

Using Simulation to Develop Entrepreneurial Skills and Mind-Set: An Exploratory Case Study

Yvonne Costin, Michael P. O'Brien, and Darina M. Slattery
University of Limerick

Entrepreneurs need to develop a range of skills to be successful, including skills in decision making, risk management, problem solving, communication, and teamwork. Games and simulations are increasingly being used in both academia and business to encourage such skills development. This paper describes a business simulation module whereby postgraduate students use a game to simulate managing and operating a business. The game replicates real-world scenarios, thereby providing an innovative and contextualized learning environment. This paper presents extracts from students' reflective essays, which describe various learning outcomes. The paper concludes with some guidelines for teachers considering integrating game-based learning into their curricula to facilitate skills development, as well as recommendations for future research.

Introduction

Entrepreneurship “refers to an individual’s ability to turn ideas into action and is therefore a key competence for all, helping people to be more creative and self-confident in whatever they undertake” (Barzdins, 2012, p. 129). The concept of entrepreneurship has been around for a long time, yet, entrepreneurship education is a relatively recent addition to university curricula (Robinson & Josien, 2014). Although a recent addition, the significant role of education in promoting entrepreneurial mind-sets and skills is now widely recognized (European Commission, 2008). Furthermore, entrepreneurship education is acknowledged as one of the key drivers for future growth and thus is becoming more accepted and applied (Militaru, Pollifrono & Niculescu, 2015).

Hynes, Costin, and Birdthistle (2011) emphasize the need for universities to stimulate entrepreneurial mindsets in students and to encourage innovation around business start-ups. The role of universities in society is changing quickly (Militaru et al., 2015), and so they need to provide a collaborative and incentive atmosphere for business creation, the formation of human capital, and the development of entrepreneurial mind-sets and skills within their students.

The remainder of this paper is organized as follows: The next section, Section 2, outlines the key literature relating to entrepreneurial skills development and best practices for designing constructivist and contextualized learning environments, with a particular focus on the use of gaming pedagogy for entrepreneurship students. Section 3 describes a case study whereby we integrated a simulation game into the curriculum for a postgraduate business simulation module to enhance entrepreneurial skills development. Section 4 presents and discusses the results, and section 5 outlines the conclusions and limitations of our study, as well as the implications of the study for other teachers and recommendations for future work.

Developing Entrepreneurial Skills and Mind-sets

This section discusses key literature relating to developing entrepreneurial skills and mind-sets, as well as how teaching design approaches might be applied in the development of entrepreneurial skills. This section also discusses literature relating to the use of games in entrepreneurship education.

Entrepreneurial Skills and Mind-Sets

The need for entrepreneurs to obtain or acquire certain skills for them to be successful cannot be over emphasized (Ibrahim & Lucky, 2014). Entrepreneurial skill is the skill in developing or creating a new product/service that will add value to society and generate monetary benefits for the entrepreneur. Olagunju (2004) posits that entrepreneurial skill is the individual ability to create a new business through the exploitation of an idea in order to benefit both the individual and the society. In a similar definition, Salgado-Banda (2007, p. 229) identified key factors or characteristics that defined entrepreneurial skill, which include “self-belief, boldness, tenacity, passionate, empathy, and readiness” that will motivate and encourage an individual to achieve certain objectives as a result of opportunity and risk taking.

Research highlights the importance of the entrepreneurial attributes (risk and innovation aptitude, rapid decision-making, long sight, ability to understand others, ability to read reality factors, ability to deal with complexity, ability to compete) that cannot be generated from scratch but can be developed and should be known by students (Bellotti et al., 2014; Munir, Idrus, Shukar, Ithnin, & Mohamad, 2015). Consequently, students need to deepen their understanding of company management competencies in an entrepreneurial perspective, understand important social realities that may help them enter the world of work in a more aware way, and better

understand their potential to become entrepreneurs (Minniti, Bygrave, & Autio, 2006).

Teaching Approaches and Entrepreneurial Pedagogy

As entrepreneurship has been progressively introduced to higher education programs (Rae, Martin, Antcliff, & Hannon, 2012; Duval-Covetil, 2013), there has been growing interest in effective teaching approaches and entrepreneurial pedagogy (Albornoz, 2009; Edelman, Manolova, & Brush, 2008; Gibb, 1987; Gibb, 2002; Kuratko, 2005; Neck & Greene, 2011) to develop enterprise and entrepreneurial mind-sets and skills in students.

In terms of teaching approaches, there are generally considered to be three main approaches: behaviorism, cognitivism, and constructivism (Ertmer & Newby, 1993). In a behaviorist environment, learners are seen as reactive because they are first presented with a stimulus (e.g., the lesson content), and they then respond (or behave) a certain way, depending on the reinforcers that are presented to them. Over time, these learners learn to associate certain responses with certain stimuli, which is why behaviorist approaches and methodologies are often referred to as stimulus-response psychology (Barnes & Holmes, 1991). Behaviorist teachers are only interested in overt behaviours and, as such, they do not consider memory or the internal processing of the mind (Ertmer & Newby, 1993).

Cognitivist teachers, on the other hand, *are* interested in internal events of learning, as well as the external events undertaken by an instructor (or game), and they see learners as active learners. Cognitivists place significant importance on the proper structuring, sequencing, and outlining of information to ensure their learners can properly digest, store, and retrieve the information when they need to do so (Ertmer & Newby, 1993).

