSimulation allowed them to experience situations and tasks that would be difficult to learn in a traditional classroom setting (T1 – 27% strongly agreed and 46% agreed; T3 – 25% strongly agreed and 45% agreed) and possibly not easily learnt in a real work place (T1 – 20% strongly agreed and 46% agreed; T3 – 18% strongly agreed and 50% agreed). Students developed confidence in the skills developed in the process (T1 – 20% strongly agreed and 46% agreed; T3 – had a slight decrease of 13% strongly agreed and 63% agreed) and generally agreed that their learning via the eSimulation would be applicable to their future professional life (T1 – 30% strongly agreed and 40% agreed; T3 – 31% strongly agreed and a smaller number of those who agreed, 31%). Overall, students believed that by blending eSimulation with the class and online activities they engaged in valuable practice of business analysis, and in particular learning data analysis, observation and making recommendations (T1 – 34% strongly agreed and 51% agreed; T3 – 29% strongly agreed and 62% agreed).

It is typical of Business or Law students, as opposed to IT or Engineering students, to initially confront the study of Business Information Systems with prejudice and hostility (as reflected in ad-hoc in-class surveys and student feedback questionnaires). It was therefore of considerable surprise to us to note that the end of semester survey revealed students recognition and understanding of the actual role of a business analyst (T1 – 23% strongly agreed and 51% agreed; T3 – 18% strongly agreed and 54% agreed) and their readiness to undertake such a professional role in the future (T1 – 16% strongly agreed and 51% agreed; T3 – 22% strongly agreed and 50% agreed). The majority of those (initially) 'resistant' students reflected on business analysis skills as being indispensable to their chosen profession and observed that the skills they acquired are transferable to professional fields outside Information Systems. Some of these transferable skills identified by students included: general business analysis skills, data analysis, interviewing techniques and elements of project management.

2008-2010 Blue Cut Fashion
Chain and Store

about this simulation

profession/discipline/field
Business analysis

academic leaders
Assoc. Prof. Jacob Cybulski, Deakin
Dr Lemai Nguyen, Deakin
Dr Pradip Sarkar, RMIT

location
School of Information Systems, Deakin
School of Business IT, RMIT

Support for this publication has been provided by the Australian Learning and Teaching Council Ltd, an initiative of the Australian Government Department of Education, Employment and Workplace Relations.

The views expressed in this publication do not necessarily reflect the views of the Australian Learning and Teaching Council.

motivation

The main motivation for the construction of the Blue Cut Fashion (BCF) simulation was to explore ways of deploying the same simulation product across several institutions and their campuses, as well as, educational objectives and methods of teaching and assessment. Simulation design had to consider reusable and configurable components. Case studies, story lines, characters and the visual environment had to be pliable and open to modifications. BCF was the first in the series of such simulations.

objective

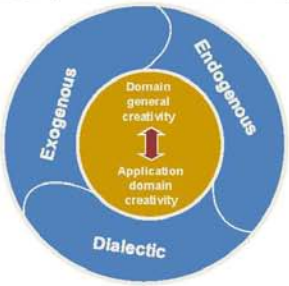
In all variants of the BCF simulation, students had to interview three representatives of the customer organisation (a fashion store - BCF), analyse the main issues facing the management and offer suggestions as to their resolution.

Two Birds with One Store

The Blue Cut Fashion (BCF) simulations provide business students with experience in dealing with common problems in information systems (IS). An important aspect of IS is the use of technology in solving business problems. Business analysis is often the starting point in the understanding of business context and its processes, as well as, determination of difficulties and inefficiencies in day-to-day business operation.

Students undertaking a business analysis project - irrespective of their year of study or their specialisation - are involved in the collection and analysis of business data, making observations, visual presentation of insights and writing recommendations to management.

BCF provides a learning framework for gaining experience in business analysis.



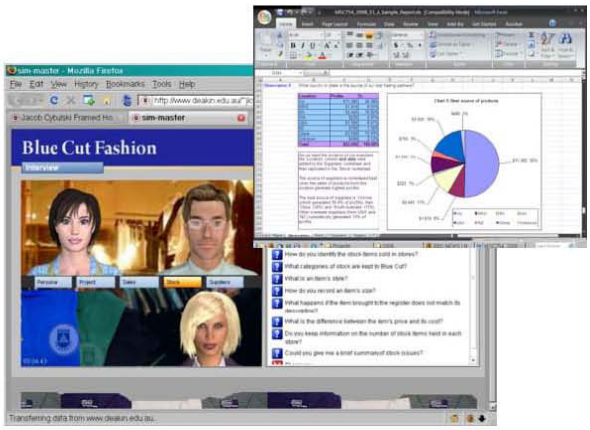
Business analysis is a process of learning and discovery in some business application domain. The most important objective for future business analysts is to become effective learners.

With this in mind, BCF was designed around a constructivist learning paradigm where the learning process can be described as emergent, collaborative, creative and domain specific. The knowledge creation relies on three distinct learning behaviours, i.e. endogenous, exogenous and dialectic, which have all been incorporated into the BCF blended learning environment (see Figure).

Endogenous behaviour supports reflective and introspective analysis of objectives, tasks and processes. Exogenous behaviour focuses on seeking knowledge from external sources (research, help desk and online forum). Dialectic behaviour invokes communication, collaboration and negotiation with experts (simulated and real) and their peers.

Effective learners also need to be creative. Through the BCF project we encourage students to think outside the square, learn to relax and resolve business and technological constraints.

DeakInSims
Blue Cut Fashion



Simulation Treatment

Blue Cut Fashions (Store) is a simulation that supports first year students in using Excel in analysing business data and proposing a high-level business advice on the organisational change.

The first year students use the (BCF Store) e-simulation as a sophisticated ***help desk*** to ask for advice on the problem area and to decide what Excel function would be useful in completing a particular project objective.

Blue Cut Fashions (Chain) is a simulation aimed at Masters students learning professional skills in requirements elicitation, analysis, specification and validation.

Masters students treat the (BCF Chain) e-simulation as a ***field trip*** and are asked to deal with multiple views of a business problem, reconcile these views, untangle conflicting information, deal with trust, and carry out research to fill in omissions.

While the two simulations have been designed around the same case study, their role in students' learning is quite different. BCF Store aims at simplifying an assignment task; whereas, BCF Chain provides a set of challenges that need to be overcome in students' assignment activities. In both simulations the objective statements are minimal, which forces students to fully engage with the simulated characters, which gives them a sense of ***self-sufficiency*** and the work undertaken becomes a ***process of discovery***.

Blended learning used in both cases, fuses reality and virtuality into a single and consistent world; first to create a sense of authenticity; and, second to provide educators with a degree of control over the simulation outcomes.

BCF sims are being tailored to distinct cohorts, and are used with groups of over 1,500 on-campus and online students.

Evaluation and Lessons Learnt

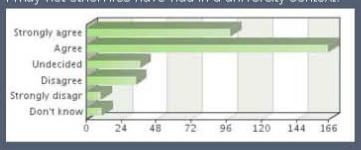
Blue Cut Fashion (Store) has been formally evaluated with an 'Opinio' survey taken by 439 students.

The preliminary analysis indicates students' recognition of an important role the BCF simulation played in their learning. They also reflected on the 'blended learning' approach employed in the project delivery and the perceived cohesion of different learning components of their study.

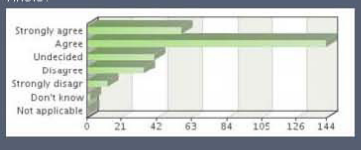
The overall feedback reflects students' positive reception of the experience gained from the BCF e-simulation incorporated in a coherent suite of teaching and learning methods.

Results of two (2) of the 38 survey questions have been presented below.

Blue Cut Fashion provided access to experiences that I may not otherwise have had in a university context.



Blue Cut Fashion is well-integrated into the unit as a whole?



insight

To assist students in accepting the simulated people, mini-sims interrupt face-to-face lectures, the characters appear on a student portal, and students can pose online queries to the simulated and real people alike.

future plans

Adoption of BCF by academics outside Deakin.

Formal evaluation of the BCF simulation across different institutions.

references

Nguyen, L & Cybulski, J (2008) 'Into the future: inspiring and stimulating users' creativity', *Proceedings of the Pacific Asia Conference on Information Systems*, PACIS 2008, Suzhou, People's Republic of China, pp. 123–35, 3–7 July.

Nguyen, L & Cybulski, J (2008) 'Learning to become a creative systems analyst', in eds. D Schmorrow, J Cohn & D Nicholson, *The PSI handbook of virtual environments for training and education: Developments for the military and beyond*, Praeger Security International, Westport, Connecticut, ch. 16.

As representatives of Generation Y (in the large majority) it was not surprising to note that the interactivity, engagement and 'gaminess' of the business analysis project sustained students' interest throughout the semester (T1 – 17% strongly agreed and 46% agreed; with a positive increase in T3 – 22% strongly agreed and 50% agreed), they felt positively engaged in the project (T1 – 17% strongly agreed and 47% agreed; T3 – 18% strongly agreed and 50% agreed), and their motivation to succeed in their assessment tasks was increasing with the level of engagement (T1 – 19% strongly agreed and 36% agreed; T1 – 22% strongly agreed and 36% agreed).

One of the important factors in this positive reception of blended learning and eSimulation was that learning work-related realities was considered by students to be non-threatening (e.g. low risk) (T1 – 24% strongly agreed and 54% agreed; T3 – 22% strongly agreed and 50% agreed). The authenticity of the simulated experience was an important aspect readily recognised by students via the real-life feel of the project, reality of handled data, reality of skills gained, and the reality of the roles they could potentially play in their future work.

Student provided many statements that represent their perception of the realism of the confronted business analysis tasks, in which they remarked on the challenging tasks faced in the project, the degree of authenticity of the business case, insightful dialogue that unfolded in the simulation, the necessity to learn the business process and strategy, applicability of theory to practice, the need for constant reassessment of the situation and questioning the observations, etc. As can be seen from these statements, students recognised realism of their 'whole' experience; they appreciated the means of interaction with the eSimulation; they acknowledged authenticity of the business case and its data, complete with its complexity and imperfection, as well as the realism of analytic tasks and their challenges. Most importantly, they enjoyed the entire experience and they would recommend it to other students (T1 – 82%; and a slightly improved perception in T3 – 90%).

Blue Cut Fashion (Chain) student evaluation interpretation

The Blue Cut Fashion (Chain) (BCF Chain) eSimulation was used in 2008–2009 in teaching Masters students (in various business disciplines) taking the Business Systems Alignment subject, with a team-based project focussing on developing Requirements Analysis skills, and the skills in aligning business and technology concerns. The case study used in the project was similar to that used in parallel by undergraduate students (Blue Cut Fashion [Store]), however, the tasks confronting the students and the mode of learning were very different. As the subject was previously taught with the use of eSimulations (FAB ATM, 2006–2007), the staff involved in teaching this subject had considerable experience in delivering blended learning to both technical and business students. The initial pilot was run in 2008 and collected students' reflections on their learning and on the simulation via experience reports prepared by students as part of their project deliverables. This feedback allowed improvement to the eSimulation. A formal survey study was subsequently used in 2009 trimester T1 (with a small group of 26 students).

The level of acceptance and degree of appreciation of the Blue Cut Fashion eSimulation by undergraduate (Store) and Masters (Chain) students was very similar. Masters students, although more critical of the eSimulation in their qualitative comments, assessed the eSimulation in a more positive way in response to the specific survey questions. Both groups appreciated the eSimulation authenticity and flexibility of learning.

Overwhelmingly, students felt that the eSimulation was a safe way of gaining professional experience (22% strongly agreed and 77% agreed), they viewed the simulation environment as highly interactive (75% agreed), engaging (12% strongly agreed and 75% agreed), and motivating (12% strongly agreed and 50% agreed). They valued the eSimulation's ability of bringing together the theory and practice of requirements analysis (77% agreed), gaining experience outside the classroom (44% strongly agreed and 44% agreed), growing confidence in their own skills (11% strongly agreed and 44% agreed), as well as engaging in valuable activities (22% strongly agreed and 77% agreed), and the skills that are highly relevant to their future work (33% strongly agreed and 55% agreed). By doing the project, students better understood the responsibilities and the tasks associated with the role of a requirements analyst (33% strongly agreed and 55% agreed) and many were willing to take on such a role in the future (22% strongly agreed and 44% agreed).

Among students' reflections on the process of working with the simulation, we found some that praised learning the technical, others business, content. Some remarked on the value of the eSimulated interviews, others on the usefulness of reports analysing interview data but produced outside the eSimulation. The majority of students would recommend the eSimulation to other students (75%).

Student 'experience reports', received as part of the project deliverables, largely confirmed the views and opinions measured by this survey. Interestingly, they also highlighted the importance of all other aspects of teaching and learning used in the curriculum, not only the eSimulation. What follows from that data is that in their learning students utilise and rely on all educational elements put together to support eSimulation. So, it is critical that all these components effectively integrate, connect and complement each other. It is essentially the skilful blending and seamless alignment of all teaching and learning aspects that have the greatest impact on students' perception of educational value and their enjoyment of the learning experience.

eSimulations developed previously by Deakin and used during the project

Biography of the educational technology designer

Stephen Segrave
Academic Education Designer, Institute of Teaching and Learning
Deakin University
stephen.segrave@deakin.edu.au

Having earlier lectured in Instructional Design and Educational Media Technologies, Stephen consults with academic staff to improve teaching and learning through exemplary and innovative educational designs. He has been recognised for design excellence through Deakin Vice-Chancellor's awards in 2000 and 2002 for 'Excellence in Teaching' and in 2008 for 'Outstanding Achievement in Teaching and Learning'. The award in 2002 was for the suite of simulations: '<HOTcopy®>: a virtual newsroom' (published, Allen & Unwin, 2003) which won the ASCILITE award for Best Software Project demonstrating *'Exemplary use of electronic technologies in teaching and learning in tertiary education'* and the Australian Institute of Training and Development (AITD) award for Innovation in Learning.

In 2004 Stephen received a Teaching Explorer Grant culminating in the Deakin Strategic Teaching and Learning Grants Scheme project: 'Experiential Learning Through Simulations: Enhancing education in the professions through interactive computer simulations online'. Five simulations were completed and used in different faculties and disciplines. Stephen has published in several national and international journals on simulations, integrated eLearning environments and academic professional development.

Biography of the eSimulation developer

David O'Brien
Interactive Media Developer, Knowledge Media Division
Deakin University
david.obrien@deakin.edu.au

David O'Brien works in Knowledge Media's Content Development Services group. David's role is to produce interactive frameworks for the enhancement of teaching and learning at the University. David's primary interest is in animation and simulation applications and the design challenges of facilitating dynamic content population of these tools. The Flash and Flex platforms are his primary development tools. David received Deakin Vice-Chancellor's awards in 2008 for Outstanding Achievement in Teaching and Learning for his work on the Deakin simulation architecture; and a 2009 eLearning Industry Excellence Award in the 'University eLearning' category.

Know Your Client

Biography of the eSimulation academic

Michael Kerry
Senior Lecturer, School of Accounting, Economics and Finance
Deakin University
michael.kerry@deakin.edu.au

Mike Kerry is a senior lecturer in financial planning. Mike has been instrumental in the development of the financial planning major at Deakin. Deakin was one of the first universities in Australia to offer a financial planning major. The rate of growth in enrolments in financial planning has been phenomenal and Deakin is now the largest provider of undergraduate financial planning education in Australia. Prior to joining the School of Accounting, Economics and Finance, Mike was General Manager of Korum, DeakinPrime, where he had extensive experience in working with professional associations including CPA Australia and the Financial Planning Association of Australia. Mike has published a number of articles and conference papers, which explain the nexus between financial education and financial behaviour.

The LiveSim Know your Client: Financial Planning was developed by Mike Kerry and Assoc. Prof. Bruce Clayton for financial planning, accounting and insurance, and implemented in semester 2, 2007 in the unit MAF311 *Superannuation Planning*. It continues to be used in that unit during 2007–2010. Know Your Client and Julie Cassidy's ClientView were recipients of the 2009 Award for Exemplar of Teaching Excellence in the Faculty of Business and Law. The awards showcase practices that lead to student engagement as measured by the Australasian Survey of Student Engagement (AUSSE) and emphasise providing students with wide, enriching educational experiences and helping students actively construct their own knowledge (active learning).

2008-2010

Know Your Client:

Financial Planning

about this simulation

profession/discipline/field
Financial Planning

academic leader
Mike Kerry and Bruce Clayton

location
School of Accounting, Economics & Finance
Faculty of Business and Law
Deakin University

Support for this publication has been provided by the Australian Learning and Teaching Council Ltd, an initiative of the Australian Government Department of Education, Employment and Workplace Relations.

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motivation

The skills and techniques for interviewing a client are integral to the work of a financial planner, just as they are to the practice of many professions. Large university enrolments in financial planning both on and off campus make it very difficult to provide the minimum experiences in client interviewing, whether for introductory learning, repeated practice, or for valid assessment. Providing this in an equitable, risk-free, authentic and interesting manner is even more challenging.

objective

A 'client fact finder' (rubric for data gathering) is used by financial planners. When using Know Your Client, students play the role of a financial planner who conducts a series of interviews with a client in order to complete the 'client fact finder' and use this in a formal assessment task requiring the preparation of the 'Statement of Advice' for a client.

Personal details, Super, Salary packaging, Assets and liabilities, Income and expenses, Estate planning, Risk profiling, Insurance...

Playing the role of a financial planner, the student makes a fixed time 'office appointment' with clients Chris and Eva Brown. It is the first time they have spoken to a financial planner. They are seeking to build wealth over the next 10 years in preparation for retirement. Briefings are provided and questions are asked, but the clients have no patience for questions about information already given.

Peak professional bodies and professional accreditation demand that graduates in financial planning are competent interviewers. Superannuation Planning is a third year unit and in the following year students may be in the workplace interviewing real clients. Previously, students were given a hard copy of a 'Client Fact Finder', one already completed from a case study, then asked to prepare a 'Statement of Advice' for assessment purposes. Without an interview process, students viewed the data provided in the Client Fact Finder as a fixed set of information about the clients. The simulation seeks to fill part of this gap for on and off campus students so they can meet the entry requirements of the professional associations.

The simulated interactions with the client epitomise real situations as they are based on recordings of actual interview sessions. Interviews simulate in real time and interview tasks are to be completed on time for the interview to be 'successful'. The clients don't always answer questions immediately and also become annoyed or anxious if the financial planner asks the wrong question or the same question twice. In the role of the financial planner, the student has to use other questions to achieve the necessary information for the Fact Finder. PDF documents that supplement the interviews are accessible at any time in Know Your Client and provide the basis for 'homework' by the students after using the eSim.

A prescribed, four-part assignment in Superannuation Planning is completed individually or as a group of two or three. Using the PMT function in Excel students calculate the retirement income stream the clients can expect in retirement. All financial modelling is in real terms and the impact of modelling in real terms is documented clearly to Chris and Eva. All group members submit an electronic copy via the Learning Management System.

Unlike classes dominated by content-knowledge to the exclusion of skills learned in authentic workplace contexts, interviewing techniques once 'learned' and practiced in this eSim should evolve and improve over time.

DeakinSims
Know Your Client

Simulation Treatment

Students come face to face with simulated clients but under conditions where students can make mistakes without being intimidated or worrying about what others may think. The eSim keeps the students engaged and builds self-confidence, gathering information from their client, listening carefully, asking the right questions and taking notes. Actors were video recorded playing the roles of clients Chris and Eva Brown.

An introductory video presents each of the eight discussion areas. The first, 'Personal Details' area is the gateway to the remaining seven topics areas that can be addressed in any order and in any number of sessions. 'Superannuation' featured in the first offering in 2009. A 'client happiness meter' (mood indicator) reflects the changing disposition of the client regarding the progress of the interview. They will not be happy if asked for information already provided in a current session. This relies on the tracking database to record information the student has already been given. Key-word question searching provides the option not to display all available questions in a menu.

In February 2009 an online version of the eSim was developed to complement the CD version, retained to deliver large media files difficult to access online by students in remote locations with slow internet connections. However, the CD version first prompts students to log into the eSim database over the network while still sourcing media files from the CD. In this way all students are tracked in their use of the eSim. The online database captures mouse-click actions by students inside the eSim enabling a variety of diagnostics to be undertaken. For example, at the class level, cohort level, individual student level as well as levels within the simulation itself.

Evaluation and Lessons Learnt

Snapshot:

In first trimester 2009 'Know Your Client' was the basis of the assignment in Superannuation Planning with 480 enrolled students in Burwood, Geelong and Off Campus.

The survey feedback received from 60 students was positive, particularly regarding its use in assessment:

On. Was Know Your Client valuable in helping you learn important things for assessment? (Yes = 85%)

On. When used in assessment, Know Your Client provides the simulated workplace conditions to measure my abilities more accurately than traditional approaches such as print. (Strongly Agree + Agree = 73%)

Do you support using Know Your Client for assessment purposes? (Yes = 87%)

This is the first DeakinSim to use the new tracking database which reported that most students sourced questions via the Key word search and did so widely over all the functional areas. Some experienced frustration with search returns.

The simulation has been evaluated in a number of ways. The online, tracking database provides various diagnostics which help in completing the assessment cycle, for example, it is possible to read a student's assignment and identify a particular weakness in their response and then (via the database report) see the extent to which they have explored the issue with the client in the interview. Secondly the diagnostics help in further improving the 'reality' of the simulation, for example, students search for questions by entering key words, when many students enter the same key word and it does not match our database of key words it gives us cause for reflection on what key words should be included and how we teach. Thirdly the diagnostics tell us more about the way our students learn, their preference for frequent short sessions rather than long sessions, their love of acronyms, their patience or lack thereof, their ability to listen etc..

future plans

Proposed, is an online entry test completed before a student may proceed to further interviews with their clients. They would need to pass a Multiple Choice Question (MCQ) test to effectively audit their knowledge and completion of the initial interview. This would test readiness for the second stage interview where the 'virtual clients / role-players' would be online in a discussion forum (LMS or 'Elluminate Live') where academic staff as conveners of the forum would role play the client and be interviewed by students. An online forum might also be established for students to upload audio files addressing unanswered questions raised during the simulation. All students would then be assigned perhaps 5 responses to listen to and provide constructive feedback to the author about how well they addressed clients concerns.

Improvements to the search function associated with the question pool is also planned.

References

DeakinSims - Our Experiences in Learning Experience Design, Institute of Teaching and Learning:

http://www.deakin.edu.au/itl/insims/professional-fields/business/know-your-client.php

Know Your Client student evaluation interpretation

The skills and techniques for interviewing a client are integral to the work of a financial planner. Large on-campus and off-campus enrolments in financial planning make it very difficult to include equitable interviewing experiences in lectures, tutorials, online and for unit assessment.

Evaluation data on the eSimulation was collected in several ways: anecdotal feedback was received from students in class, from tutors, from the database (that tracks the students' interactions, searches and question choices) behind the eSimulation; and from the online survey. These provided some insights into the weaknesses and limitations of the eSimulation and also gave us some guidance for further refinement. Some of the issues we need to address include:

- When students use the database search function for selecting questions from matched keywords, they experienced some frustrations and this needs to be improved;
- Inside lectures and tutorials more training is needed on how to make the most effective use of the eSimulation;
- The eSimulation has a shelf life and we need to think laterally about how it can be refreshed.

The unit team is very positive about the impact of the eSimulation in terms of how it authentically represents practice in the workplace and increases the level of engagement from students.

The feedback received in the survey from students has been very positive. Below is a summary of students 'closed' responses broadly linked to the Australasian Survey of Student Engagement AUSSE measures. Also included in italics are several student responses to selected survey questions, which the team believes accurately reflect the extent to which students' valued using the eSimulation.

Academic challenge	**Question 2.** Know Your Client provided access to experiences that I may not otherwise have had in the unit. (Strongly Agree + Agree = 82%) **Question 17.** Was Know Your Client valuable in helping you learn important things for assessment? (Yes = 85%) **Question 19.** Do you support using Know Your Client for assessment purposes? (Yes = 87%) **Open response** *'It put into real perspective what my role as a future financial planner might entail, and taught me the importance of asking good questions so as to obtain the correct information from the client'.*
Active learning	**Question 9.** When used in assessment, Know Your Client provides the simulated workplace conditions to measure my abilities more accurately than traditional approaches such as print. (Strongly Agree + Agree = 73%) **Open response** 'it's a different kind of assessment that allows you to research in a different way. more interactive than traditional assessments which makes it more interesting'

Enriching educational experiences	**Question 1.** Know Your Client brought to life abstract topics and helped me to relate them to the practice of financial planning. (Strongly Agree + Agree = 88%) **Question 18.** Know Your Client integrates well into the unit as a whole? (Strongly Agree + Agree = 81%) **Question 26.** Know Your Client sustained my interest throughout. (Strongly Agree + Agree = 75%) **Question 27.** I was positively engaged in the experiences provided in Know Your Client. (Strongly Agree + Agree = 79%) **Open responses** *'It gives a practical and interactive experience with clients, even though it is a simulation, and is better at giving an insight to financial planning than a text based outline for the interview would have been.'* *'It makes the assessment more fun'*
Supportive learning environment	**Question 25.** Know Your Client allowed me to learn at my own pace, in my own time and place. (Strongly Agree + Agree = 83%) **Question 29.** Know Your Client provides a non threatening (e.g. low risk) way of learning work related activities. (Strongly Agree + Agree = 77%) **Open responses** '*Really enjoyed dealing with face to face clients in a situation where you could make mistakes and ask the wrong questions without being intimidated or worrying about what anyone thinks of you. Great idea. Students should be made to ask the wrong questions in this environment because its harmless and builds confidence'* *'Keeps one engaged'*
Work integrated learning	**Question 3.** Know Your Client helped me learn financial planning skills because the scenarios helped me understand how complex situations unfold. (Strongly Agree + Agree = 79%) **Question 7.** I expect my learning from Know Your Client to be useful later in the workplace. (Strongly Agree + Agree = 75%) **Question 12.** Using Know Your Client has led me to reflect more on the actual role of a financial planner. (Strongly Agree + Agree = 88%) **Question 16.** For learning financial planning skills. Is Know Your Client 'authentic' in any important ways? (Yes = 83%) **Open responses** *'It is authentic in that the client didn't always answer questions in a prompt manner and so the financial planner had to direct them with other questions to obtain the relevant information. It is also relevant because the client got annoyed or anxious if the financial planner asked the wrong question or the same question twice.'* *'It felt as though I was interviewing* the *clients, like over the internet or video conference'.*

Question 33. Should digital simulations be created for use in other units of the course? (Yes = 91%)

It can be said that the eSimulation is effective because:

- It replicates an interview process better than any other 'tools' at our disposal. With 400 plus students per semester including 100 of these in remote locations it would be extremely difficult to replicate the interview process in any other way (see answers to questions 2, 4, 7 & 25)
- It is fun to use, it engages and supports students. It also works because students see through the fun and appreciate how it attempts to simulate the work environment (see answers to question 7, 26, 27 and 29).

The unit has always rated highly in the university's formal evaluations rankings and the pre-existing high level of staff and student *interaction* in part has driven this. Interaction increased as a result of using the eSimulation. Students, via the LMS and in lectures/tutorials were keen to find out more about the simulated clients and this stimulated considerable debate online relative to previous semesters where students were more passive in accepting a text-based, briefing about the clients. The eSimulation not only fills the interviewing 'gap' for our on campus students, it also places off-campus students in a more equitable position regarding experiential learning in preparation for the assessment and the profession.

ClientView

Biography of the eSimulation academic

Associate Professor Julie Cassidy
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Associate Professor Julie Cassidy is a member of the School of Law at Deakin University (Australia). She completed her Bachelor of Laws (Hons) in 1987 at University of Adelaide and her Doctor of Philosophy in 1993 at Bond University. She is admitted as Barrister and Solicitor of the Supreme Court of Victoria, Barrister of the Supreme Court of Queensland and Barrister of the High Court of Australia. Julie has been teaching law since 1987, teaching a variety of subjects, and currently teaches corporations and taxation law subjects.

Julie pioneered the teaching of practical legal skills through experiential learning and over many years has developed effective resources in evolving formats that meet diverse student learning needs. She is also an early adopter of technology to promote student access. Legal scholarship has informed her teaching and allowed her to develop innovative and influential curricula, including practical legal skills programs. Her other research interests include company law, taxation and Indigenous rights.

Biographies of the eSimulation academics

Professor Martine Powell
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Professor Martine Powell is a leading expert in the area of eyewitness testimony and investigative interviewing. To date, she has over 130 publications related to the topic, including a book entitled *A Guide to Interviewing Children* (Allen and Unwin).

Dr Belinda Guadagno
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Dr Belinda Guadagno is an early-career researcher who, having completed her doctorate in the area of children's eyewitness testimony, also specialises in the area of investigative interviewing of children.

Professor Powell and Dr Guadagno play a major role in the education and training of professional investigative interviewers (e.g., police, social workers) throughout Australia. In particular, they have established the first ever fully online course in this field, entitled Advanced Practice in Forensic Interviewing of Children, which includes the eSimulation UnReal Interviewing.

2006-2010

UnReal Interviewing:

Virtual Forensic Interviewing

about this simulation

profession/discipline/field
Forensic Psychology

academic leaders
Professor Martine Powell
Dr Belinda Guadagno

location
School of Psychology
Faculty of Health, Medicine, Nursing and Behavioural Sciences
Deakin University

Support for this publication has been provided by the Australian Learning and Teaching Council Ltd, an initiative of the Australian Government Department of Education, Employment and Workplace Relations.

The views expressed in this publication do not necessarily reflect the views of the Australian Learning and Teaching Council.

motivation/objective

Evaluation research across the globe has highlighted inadequacies in interviewers' questioning; interviewers tend to ask few non-leading, open-ended questions which elicit the best response. Insufficient opportunities for *practice* and *feedback* are the major reasons attributed for this poor interviewer competency. UnReal Interviewing was developed to 'expand the reach' of trainers of investigative interviewers. The simulation enables trainers to provide ongoing professional development for interviewers in dispersed work environments, without the financial cost of extracting large numbers of professionals from the workplace to the classroom. UnReal Interviewing allows trainees to administer their own practice opportunities (unrestrained by space and time) and provides immediate expert feedback that is crucial for open-ended question maintenance.

Maintaining non-leading, open-ended questions: a critical skill when interviewing children about suspected abuse.

UnReal Interviewing was created as a training tool for professionals (e.g., police and child protection officers, psychologists) who conduct investigative interviews with children. The simulation was designed to promote the use of non-leading, open-ended questions by providing trainees with the opportunity to practice interviewing a 'virtual' child and receive feedback about their questioning.

Whenever there is an allegation of abuse perpetrated against a child, the child witness will be interviewed by a professional working in the forensic field. Although investigative interviews may vary in purpose, scope and content, the common objective of all these interviews is to elicit an *accurate*, *complete* and *detailed* account of the incident in question.

Experts agree that the most critical skill when eliciting an account from a child is the ability to maintain the use of *non-leading, open-ended questions*. Such questions encourage elaborate responses but do not dictate or suggest what information is required. Open-ended questions are essential because they maximise the accuracy of the child's account and minimise the opportunity for confusion, contamination and/or misunderstandings between the child and the interviewer.

Experts in investigative interviewing are also in agreement about what is generally needed to promote the use of open-ended questions. As with most practical skills, *regular practice* in the use of open-ended questions and *expert feedback* is critical.

Learning to use and maintain open-ended questions in an interview involves several discrete sub-skills, including the following: (a) knowing what an open-ended question is, and why it is important; (b) recognising various types of open-ended questions; (c) choosing the most effective open-ended question at the appropriate point in the interview, and (d) being able to vocalise the right open-ended question. UnReal Interviewing was specifically designed to facilitate the development of skill (c).

In UnReal Interviewing trainees interview a virtual 5-year-old girl (Theresa) about suspected abuse by choosing the best questions to ask from among lists of options provided. At each step in the interview, trainees are provided four questions to choose from, and depending upon their choice the trainees receive a child response and four further question options from which they are to select their next question. Each question determines the path of the interview, and trainees receive immediate expert feedback about their selections.

DeakinSims
UnReal Interviewing

Theresa

questions

- What happens at Jerry's house?
- Tell me everything about what happens on Tuesdays, when you go to Jerry's house.
- Who's Jerry?
- Do you go to Jerry's house on any other days?
- That's all the questions I have to ask you today. Thank you very much for coming and talking to me.

question evaluation

It is useful to start by eliciting the child's understanding of the purpose of the interview. Doing this often elicits a disclosure from the child. Further, this question has been phrased very well i.e., it is non-leading and encourages an elaborate response. An excellent opening question.

Creating the Simulation

UnReal Interviewing was developed for use in distance education contexts. The simulation was created to selectively simulate professional practice, rather than to create a richly complex, immersive environment. In this sense, it is best described as an experiential simulation, as denoted by the inclusion of two features of this type of digital simulation. These include (i) a *live actor* (rather than animated computer characters or simple case-study text) who is rendered in the simulation as a video character; and (ii) a learner engaging in the simulation participates in the timed interview with a virtual child that generally unfolds in *real-time*.

Unreal Interviewing allows learners to participate in the interview by influencing the scenario through their question selections, analysing the resultant information and making professional decisions along the way.

As far as we are aware, UnReal Interviewing is the first interactive computer-simulation exercise developed to assist professionals in learning how to interview a child. The program encourages trainee interviewers to take an *active* role in initiating practice in the selection of open-ended questions and monitoring of their performance.

Preliminary Evaluation Research

A research snapshot:

UnReal Interviewing has been trialled with 65 trainee investigative interviewers (i.e., police and child protection officers, psychologists) enrolled in a distance education course aimed at improving their interview competency. At the end of the course trainees were invited to provide anonymous unstructured qualitative feedback about their impressions of UnReal Interviewing and its training value.

Overall, trainees perceived UnReal Interviewing as easy to use and a valuable learning tool. Specifically, trainees reported that the simulation offered a realistic training environment where different questions could be tested and immediate feedback could be received. The simulation was also commended for improving trainees' confidence using online technology.

"The only way to really improve is to practice and this is such a terrific way to do just that. Mock interviews with adult role-players can be useful but this program allows you to really feel like you are interacting with a young child – it has that element of realism." Female trainee.

"I thought UnReal Interviewing was a great tool for learning. It's so wonderful to get feedback straight away because it provides either confidence you are on the right track or alternatively highlights the areas you need to work on... I must confess I did feel a little anxious initially because I'm not good with technology but Unreal Interviewing was really easy to use - by my second attempt I was having fun and I feel much more confident about using computer simulations like this in the future. A surprisingly very enjoyable way to learn!" Male trainee.

"Unreal Interviewing was just brilliant... It really shows you how the various questions you ask can take the interview in a totally different direction. The immediate feedback was extremely valuable in highlighting the impact of asking certain questions as opposed to others. It also highlighted to me specific questions that I thought were open... It was really interactive and problems in your questioning were immediately evident by the child's response." Female trainee.

future plans

Future directions for computer-simulations in the investigative interviewing area will be determined by ongoing quality control evaluation.

references

(References not specifically about the simulation)

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UnReal Interviewing student evaluation interpretation

Overview

The survey was administered to provide insights into students' perceptions of the value of the eSimulation. Importantly, the eSimulation is used in a broader context of varied methods for providing students with practice and feedback to maintain their skills in non-leading, open-ended questions during forensic interviewing. Insufficient opportunities for practice and feedback are the major reasons attributed to poor interviewer competency in the field.

While student critique of the eSimulation has consistently been very positive, and the open-ended, free-text questions in this survey provided strong endorsement of the eSimulation (see below), the most pressing questions for evaluation (and future research) deal with the relationship between the performance of practitioners in the simulated child interview and other tasks in the course conducted before and after the simulated interview. To properly evaluate the eSimulation, funding would be needed to give participants access to the simulated interview for conducting pre and post assessments of their interviewing behaviour.

Learning to use and maintain open-ended questions in an interview involves several discrete sub-skills, including:

- knowing what an open-ended question is;
- knowing why an open-ended question is important;
- recognising various open-ended questions among other question types;
- choosing the most effective open-ended question at the appropriate point in an interview;
- being able to vocalise the right open-ended question.

The eSimulation provides practice and feedback for the development of skill (c).

Evidence from the survey responses certainly supports the view that students value the practice and feedback in a manner that has sufficient realism to be motivating and 'worthy' of the time taken to learn. As one student commented: 'It is much easier to imagine the real world analogue of the learning using this tool.'

Profile of students

The students using this survey were recruited from the Professional Development Unit (PDU) in the Faculty of Health, Medicine, Nursing and Behavioural Sciences. The PDU offers distance education in areas of health care. In the unit PDP101, *Advanced Practice in Forensic Interviewing of Children*, module 3 provides access to the eSimulation online at all hours in the privacy of the students' work or home environment where it is hoped they will use it for repeated practice.

The professionals most recently enrolled in the unit, included police officers; previous enrolees included psychologists, social workers, investigative interview trainers and teachers. The unit has been offered four times:

- 2009 – 8 students (Trimester 3 – Summer);
- 2008 – 14 students;
- 2007 – 24 students;
- 2006 – 19 students.

In addition to the above, the eSimulation has been used in a research project with 15 primary school teachers and with social work students.

Limitations and shortcomings

Clearly, four responses (three completed) are inadequate for any quantitative analysis, however this number is reasonable given there were eight students in this distance education unit involving self-paced modules that naturally lead to students reaching the eSimulation at different times.

To account for the self-pacing, the survey was run between December 4, 2009 and February 28, 2010. The computer network firewalls that many students experience as members of police forces around Australia have caused some problems with running the eSimulation. The length of the survey and the low relevancy of several questions will need attention in future. A modified survey has been used with a cohort that includes Masters and undergraduate Social Work students.

Future research priorities

To properly research the eSimulation, the following pre/post strategy would be required:

- practitioner access to the eSimulation for conducting pre and post assessments of their interviewing behaviour;
- access to trainee interviewers in groups of 20 or so participants;
- a sample of around 60 including a control group;
- support to administer an assessment interview (before and after), as well as transcribing, and coding the interview.

In addition to such data, Deakin University has created a tracking database for recording all interactions that each student has with the online eSimulation.

To conduct satisfactory research into the efficacy of the eSimulation, in addition to the data above, we need to know:

- Username of student;
- Their frequency of access to practice the eSimulation (the number of log-ins for each username);
- The ‘time of day’ they logged into the interview;
- The ‘duration’ of each session they conducted the interview;
- The question option each student selected at any point in the interview;
- The proportion of the questions for which the student chose the right question;
- If the student successfully reached the ‘disclosure’ event at the end of each log-in;
- For the student’s second and further attempts, if the option of receiving teacher feedback on question choices, was selected by the student;
- If the students asked to immediately view feedback (for each question choice) or at a later time;
- If the students completed the eSim or abandoned it mid-stream;
- Their responses the first time and then the second time students completed the eSimulation (test and re-test data);
- The relationship between their performance in the child interview and other tasks in the course conducted before and after the simulated interview.

Findings

The feedback from four students endorses anecdotal support received thus far from users of the eSimulation. Views consistently expressed are reflected in the following:

- I like the use of a 'real' child and listening to their voice. Personally, I learn better through 'doing', (and another) 'listening and watching and then doing as opposed to reading.'
- 'It gives you a chance to practise in your own time rather than being rushed to make appointments to interview colleagues.'
- 'but really I think it comes down to practice, practice ... the more practice and feedback the better.'

However, students clearly see the specific place of the eSimulation in the broader context of learning in the unit. They understand that more experience is needed if they are to learn more than skill (c) above. The following accord with this:

- 'more mocks / pracs and at least 4 mock interviews with the role-players that would be good practice/feedback for the students. I do appreciate that this would be highly resource intense and for this reason not feasible – I think the virtual interview provided an alternative to this. '
- 'It would be worthwhile following up this training with a 2 day face to face at the Uni where people practice their interview skills as a final evaluation / assessment.'
- 'I liked the online quizzes and discussion at the end of each module. I also appreciated being forced (through the assessment requirements) to conduct real or mock interviews where I had to submit the tape – it forced me to apply the practical skill not just complete the readings.'

One endorsement reflects the perceived value of the eSimulation by students:

> I could see the benefit of using this tool as a revision/validation activity for members at a 12 month mark. If they want to remain on a list of 'child interviewers' then they have to have completed this activity each year (or however often recommended by their training academy).

Appendix B: Charles Sturt University experience (eSimulation profile)

Biography of the educational technology designer / eSimulation developer

Deborah Murdoch
Educational Technology Designer, Division of Learning and Teaching Services
Charles Sturt University
dmurdoch@csu.edu.au

Deborah Murdoch is an educational technologist involved in designing practical learning experiences and resources with academics for students using educational technologies. She has worked as an Educational Designer and Educational Technologist at Charles Sturt University and has experience as a high school teacher with a specialisation in information technology. Deb has a broad background in teaching over many years in a wide range of areas in both child and adult education and industry.

Deb has particular interests in simulations, interactive media, serious games and authentic work related teaching including role-plays. She holds qualifications in education, majoring in Information and Educational Technology. Deb has a strong interest in creating professional development programs and resources to assist academics and educational designers improve teaching and learning using the most suitable ICTs.

Suicide Risk Assessment

Biography of the eSimulation academic

Stephanie Johnson
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Stephanie has had a lecturing position with Liverpool John Moores University, England, and previous to that was a lecturer and student counsellor at Charles Darwin University, Darwin, Australia for three years. Stephanie has had over 15 years experience in the field of social work and counselling in Australia and Europe.

Stephanie has been working in the area of education for the last ten years and has been practising as a counsellor since 1993. Her background is in counselling and social work; she has a four-year Bachelor of Social Work from the University of Tasmania and a three-year Master of Social Work from the University of Newcastle, Australia. Stephanie is also recognised as a Mental Health Social Worker under the Better Health Initiatives of the Federal Government. Stephanie also has postgraduate training in adult education. Stephanie has trained under Michael Durrant and Brian Cade in the area of Solution Focused Counselling and Brief Family Therapy for the last 12 years.

Stephanie's area of research is in adolescent trauma, mental health and counselling. Stephanie has published and presented internationally in the area of social work and has developed an international social work profile lecturing in Australia, England and Europe over the last three years.

Stephanie's interests are in mental health, yoga, counselling/social work and teaching. Stephanie is passionate about social work education and inspiring students to be lifelong learners.

2008-2010 Suicide Risk Assessment

Mental Health

about this simulation

profession/discipline/field
Mental health

academic leaders
Stephanie Johnson, CSU

design leader
Deborah Murdoch, CSU

location
School of Humanities and Social Sciences, CSU

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motivation

The motivation for the design of this simulation was to give Mental Health students an opportunity to develop skills in interviewing techniques and professional practice associated with them. The simulation is used in both post- and undergraduate subjects and, being offered to distance education students primarily, provides an opportunity for professional practice development in a safe environment. Some students reside in rural and remote communities and may not have the opportunity to practice the required skills.

objective

The objective of this simulation is to develop not only skills in interviewing clients but also to improve the students understanding of the literacy of interviewing and their ability to condense their assessment of the client into professional notes.

Meeting the needs of students

Suicide Risk Assessment (SRA) provides students to undertake an interview with a potentially suicidal client in a safe environment for both the client and themselves. Students need to build skills in interviewing techniques as well as the literacy of interviewing. Rural and remote students may not have an opportunity to experience interviewing until residential schools and a computer mediated interview offers an opportunity to practice those skills.

This simulation has been developed to provide opportunities to develop and hone those skills and develop an understanding of the structure of an interview. The simulation is situated in a subject as part of the learning resources and the assessment. Regular lectures in a flash format are provided to students in conjunction with study notes but in distance education it is difficult to provide students with the opportunity to practice the practical skills needed for professional practiced.

SRA offers that practice to students in a safe computer mediated environment that scaffolds their learning before a residential school that continues to build on the earlier established skills.

Mental health professionals need to develop client assessment skills and an understanding of potential risks to the client. Assessment is linked to the simulations by asking students to develop an assessment and case notes from the interview. Dependent on the level, masters or undergraduate, students will be asked for a varying degree of information and understanding gained from the interview and relate it to the theory discovered in earlier teachings.

SRA was designed in keeping with constructivist principles where students are provided with notes, lectures and online discussions through a subject forum and encouraged to discover information and understandings through experience. This is a blended learning experience where students access information from a range of sources, both offline and online, to developing an understanding of practice based learning in an authentic manner.

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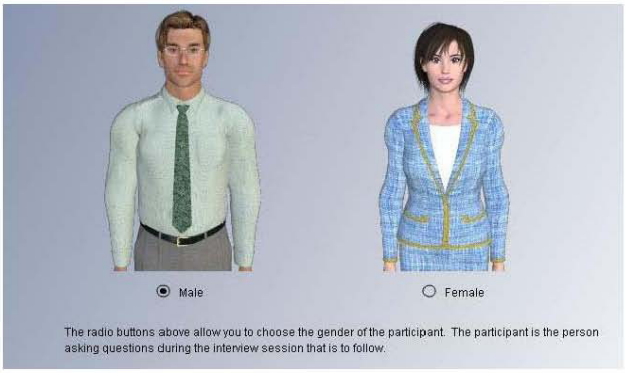

Simulation Treatment

Suicide Risk Assessment (SRA) **is a simulation aimed at both Masters and undergraduate students. Assessment tasks at both levels will demand a different level of understanding of the skills needed for the assessment of the client and a corresponding written report of the client state.**

Students are asked to complete case notes from their interview experience and relate it to prior knowledge gained in earlier study.

Students learn about the literacy of asking questions of a client in an appropriate order, the phrasing of the questions, appropriate questions, interview opening and closing techniques and appropriate responses to client answers.

Students treat this simulation as an opportunity to develop their interviewing skills in a tiered and scaffolded learning development to professional practice.

Evaluation and Lessons Learnt

Suicide Risk Assessment (SRA) has been evaluated with an online survey participated in by approximately 25% of the students offered the simulation.

The preliminary analysis indicates a positive acceptance of the simulation and an agreement that it offered students an otherwise unavailable service.

There are minor issues of design to be addressed after the second iteration of this simulation. Issues of speed and tone of speech and text delivery in the introduction need to be improved.

insight

Careful design of the simulation into the subject to ensure a good blend of learning experiences in the overall presentation of resources is required. The simulation is offered to students who study by distance and attend residential school. It was thought that by presenting students with additional opportunities to practice their interviewing skills they would develop confidence and decision making skills in the art of interviewing and come to residential schools with more confidence in practical skills. The ability to offer students a blend of experiences scaffolds their learning in different situations. Through a constructivist approach students have learnt theory and are encouraged to apply the theory through the use of simulations.

future plans

This simulation is being offered to two different cohorts currently and future plans include offering the simulation to a wider audience across disciplines.

references

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SRA student evaluation interpretation

Overview

The aim of this evaluation was to determine whether the use of the simulation improved student learning, including student response to simulation use, enhancement of authentic experiences, safe practice environments, opportunities for diverse feedback, building confidence, and reflection on learning. This evaluation occurred after the first iteration of the eSimulation Suicide Risk Assessment in mid July, 2009. The evaluation has 41 questions and includes both Likert scale and free format comments. It included questions on learning approaches, assessment of professional practice, reflection on learning and demographics. Although the population of the survey was 20, the response rate was only 15% and consequently cannot be regarded as conclusive at this point. The survey summary can be found within this report.

Limitations and shortcomings

Due to the poor response rate, this evaluation could not be considered a strong and conclusive assessment of the use of this simulation. Respondents did not answer all questions and in most cases, only one or two respondents answered the question. Question 30 was not completed by any respondent and Question 13 was regarded by two respondents as being not applicable. As both questions apply to assessment tasks in the subject, it could be surmised that students did not make a clear link between the use of the simulation and the assessment task for the subject. It is notable that an extremely high proportion of responses were the same (100% response rate) on the Likert scale questions. The response rate was only 15% and may have had some effect on this occurrence. It is concerning that 25% of responses were undecided, leading to an inference that the simulation did not lead the students to a clear conclusion of its purpose.

Profile of students

Students who completed this survey were all distance education students (100%), one female, one male, one in the 35–50 age group and one above 50 years of age.

Findings

eSimulations as a learning process to enhance study

Overall, the responses to questions that demonstrate benefits to enhance study were positive with students responding with Agree or Strongly Agree to a majority of the questions (questions 2, 4, 5, 13, 17, 28, 29, 33, 37). Comments indicated that the response to the ability to study at the student's own pace and convenience was positive but that the tool needed further development to have even greater impact. Due to the lack of connection to assessment tasks, both respondents may have felt that there was insufficient application of the simulation to achievement of learning results (questions 13, 37). The ability to develop reflective practice was commented on by one student which indicates an enhancement to study. It appears that convenience of time and place, practice of professional skills, and reflection on learning were provided for in a positive manner in this simulation. A stronger connection to assessment needs to be established to promote its use in this area along with further development of the resource professional practice.

eSimulations as a learning process to enhance professional practice

Responses to some questions (1, 3, 6–9, 11, 14–16, 18, 31, 34) indicated that there were mixed reactions to the benefits of this tool to enhance professional practice, with one respondent returning undecided to four questions, but that only two responses indicated

an element of disagreement. Overall the response indicated that students found the use of the simulation to be helpful and practical for professional practice, particularly as they were available for use in an environment that allowed for safe practice and reflection.

eSimulations as a tool

Questions that asked about the use of the simulation as a tool in learning indicated that students found that its use provided valuable evidence for assessment purposes. Questions 10, 19 and 20 all indicated a very positive response to using the simulation as an assessment tool although students indicated in questions 23 and 24 that there had been little discussion in class that would assist this. Reponses to Question 25 indicated that students thought that the interview tool could be used for other learning purposes, including by other service providers, not just in a university context. Students also had positive responses to questions (questions 25, 35, 36) that inquired whether simulations should be created for use in other subjects, and a 100% response to the query concerning recommending simulations to others. Overall, students appeared to find the simulation a valuable tool that encourages reflection and practice and would like to see further development occur.

Domestic Violence Simulation

Biography of the eSimulation academic

Chris Bushell
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Chris Bushell retired from the NSW Police Force after 30 years of service. He has experienced most facets of policing at various levels of the police force. He joined Charles Sturt University in 2000, firstly as distance education (DE) subject coordinator in the Associate Degree in Policing Practice (ADPP) before moving onto the role of Year 2 course coordinator. Since 2007 he has taken an active interest in developing learning materials for the DE subjects of the ADPP moving from a paper based delivery to a multi-media learning tool.

2010

Domestic Violence

Policing

about this simulation

profession/discipline/field
Policing

academic leader
Chris Bushell, CSU
design leader
Deborah Murdoch, CSU

location
School of Policing Studies, CSU

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motivation

The motivation for the design of this simulation was to give policing students an assessment task to assure lecturers of student understanding of required actions in policing duties and the reasons for those actions.

objective

The objective of this simulation is to develop understanding in students of their actions and reflection on the purpose and justification of the actions.

Blended learning and SOLO Taxonomy

Domestic Violence (DV) provides students with the opportunity to learn the requirements of the job and to demonstrate an understanding of why any actions pursued were undertaken.

This simulation has been developed to provide opportunities to develop skills in policing actions and develop an understanding of their justification. The simulation is situated in a subject as part of the learning resources and is a mandatory assessment. Students attend lectures and have learning resources such as study notes and re-enactment videos in a range of situations. This simulation is an assessment of student knowledge and understanding of actions learnt previously. It has been designed for students to learn in a structured way through a series of learning resources that build on each other. Students are able to complete the simulation as many times as needed to reinforce learning but must be accurate for a pass to be confirmed.

Students are able to access the simulation in a computer mediated environment that scaffolds their learning before a practicum role play.

The simulation is designed to be completed in a sequence of both online and offline resources that build student knowledge in a structured way and help students to discover the recognisable patterns that occur in much of their work.

DV was designed in keeping with constructivist principles where students are provided with notes, lectures and online discussions through a subject forum and encouraged to discover information and understandings through experience. This is a blended learning experience where students access information from a range of sources, both offline and online, to developing an understanding of practice based learning in an authentic manner.

It is believed that structuring the resources in such a way scaffolds recruits by offering material in a method that reinforces prior learning and encourages retention of knowledge. It also offers student an opportunity for reflection and development of an understanding on their actions.

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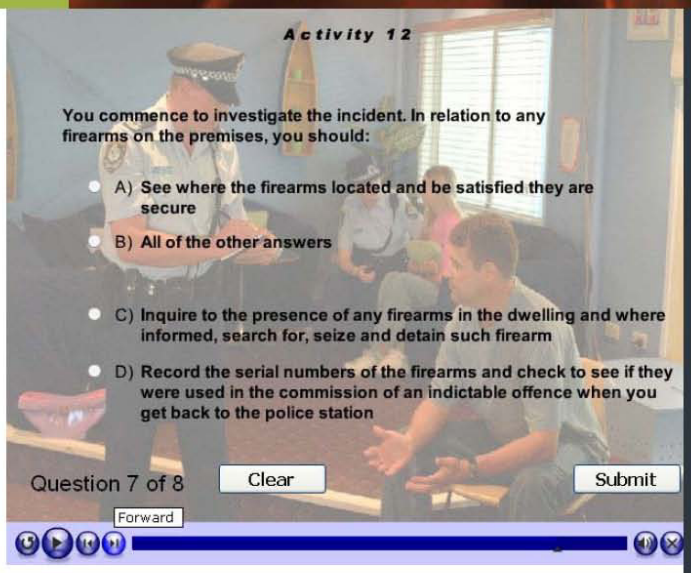

Simulation Treatment

Domestic Violence Simulation (DV) **is a simulation aimed at police recruit students at an undergraduate level. It is a learning and assessment tool that has been designed from a course view of integrating a blending of face to face, online and distance learning materials throughout the five sessions of the degree.**

In the course students progress from face to face instruction in their first two sessions to distance learning as they are appointed to Local Area Command. Students are required to comply with National Core Competencies and the simulation has been designed to incorporate activities that reinforce these requirements.

Development of knowledge over the whole course combined with the practical experience gained in the field meant that students must undergo assessment that demonstrates competence. The demonstration of these competencies is an integral part of police promotion. This simulation steps the student through the practice of applying theoretical understanding of knowledge to the demonstration of competences.

Evaluation and Lessons Learnt

There has been a positive student response to the simulation with most feeling that the use of the simulation improved their learning. As students are ejected from the simulation if they make an incorrect response too many times, there is some frustration on the part of students who are ill prepared to complete the simulation. However, the ability to complete the simulation multiple times compensated for this frustration and encouraged students to learn requirements through linked material.

The simulation was originally designed to take place over a semester and to be assessed fortnightly. On reflection this was changed to three sections of the simulation released fortnightly and assessed within a fortnight of each release. This was felt to be a better assessment schedule for both students and lecturer.

This simulation was created in Captivate and used still images, audio and text to convey situations but on reflection a proposal has been made to include video in future iterations of the simulation. Amateur actors were used for the audio files but in future it was felt an improvement to have professionals in these roles in the future. Realistic situations were demonstrated by images that showed images of police officers simulating real circumstances. This could be augmented by the use of video in the future.

insight

Careful design of the simulation into the course ensured that students experienced a combination of face to face, online and practical experiences. This simulation is part of a blend of opportunities for students to learn theory and put it into practice through simulations before going into a work situation.

future plans

This simulation is being offered to two different cohorts currently and future plans include offering the simulation to a wider audience across disciplines.

references

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DVS student evaluation

Overview

The aim of this evaluation was to determine whether the use of the simulation improved student learning, including student response to simulation use, enhancement of authentic experiences, safe practice environments, opportunities for diverse feedback, building confidence, and reflection on learning. This evaluation occurred after the first iteration of the eSimulation, Domestic Violence Simulation in mid March, 2010. The evaluation has forty one questions and includes both Likert scale and free format comments. It included questions on learning approaches, assessment of professional practice, reflection on learning and demographics. The population of the survey was 20 and the response rate was 94%. The survey summary can be found within this report.

Limitations and shortcomings

This simulation is only in its first iteration as a pilot program.

Profile of participants

Participants who completed this survey were predominantly male, with only 9% of the respondents being female. The age of participants was mostly in the 21-35 year range with one younger than twenty five and one older than thirty six years of age. All are working police officers with experience of one year and upwards in police work.

Findings

eSimulations as a learning process to enhance study

Overall, the responses to questions that demonstrate benefits to enhance study were positive with students responding with Agree or Strongly Agree to a majority of the questions (questions 2, 4, 5, 13, 17, 28, 29, 33, 37). Comments indicated that the response to the ability to study at the student's own pace and convenience was positive but that the tool needed further development to have even greater impact. Due to the lack of connection to assessment tasks, both respondents may have felt that there was insufficient application of the simulation to achievement of learning results (questions 13, 37). The ability to develop reflective practice was commented on by one student which indicates an enhancement to study. It appears that convenience of time and place, practice of professional skills, and reflection on learning were provided for in a positive manner in this simulation. A stronger connection to assessment needs to be established to promote its use in this area along with further development of the resource.

eSimulations as a learning process to enhance professional practice

Responses to some questions (1, 3, 6–9, 11, 14–16, 18, 31, 34) indicated that there were mixed reactions to the benefits of this tool to enhance professional practice, with one respondent returning undecided to four questions, but that only two responses indicated an element of disagreement. Overall the response indicated that students found the use of the simulation to be helpful and practical for professional practice, particularly as they were available for use in an environment that allowed for safe practice and reflection.

eSimulations as a tool

Questions that asked about the use of the simulation as a tool in learning indicated that students found that its use provided valuable evidence for assessment purposes. Questions 10, 19 and 20 all indicated a very positive response to using the simulation as an assessment tool although students indicated in questions 23 and 24 that there had been little discussion in class that would assist this. Reponses from Question 25 indicated

that students thought that the interview tool could be used for other learning purposes, including by other service providers, not just in a university context. Students also had positive responses to questions (questions 25, 35, 36) that inquired whether simulations should be created for use in other subjects, and a 100% response to the query concerning recommending simulations to others. Overall, students appeared to find the simulation a valuable tool that encourage reflection and practice and would like to see further development occur.

Appendix C: RMIT experience (eSimulation profile)

Purple Integrated Taxi System (PITS)

Biography of eSimulation developers / academics

Dr Martin Dick
Senior Lecturer, School of Business Information Technology and Logistics
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Martin Dick holds the position of Senior Lecturer and Director of the Bachelor of Business (Business Information Systems) degree program in the School of Business Information Technology and Logistics, RMIT University, Australia. He holds a Bachelor of Computing (Honours) (Monash University) degree and a Doctor of Philosophy in Computing from the School of Computer Science and Software Engineering at Monash University. Martin teaches widely across the curriculum, with a particular focus on the teaching of Systems Analysis and Design and associated disciplines. He has received grants to support research in areas such as developing strategies to foster acceptable work practices amongst undergraduate students, and the development of the PASEWeb software (Personal Assistant for Software Engineers on the Web).

Martin has published widely in his areas of research interest, including 18 refereed papers on aspects of computing education. He has served as a Member of the Program Committee for the 6th Australasian Computing Education Committee (2004), Member of the Asia-Pacific Forum for Educational Integrity (2003–) and Member of the Organising Committee for the 4th Australasian Computing Education Conference (2000).

Professor Ross Smith
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Ross Smith is Deputy Head of School (Teaching and Learning) and Professor of Information Systems in the School of Business Information Technology and Logistics at RMIT University, Australia. Since completing his doctoral studies in computational physics at the University of Melbourne in 1977, he has been a member of faculty at the Australian National University, Swinburne University of Technology, Deakin University and, since January 2007, RMIT University. Ross has taught widely across the curriculum in systems analysis and design, supply chain management, software engineering, systems implementation, and software project management.

Ross has researched and published widely, including over 130 scholarly refereed papers in systems methodologies, requirements engineering and knowledge management. Ross has also researched and published on the process and practice of Work Integrated Learning (WIL). He is a 2006 winner of a Carrick Citation for Outstanding Contributions to Student Learning, 'For excellence in postgraduate education in the area of Supply Chain Management, in particular by addressing industry needs through the development of innovative eLearning strategies'.

PITS student evaluation

Feedback on the PITS simulation provided by student surveys at RMIT's Melbourne campuses were overwhelmingly positive – positive responses were in excess of 70% for almost all questions.

Of particular interest were students' responses to the assertions 'While I was using PITS interview simulation, it provided a method for me to reflect on the quality of my performance' and 'The PITS interview simulation helped me develop confidence in my present capabilities in the area' , where positive responses were only 47% and 38% respectively. These may reflect a need to strengthen the drawing of lessons from the simulation in the plenary session – and possibly a need to introduce additional resources to facilitate a formal period of student personal reflection as part of the class session.

Supportive responses to the open questions include comments such as:

> 'It relates to business … because it helps teach the sort of questions that you would need to ask'; 'What was explained would occur in reality as it looks like and sounds like a real interview'; and 'It allows you to understand and see how you need to perceive business problems and where you should look'.
>
> Students were, however, critical of what they perceived as a lack of realism in the character image and voice, in particular as captured in comments such as:; 'There is something missing, he has no emotions'; and 'Body language and other non-verbal factors play a role in a real life situation'.
>
> It is certainly true that there was no 'wow factor' for students. It is apparent that we are working with students who have seen far more sophisticated computer realisations of on-screen characters than these simulations could generate. This was typified by comments such as: 'The character is not life like at all – he sounds like O-man from Half-Life.'
>
> It should be noted that the PITS simulation has also been recently used in the same course at RMIT's campus in Ho Chi Minh City, Vietnam. Formal survey results are not available at the time of writing, however anecdotal feedback includes:
>
> 'The voices seem very unnatural and are at times hard to understand'; and 'Pacing is slow, students would prefer if they could just read the text and skip the actual audio'. Whilst these comments deserve further investigation before drawing conclusive findings, one might suspect that students for whom English is a second language, such as those at RMIT Vietnam, are less concerned with using the simulation to learn interview design, than with understanding the content of the answers to specific questions. As such they report problems understanding the spoken answers, and a wish to simply have transcripts of the answers.

2008-2010 Purple Integrated Taxi System (PITS)

about this simulation

profession/discipline/field
Business Information Systems Analysis

academic leaders
Dr Martin Dick, RMIT
Prof. Ross Smith, RMIT

location
School of Business Information Technology and Logistics, RMIT

Support for this publication has been provided by the Australian Learning and Teaching Council Ltd, an initiative of the Australian Government Department of Education, Employment and Workplace Relations.

The views expressed in this publication do not necessarily reflect the views of the Australian Learning and Teaching Council.

motivation

The motivation for the construction of the PITS simulation was twofold:

Firstly, it served as a vehicle to investigate the transfer of simulation technology knowledge from one university (Deakin) to another (RMIT).

Second, it supported investigation of the role that simulation technologies can play in allowing students to experience and test designing system requirements gathering interviews.

objective

In the PITS simulation, students design a system requirements gathering interview. Students choose from a selection of possible interview questions, and sequence those questions. Using the simulation they then "run the interview" they have designed, and reflect on the success or otherwise of their interview designs.

This Taxi Company is the PITS!!!

The Purple Integrated Taxi System (PITS) simulation is part of an under-graduate course in Business Information Systems Analysis and Design. The PITS project is conducted over the whole of the twelve week duration of the course and is designed to develop students' capabilities to build an appreciation of the business needs of a company, to construct business information systems models and to assess the feasibility of the system so specified to proceed to full scale implementation. An essential skill required by students graduating from such a course is the ability to design interviews with organisational clients and future system users for the purpose of determining system requirements and feasibility.

This simulation is built around a case study of the Purple Taxi Company, which requires a new computer-based information system (PITS) at their taxi dispatchers' desk. Students are supplied, in the first instance, with a text-based requirements brief, prepared by the company, to which they must respond. Students prepare initially a set of models of this information system, using techniques taught during the course. Subsequently they reflect on this work and prepare an assessment of the feasibility of proceeding to full scale implementation.

To support their assessment of feasibility to proceed with the PITS system implementation, students are provided with a simulation of interviews, conducted with characters drawn from the initial brief. Students are provided with thirty to forty questions from which to choose, to put to a character in the simulation, spanning issues from business need, to functionality, technical issues, economic challenges, office politics, and the personal reactions of the character to the proposed project. In a two hour class, students work initially to design an interview with this character, to inform their assessment of PITS feasibility. They are challenged to choose typically 12 questions from the set provided, and to order them logically as they would propose such an interview should proceed.

When happy with their design, the students "run the interview" using the PITS simulation. They are then guided, in their teams, and subsequently in a plenary session, to reflect on how their planned interview "played out", and to suggest improvements to their choices of questions and to the sequencing they proposed.

School of Business IT and Logistics
PITS
RMIT UNIVERSITY

Simulation Treatment

At the heart of the learning that students take from the PITS simulation is the **plenary session**. In these sessions the instructor takes a selection of the interview designs from class groups and plays them to the full class.

Students critique each other's designs, reflecting upon both question choice and sequencing. Proposed alternatives can be played immediately.

In so doing, students get first-hand experience of the process of interview design, and feedback on the possible consequences of poor question choices and poor ordering choices.

Whilst the question choices and sets of question responses could have been provided in paper-based form, the immediacy of having the computer based simulation play the interview that has been designed encourages students to experiment, providing students with immediate feedback on the consequences of choices that are made when designing interviews.

Underpinning this simulation is a model of **action learning**, facilitated by the simulation. An initial phase of interview **planning** is followed by students "**experiencing**" the interview, as played out using the computer-based simulation.

The concluding plenary session facilitates both **individual and collective (all-of-class) reflection**. Alternative interview designs, postulated by students in the plenary session, are played to the whole class, as a means of **confirming learning**.

Blended learning used in this case, fuses reality and virtuality into a single and consistent world; first to create a sense of authenticity; and, second to provide educators with a degree of control over the simulation outcomes.

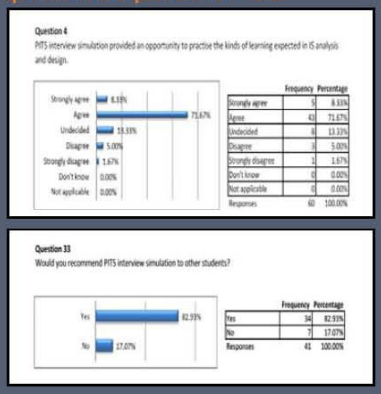
Evaluation and Lessons Learnt

Feedback on the PITS simulation, formally evaluated using a survey completed by 54 students was overwhelmingly positive – positive responses were in excess of 70% for almost all questions.

Supportive responses to the open questions include comments such as:

"It relates to business … because it helps teach the sort of questions that you would need to ask"; " What was explained would occur in reality as it looks like and sounds like a real interview"; and "It allows you to understand and see how you need to perceive business problems and where you should look".

Results of two (2) of the 38 survey questions are presented below.



insight

Students were critical of what they perceived as a lack of realism in the character image and voice, in particular as captured in comments such as:; "There is something missing - he has no emotions"; and "Body language and other non-verbal factors play a role in a real life situation".

It is certainly true that there is no "Wow-factor" for students. It is apparent that we are working with students who have seen far more sophisticated computer realisations of on-screen characters than these simulations could generate. This was typified by comments such as: "The character is not life like at all - he sounds like O-man from Half-Life"

future plans

The PITS simulation has also been recently used in the same course, offered at RMIT's campus in Ho Chi Minh City, Vietnam. Formal survey results are not available at the time of writing.

Biography of eSimulation developers / academics

Ian Searle
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Following an extensive career in secondary education and 12 years in the IT industry as a senior consultant (business analysis and system architecture) and project manager, Ian Searle now holds the position of lecturer in the School of Business Information Technology and Logistics at RMIT University, Australia. Ian's teaching focuses on hardware and operating systems, and in particular on innovative approaches to teaching Project Management to postgraduate students.

Dr Hossein S Zadeh
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Hossein S Zadeh holds the position of Senior Lecturer and Director of the Master of Business Services Sciences degree program in the School of Business Information Technology and Logistics, RMIT University. He has researched and published in Multicrew Optimisation and Decision Support Systems. His research, linking the diverse fields of engineering, management, and IT has attracted over $1,000,000 in grants, awards, scholarships and contracts, from organisations such as the Australian Research Council and the Department of Defence. His current research focuses on educational and healthcare services as pillars of most modern economies. Hossein is a continuing reviewer of multiple international journals and conferences, and has been a session organiser and reviewer of IEEE Aerospace conference since 2002. Hossein's teaching focuses on eBusiness technologies, and innovative approaches to teaching Project Management to postgraduate students.

Ringo Robotics student evaluation

Feedback provided by student surveys was overwhelmingly positive. This might actually be seen as an issue, as the surveys provided few insights which might be used to build on, and to improve, the simulation.

The response rate in Semester 2, 2009 was about double that of the previous semester. The difference can be accounted for by administration of the RMIT Good Teaching survey in the same lecture session in Semester 1. The students were ‘surveyed out’ by the time they did the eSimulation survey.

There were some comments about the simulation resulting in a project that was too ‘nice’. Simulated events did not really threaten the life of the project. There was also a comment about simulations not really reflecting life.

There were some negative responses to Question 18, about the use of the simulation for assessment purposes. There were also some comments in response to Question 20 about opportunities for preparation. Responses to Question 20 could reflect the pressure that was deliberately applied during the simulation. The pressure was deliberately introduced as an aspect of ‘realism’. The teaching staff wish they could find a way to apply even more pressure – in the interests of the students’ education!

2008-2010

Ringo Robotics
Project Management

about this simulation

profession/discipline/field
Project Management

academic leaders
Ian Searle, RMIT
Dr Hossein Zadeh

location
School of Business IT & Logistics, RMIT

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motivation

The main motivation for the development of the Ringo Robotics simulation is to provide students learning about project management as part of their Masters of Business in Information Technology program with as close to real life experience at running a project as could be managed in the classroom environment.

objective

The simulation runs over the twelve weeks of an academic semester. Students have to develop a commercial proposal based on a case study and brief, plan the project and simulate the delivery of the project's product to the client. During the simulation, students are faced with various unexpected events and issues which they have to manage effectively.

Coping with the vagaries of Project Management

As the pace of change accelerates, change management is becoming more and more important. Project Management is all about effectively coping with change.

Most working people have been or will be involved with projects because they are involved with change. Therefore, the business of project management is becoming more and more important.

Many of the older generation of project managers "fell" into the role with very little preparation and even less training. The current generation is more likely to choose project management as a crucial part of their career. They are "aspirational" rather than "accidental". Project management qualifications are now an important part of any ambitious manager.

As project management is as much an art as it is a science, a major question is: "How do we educate up-coming project managers in the art and practice of project management? How can we encourage them to feel the fear and the pain involved?"

While the science and the theory can be learned from lectures, reading and discussion, the art requires practice. One way of providing practice without undue cost or risk is through simulation.

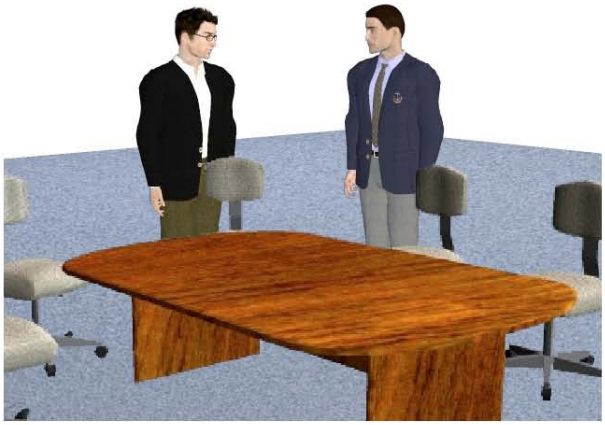
Simulations allow the educator to provide some of the experience and practice that project managers need. It provides a relatively safe environment in which to experience difficulty and make mistakes.

Simulations, to be effective, need to be as realistic as practicable, both in types of problems and issues and in the way they are presented to those involved with the simulation. They also need to exercise the full range of skills that PMs need – not just the "hard" matters of estimating, budgeting and scheduling but also the "soft" skills of communicating with and managing team and client. The scenarios presented in the simulations also need to have a good deal of ambiguity and uncertainty while still giving participants enough information to make decisions.

School of Business IT and Logistics
Ringo Robotics

RMIT UNIVERSITY

An incident after the Kick-Off meeting



Respond by preparing an estimate for addressing Mr. Bracket's request. Don't try to find a solution at this time, you are just estimating for the requirements gathering phase.

You should also prepare a briefing note for your project director advising of the request and suggesting how the project could be managed, if it eventuates.

Simulation Treatment

The simulation involves the whole twelve weeks of the course. Elements in the simulation are: preparing a proposal for the client, accepting the project, preparing the project plan, and executing the project.

During the execution of the project, various events happen which alter the course of the project execution. The events are presented to the participants in various ways: by messages (phone, e-mail) and by scenarios which are presented by electronic animations. In the illustration above, for example, the project sponsor is requesting a change of scope from the project manager. As this is the first scenario in the simulation, students are given a few hints to work with.

Each week, the project team meets with the "client", in a "Project Steering Committee" meeting. The "client", in fact, is another of the project teams in the group.

The project team presents the standard reports usually provided in project meetings: progress, status and forecast. The clients role play the various stakeholders, asking probing questions about the team's management of events.

Assessment of the project execution is peer-to-peer. The "client" group in the committee meetings assesses the project team on a number of criteria provided in a marking guide.

Tools and technologies used in the simulation are:

- Media Semantic Character Builder (for scenario animations)
- Electronic mail system (messages used to provide the "events")
- RMIT Learning Hub (Blackboard) for:
  - Hosting electronic animations
  - Hosting voice message system
  - Wiki – used by students for project documentation

insight

Tutors need to be proactive in encouraging students to gain the greatest benefit from role-playing.

future plans

Development of simulations for a wide range of project management case studies

Formal evaluation of Project Management simulation to identify effectiveness and improved effectiveness

evaluation

Members of the course are asked to participate in a survey at the end of the simulation. The survey instrument in printed form, involving 34 questions: 5 point scale and free-form text. Results of the surveys conducted so far are still being evaluated.

Appendix D: Deakin's LiveSim

In 2008, Deakin funded an internal eSimulations Database project to provide a technical solution for the collection and tracking of student data and student participation within simulated learning environments, in order to provide evidence for authentic student assessment, evaluation and research. LiveSim, a generic framework/template consisting of a PHP based web interface, together with an Oracle database back-end to an existing suite of eSimulations, was developed which can be used for future eSimulations.

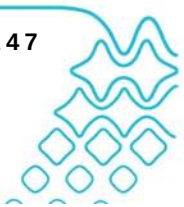
eSimulation development scoping model

The following table provides an overview of the various tasks that might typically be undertaken in the production of a simulation, using the LiveSim template. Total development times are estimates and will vary depending on media formats (see the 'Performance media' section of this document for further detail on these variations).

Alternate shadings of rows indicate groups of tasks that can be completed concurrently.

Task	Description	Prerequisites	Responsibility	Est. time (hours)
Establish team	Identify project team members: technical manager, education developer, media manager, project manager.	nil	Project manager	2
Scoping doc provided	Initial project scoping template sent to client. This template requests information pertaining to script/dialogue (including academic introduction), interface design, pre sim screen content, virtual environment design, database requirements, delivery dates etc.	nil	Project team	1
Initial team meeting, brainstorming session (1–2 weeks after scoping doc sent out)	Clearly establish the concept, purpose, pedagogy, etc. Discuss scoping doc and assist client in scoping any virtual characters – how they are to be represented e.g., audio, video, questions, telephone, TV, radio.	Scoping doc provided	Team and client	1
Scoping doc returned	Initial project scoping template completed and returned to production team for review.	Initial brainstorm session	Client	1
Team review of scoping doc	Development team reviews project scoping document, and responds to client with any questions, suggestions or potential problems in the production process.	Scoping doc returned	Team	2
Client response to team review	Client responds to questions or concerns from the development team.	Scoping doc reviewed	Client	1
Script writing and character definition	Client/other begins writing script doc.	Client response to team review	Client/other	20–40
Extra development scoped	Identification, scoping and approval of any new supporting panel components or other screen components that require extra development time.	Client response to team review	Team	2–8

Task	Description	Prerequisites	Responsibility	Est. time (hours)
Scoping doc sign off – initial	After development team response, and liaison with the client, the project scoping document is finalised and signed off. The project scoping document may undergo further minor revisions but character definitions and environmental design is final at this point.	Scoping doc returned	Team and client	1
Actors (*if required)	Actors auditioned and cast for all roles.	Scoping doc sign off – Initial	Media manager	6*
Photography (*if required)	Photographer is briefed on required (non library) photographic materials, and delivers them prior to virtual environment design concept stage.	Scoping doc sign off – initial	Media manager (with photographer)	2*
Interface design concept	Interface graphic design concepts developed and submitted to client (approval not crucial to timeline but needs to be received prior to delivery of post produced digital materials and commencement of the simulation build).	Scoping doc sign off – initial	Graphic designer	4
Virtual environment design concept	Virtual environment designs created and submitted to the client and the production team for approval. Approval from client and production team needs to be received prior to the commencement of the video recording phase.	Scoping doc sign off – initial Photography	Graphic designer	8
Deliverable – stage one	Generic template used to deliver an initial no media mode (text feedback only) or character server mode version of the simulation. This deliverable will include any pre simulation screens (e.g. orientation materials) and an initial build of the debrief screen, but these will need to be represented without any digital materials (photos, videos etc.). This deliverable may also include prototype database functionalities as requested.	Scoping doc sign off – initial	Technical manager	12
Content test one	Test that programmed content matches the script/dialogue and test for any other interface issues. Clear for delivery to client.	Deliverable – stage one	Technical manager and technical assistant	2
Client review one	Client provides feedback on the no media mode version of the simulation. Any requests for script/dialog changes will be final. There will be a further opportunity to review other interface elements after client review two.	Content test one	Client	1
Media manager reviews script	Add any further suggestions on script/dialogue	Client review one	Media manager	3
Scoping doc sign off – stage one	Script/dialogue now finalised. Other simulation elements able to be reviewed at ‘Client review two’ stage. Actors auditioned and cast for roles.	Client review one	Client/Team	4
Interface design sign off	Interface designs finalised and approved by the client	Interface design concept	Client	0.5
Environment design sign off	Virtual environment designs finalised and approved by the client	Virtual environment design concept	Client	0.5



Task	Description	Prerequisites	Responsibility	Est. time (hours)
Filename convention	Production team establishes and publishes filename convention for naming of all digital media files. (Filenames need to be included throughout process e.g. in After Effects compositions and slates to remain in footage through post production process.)	Scoping doc returned	Technical manager, media manager, admin/ production assistant	0.5
Video recording (*if required)	Video recording sessions can now be scheduled. Video materials recorded.	Scoping doc sign off –stage one Environment design sign off Filename convention	Video producer	4*
Audio recording (*if required)	Audio recording sessions can now be scheduled. Audio materials recorded.	Scoping doc sign off Stage one Environment design sign off Filename convention	Audio producer	6 hours
Video post production (*if required)	Post production (After Effects) on all video materials completed. Filenames to be in accordance with the established filename convention for the project. (Chapter Tracks to be created for QuickTime files.)	Video and audio recording	Video post production	30*
Audio post production (*If required)	Post production on all audio materials completed. Filenames to be in accordance with the established filename convention for the project. QuickTime format required – with Chapter Tracks.	Video and audio recording	Audio post production	8*
Deliverable – stage two	The 'no media' mode version of the simulation is developed further by adding all post produced, video and audio materials, virtual environment graphics and interface design graphics.	Interface design sign off Environment design sign off Video and audio post production	Technical manager	5–40* (*media dependant)
Technical testing		Scoping doc sign off – Stage three	Technical manager, technical assistant	4
Content test two	As per Content test one.	Deliverable – stage two	Technical manager, technical assistant	3
Client review two	Client provides feedback on deliverable – stage two and requests minor alterations to any elements (other than script dialogue).	Content test two	Client	2
Scoping doc sign off – stage two	All but minor revisions now complete.	Client review two	Client/ technical manager	0

Task	Description	Prerequisites	Responsibility	Est. time (hours)
Deliverable – stage three	Final minor revisions completed.	Scoping doc sign off – stage two	Technical manager	12
Client review three	Client reviews and confirms that final minor revisions are complete.	Deliverable – stage three	Client/ technical manager	1
Scoping doc sign off – stage three	Simulation ready for testing.	Client review three	Client/team	0
Technical testing		Scoping doc sign off – Stage three	Technical manager, technical assistant	5

These estimates indicate that smaller scale simulations or simulations that make use of time efficient media formats such as character server dynamic avatars, might require 130 hours of production time, whereas more time hungry development, perhaps utilising live actors, may push production times up to 210 hours.

It is important to note that these estimates are based on Deakin's experience with simulations produced so far, all of which have been significant in size and scope. It is conceivable that smaller simulations, requiring relatively simple state logic, and making use of time efficient media, could be produced in well under 100 hours.

For Deakin LiveSim technical documentation detailing:

- Deakin LiveSim screen sequencing
- Performance media
- Deakin LiveSim roles

Visit http://www.deakin.edu.au/itl/insims/altc-project/dissemination.php.

Appendix E: Student evaluation survey instrument

Student survey: Blue Cut Fashion (Store) eSimulation

(For this question type, tick your response to each statement in ONE of the 7 shaded boxes.)

1	'Blue Cut Fashion' **brought to life** abstract topics and helped me to relate them to the practice of Business Analysis.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
2	'Blue Cut Fashion' **provided access to experiences** that I may not otherwise have had in a university context.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
3	'Blue Cut Fashion' helped me learn business analysis skills because the scenarios helped me **understand how complex situations unfold.**					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
4	'Blue Cut Fashion' provided an opportunity to **practise the kinds of learning** (e.g. data analysis, observation and making recommendations) expected in the unit.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
5	'Blue Cut Fashion' opened up new **opportunities for diverse feedback** about how well I learned what the unit was designed to teach.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
6	'Blue Cut Fashion' was a **valuable way of learning concepts and skills** that would be difficult to experience in a real work place.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
7	While I was using 'Blue Cut Fashion', it **provided a method for me to reflect** on the quality of my performance.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
8	'Blue Cut Fashion' **helped me develop confidence** in my present capabilities in the area.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
9	I expect my learning from 'Blue Cut Fashion' to be **useful later** in an actual workplace.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
10	'Blue Cut Fashion' **provides reliable evidence** for assessment purposes of the kinds of learning expected.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
11	'Blue Cut Fashion' provides the simulated workplace conditions to **measure my abilities more accurately** than traditional approaches such as print can do.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
12	'Blue Cut Fashion' allows me to **provide a more complete picture of my abilities** than traditional methods such as print.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
13	Overall, 'Blue Cut Fashion' helped me **achieve the learning results expected** in the unit.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
14	Using 'Blue Cut Fashion' has **led me to reflect more** on the actual role of a business analyst.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
15	Using 'Blue Cut Fashion' has **led me to reflect on my readiness** for the professional role of a business analyst.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
16	'Blue Cut Fashion' **broadened my thinking** about the actual practice of business information systems.					Not Applicable Don't Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	

17. Describe any **valuable learning** from your use of 'Blue Cut Fashion'.

18. For learning systems analysis skills, is 'Blue Cut Fashion' **authentic in any important ways?** [Yes / No]
Please explain your response.

19. Was 'Blue Cut Fashion' valuable in helping you to **learn important things for assessment?** [Yes / No]
Please explain your response.

20. Do you support using 'Blue Cut Fashion' **for assessment purposes?** [Yes / No]
Please explain your response.

21. 'Blue Cut Fashion' is **well-integrated** into the unit as a whole. [Yes / No]
Please explain your response.

22. 'Blue Cut Fashion' could be used as **a stand-alone resource** for independent learning. [Yes / No]
Please explain your response.

23. Through communications in class or online, were there adequate **opportunities for you to prepare** for using 'Blue Cut Fashion'. [Yes / No]
Please explain your response.

24. Through communications in class or online, were there adequate **opportunities for you to review and discuss** 'Blue Cut Fashion'? [Yes / No]
Please explain your response.

25. Could 'Blue Cut Fashion' be **used for other learning** purposes? [Yes / No]
Please explain your response.

26. ‘Blue Cut Fashion’ was only one of **many learning approaches** you may have experienced in the unit. Which of the following approaches were used in conjunction with Blue Cut Fashion? (Check boxes for the approaches you experienced.)

Tick any of 1–5 and/or add any other approaches you have experienced.

1	Study guide practice examples		13	
2	Study guide examples		14	
3	Guided readings		15	
4	In text questions		16	
5	Case studies		17	
6	Face-to-face tutorial discussions		18	
7	Face-to-face lectures		19	
8	iLectures		20	
9	Quizzes in DSO		21	
10	Online discussion groups		22	
11	Class role-plays		23	
12	Practical field work		24	

27	‘Blue Cut Fashion’ allowed me to learn at my own **pace**, in my own **time** and **place**.					Not Applicable Don’t Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
28	‘Blue Cut Fashion’ **sustained my interest** throughout.					Not Applicable Don’t Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
29	I was **positively engaged** in the experiences provided in ‘Blue Cut Fashion’.					Not Applicable Don’t Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
30	My **motivation** to do assessment tasks **increased** due to the experience with ‘Blue Cut Fashion’					Not Applicable Don’t Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
31	‘Blue Cut Fashion’ provides a **non-threatening** (e.g. low risk) **way of learning** work-related realities.					Not Applicable Don’t Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
32	‘Blue Cut Fashion’ provides the **opportunity to demonstrate** clearly what I think I can do.					Not Applicable Don’t Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	

33. Blue Cut Fashion’ is **hyper-real.** That is, a variety of elements are incorporated in the one setting that would not otherwise be possible to experience. **What element of this do you value?**

34. What are the **practical benefits** of engaging **in a simulated experience**, rather than having the actual experience in the physical world?

35	Should eSimulations be created for **use in other units?**					Not Applicable Don’t Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	
36	**Would you recommend** ‘Blue Cut Fashion’ to other students?					Not Applicable Don’t Know
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree	

37. What **personal observations** of ‘Blue Cut Fashion’ would you like to provide?

38. From which campus do you study?

1	Burwood	
2	Geelong	
3	Warrnambool	
4	Off-campus Australia	
5	Off-campus international	

Thank you for taking the time to complete this questionnaire.

Appendix F: Possible redesigned student eSimulation survey question examples

Your student number _____

(From this one observation point we have a great deal of demographic data; the difficulty would be in extracting it in a suitable format for subsequent analysis.)

Specific questions relevant to demographic grouping hypotheses:

How much time do you spend using computer games?_____(units)

How much time do you spend on the computer doing stuff not related to university studies?_____(units)

Did you use an eSim in this subject? Yes / No. If no, go to a later question.

I found the eSim to be:

Explain to respondents that they must tick the value which most closely represents their thoughts on this matter for example, ticking '1' indicates that they found it very beneficial, ticking '9' indicates the opposite, and ticking '5' means that they are neutral.

I found it beneficial to my learning	1 2 3 4 5 6 7 8 9	It did not help me learn anything at all

Students will tick somewhere on the above semantic differential scale. Scalar quantities and limits to be defined by research team.

The development of the survey mechanism depends on which method the research team adopts to move forward with. Included here is an example that incorporates the simplification of the proposed hypotheses, and an example of some questions that attempt to align with constructs identified by Mr Segrave. In an attempt to identify those constructs, as well as others that may exist, a variety of semantic differential terms and linked phrases should be presented, for example:

Confusing to use	----------	Simple to use
Brilliant	----------	Disastrous
New skills learned	----------	No new skills learned
Business professionalism improved	----------	Not improved at all
Insight into real world skills	----------	Learned nothing new at all
Entertaining	----------	Boring
Motivated me to participate	----------	I'd rather be doing something else
Practical skill development	----------	Learnt nothing new

Include in each paired phrase a numeric scale that respondents can select from.

Using your Q1: *Know Your Client brought to life abstract topics and helped me to relate them to the practice of financial planning:*

This eSim:

Improved my financial planning knowledge	1 2 3 4 5 6 7 8 9	Did nothing to improve my knowledge of financial planning

Or whatever way you would choose to phrase it given the theme of the response you sought to measure.

Whatever the research team believe aligns with their underlying strategies should inform the development of these semantic type differential pairs. The presentation should be such that, the respondent selects by simply placing a mark on a line. Notwithstanding, the reduction in 'time on task' this simple approach provides respondents, would theoretically allow for a great number of requested data points. Other hypotheses, for example:

'Do eSims affect online engagement?' should be phrased such that either the treatment or control group can answer it.

For example:

Did anything motivate you to engage online? Yes / No. If no, go to later question.

If yes, what motivated you to engage online?

Participant could select from a list:

Educator, I was told to, It seemed the easiest way, electronic simulations, other or ask for a one word response.

Similarly, consider a control group question for all questions.

Do eSims affect assessment? What proportion of their educational experience in that unit did the respondent consider the eSim to comprise?

Do eSims affect overall educational experience?

This could be assessed using the same type of semantic differentials described above.

Questions should be presented that require only simple thought, for example:

How much time would you guess that you spent reviewing the eSim in this subject?
_____(units)

Of course this would be zero for control group participants.

Correlate this measure with students overall and interim assessment results for an interesting regression model result, could it be that the more time spent reviewing eSims is indicative of a student with a higher mark?

1. *eSims should comprise what proportion (if any) of a/any Unit? (This is also a surrogate question which inadvertently implies the importance of an eSim to the respondent.)*

Ask the student about this estimated proportion outright.

Appendix G: Knowledge transfer and eSimulation development experience capture tool

Six key issues blogs (21 April 2010)

Question 1

Your name: Enter your name in the text field below. This will be like a blog. Your entries are not anonymous.

Question 2

Nominate your own general challenges, issues, problems or solutions.
(This is an open question. Dot-point your reflections before looking at the prompted items under each section.)

For issue (1) 'Technical (infrastructure) design'

Question 3

Nominate your own challenges, issues, problems or solutions

Question 4

Determining organisational needs and resources
(what facilities and resources are available to support future eSims and what is needed to develop / acquire in the future)

Question 5

Determining early eSimulations
(what infrastructure option is best for my organisation)

Question 6

Acquisition of eSimulation infrastructure
(purchasing technology components – servers, characters, voices and additional software, developing in-house skills and capabilities, negotiation of certain capabilities to be outsourced)

Question 7

Deployment of eSimulation infrastructure
(installation and learning to effectively use infrastructure components)

Question 8

Evaluation and improving the eSimulation infrastructure

For issue (2) 'Technical (eSimulation) design'

Question 9

Nominate your own challenges, issues, problems or solutions

Question 10

Designing user interfaces
(environments, spaces, stage design, props, brands, forms, buttons and controls, sounds, engagement of graphic designer, photographer and multimedia designer, sound engineer)

Question 11

Designing scenario / dialogue
(scenario design, questions/prompts, responses/lines, conversation states and state transitions, interrupts, time events, fidgets and boredom)

Question 12

Designing control and interaction
(forms, buttons, text and media objects, custom swf, integration, flow of screens and navigation)

Question 13

Designing characters and voices
(choosing characters, selection of voices, creation of custom avatars)

Question 14

Developing scripts
(developing dialogue scripts using tools, embedding special effects, emphasis and body language, XML work to integrate and link the screens)

Question 15

Customisation of existing eSimulations
(changing characters and voices, changing brands, changing media objects, changing dialogue, changing the flow and logic, changing the template, changing the framework)

Question 16

Teaching educational designers/developers in eSimulation development
Teaching IT, multimedia developers and teachers in eSimulation development

For issue (3) 'Education design'

Question 17

Nominate your own challenges, issues, problems or solutions

Question 18

Adopting existing eSimulations for teaching
(own or acquired)

Question 19

Setting educational objectives
Embedding educational objectives in an eSimulation (types and number of scenarios, tasks to be undertaken, dialogues to be developed or customised, issue
(what should eSim achieve in the curriculum)

Question 20

Determining educational methods with eSimulations
(types of engagement, skills and knowledge to be developed, skills and knowledge to be required, ways of assessing learning, individual / group tasks)

Question 21

Blending eSimulations with other curriculum components
(how eSimulations will interact with classroom, face-to-face and online activities)

Question 22

Setting assessment regime with eSimulations
(how learning with eSims be assessed)

Question 23

Tracking and assessment of students' performance
(collecting student performance in a database, assisting teachers in marking, designing assessment tasks outside the eSimulation, understanding performance vs. activities vs. standards)

Question 24

Evaluation of educational outcomes and improving eSimulation experiences of students and staff (surveying students and staff, lessons learnt, actions to follow)

Question 25

Teaching the teachers in using eSimulations in classes

For issue (4) 'Student experience design'

Question 26

Nominate your own challenges, issues, problems or solutions

Question 27

Designing student experience
(styles of interaction, ways of immersion in tasks, flow of events, types of interaction, audio-visual environments, level of authenticity, reality gaps, time pressure, repeatability of the eSimulation experience.)

Question 28

Creating eSimulation 'presence' in lectures, tutorials, online and assessment
(creating authenticity of experience)

For issue (5) 'Research design'

Question 29

Nominate your own challenges, issues, problems or solutions

Question 30

Evaluation of technical eSim design and improving eSimulations (how well did it work, what can be changed and how)

Question 31

Evaluation of educational outcomes and improving (students' and staffs') eSimulation experience (surveying students and staff, lessons learnt, actions to follow)

For issue (6) 'Collaboration and dissemination'

Question 32

Nominate your own challenges, issues, problems or solutions

Question 33

Collaboration with and/or dissemination to colleagues on the same campus

Question 34

Collaboration with and/or dissemination to colleagues in the same university

Question 35

Collaboration with and/or dissemination to ALTC project participants

Question 36

Collaboration with and/or dissemination to parties in Australia

Question 37

Collaboration with and/or dissemination to colleagues overseas

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