Constructivism, a branch of cognitivism which is sometimes referred to as contextualized learning, sees learners as constantly constructing understanding and representations, so it is not simply a case of receiving information and retrieving it at an opportune time; these kinds of learners must be very active in the learning process, and they must help shape their own understandings. Jonassen, a key theorist in the field of constructivism, discusses the characteristics of constructivist learning environments (CLEs) (Jonassen, 1999). In a CLE, learners are afforded tools that enable them to engage in discussion, collaboration, and reflection; such tools are often available in virtual learning environments such as Moodle, Blackboard, and Sakai. To succeed in a CLE, learners need to work as individuals but also collaborate and learn from peers because “knowledge is individually constructed and

socially co-constructed by learners” (Jonassen, 1999, p. 217). The key component of a CLE is the problem that learners are asked to solve (Jonassen, 1999). Unlike traditional behaviorist environments, the CLE environment focuses on engaging the learner in solving authentic, contextualized problems that resemble problems typically found in the “real world” (Brookes, Moseley, & Underwood, 2012; Jonassen, 1999) and so are most appropriate for the delivery of effective entrepreneurial education.

Evidence from the literature suggests that traditional teaching methods to deliver entrepreneurship education are inappropriate and outdated (European Commission, 2008; Gibb, 2002; Higgins, 2008; Hytti & O’Gorman, 2004). Indeed, as entrepreneurship scholars have developed understanding of the way entrepreneurs learn through practice and reflection, educators have concluded that enterprise pedagogy requires experiential elements that encourage students to mimic entrepreneurial behavior (Gibb, 2002; Pittaway & Cope, 2007). Furthermore, the teacher needs to become a facilitator rather than a lecturer or disseminator (Garrison & Anderson, 2003). One way educators can shift the active instructor/passive student relationship to a more dynamic student-led/tutors-as-facilitators relationship is through the provision of contextualised learning and experiential education, such as that afforded in a constructivist learning environment (Costin, Drakopoulou Dodd, Hynes, & Lichrou, 2013; Jonassen, 1999).

As a strategy, contextualized learning provides educators with a way to remove the abstraction from traditional academic content and allows students to experiment with the application of their knowledge to a given problem. Students become the drivers of their own learning process, and evidence suggests this approach results in increased engagement and motivation (Sviniki, 2004; Titzer, Swenty, & Hoehn, 2012). Contextual learning requires students to engage with “real world” scenarios that provide authentic experiences (Jonassen, 1999; Leger, 2006).

The Use of Business Simulation and Games

The pinnacle of contextual learning in enterprise occurs when students launch new ventures or dabble with a real small or medium-sized enterprise (SME), observe the consequences of their actions, and learn from their mistakes. Common experiential pedagogical methods include business plans (Hills, 1988), business simulations (Wolfe and Bruton, 1994), and “serious games” (Bellotti et al., 2014; Low, Venkataraman, & Zrivatsan, 1994). Shaffer (2005, p.1) describes “epistemic games” as the following:

Activities are simultaneously aligned with the interests of the learners, the structure of a domain of knowledge, valued practices in the world, and the modes of assessment used. By using elements from the real context, and embedding them in the game design and gameplay, the context can be recreated with a high degree of authenticity (Brookes et al., 2012, p. 3).

A number of authors (Faria, Hutchinson, & Wellington, 2009; Washbush & Gosen, 2001; Williams, 2011; Wood, Beckmann, & Birney, 2009) have suggested the use of simulation games as an innovative pedagogical approach to teaching entrepreneurship (Souitaris, Zerbinati, & Al-Laham, 2007; Prensky, 2001) as they enable students to practice the concepts of entrepreneurship and business management (Bellotti et al., 2014).

There seems to be some ambiguity in the literature in defining what is a simulation and what is a game. This ambiguity arises partly from the fact that the term simulation can be applied to both a genre of computer game and a digital training tool. Gaming simulations include sporting, racing, train, and flight varieties, to name but a few. While many games require suspension of disbelief on the part of the user, training simulations, on the other hand, model the real world accurately:

Key features of simulations are that they represent real-world systems; they contain rules and strategies that allow flexible and variable simulation activity to evolve; and the cost of error for participants is low, protecting them from the more severe consequences of mistakes (Garris, Ahlers, & Driskell, 2002, p. 443).

A simulation is a replica of reality: of actual events, decisions, and resultant performance and the consequences of decisions made within a given context, in this instance a small firm. It enables students to learn through interactive and experiential learning that mirrors the real world of starting and growing a new business. Simulations are therefore useful to learn about the complexities of running a small firm where the application, not the definitions, of business concepts, functions, and operations are most important. Decisions do not occur sequentially, but simultaneously and interactively, just as they do in the business world. Decisions are made with incomplete, unreliable, or unavailable information, where the problems are unfamiliar, within restricted timeframes, under competitive conditions, and are impactful on the future financial strength of the business. Participation in the game promotes creativity amongst the participants, who develop a shared view of their learning, and further, it has a personal learning aspect in terms of independence of decision making,

attitude toward risk, and adaptability and flexibility of participants in thought and action.

Method

This section of the paper describes the background context of the case study, the simulation game used, the characteristics of the participants, and the how the data were collected.

Context of the Case Study

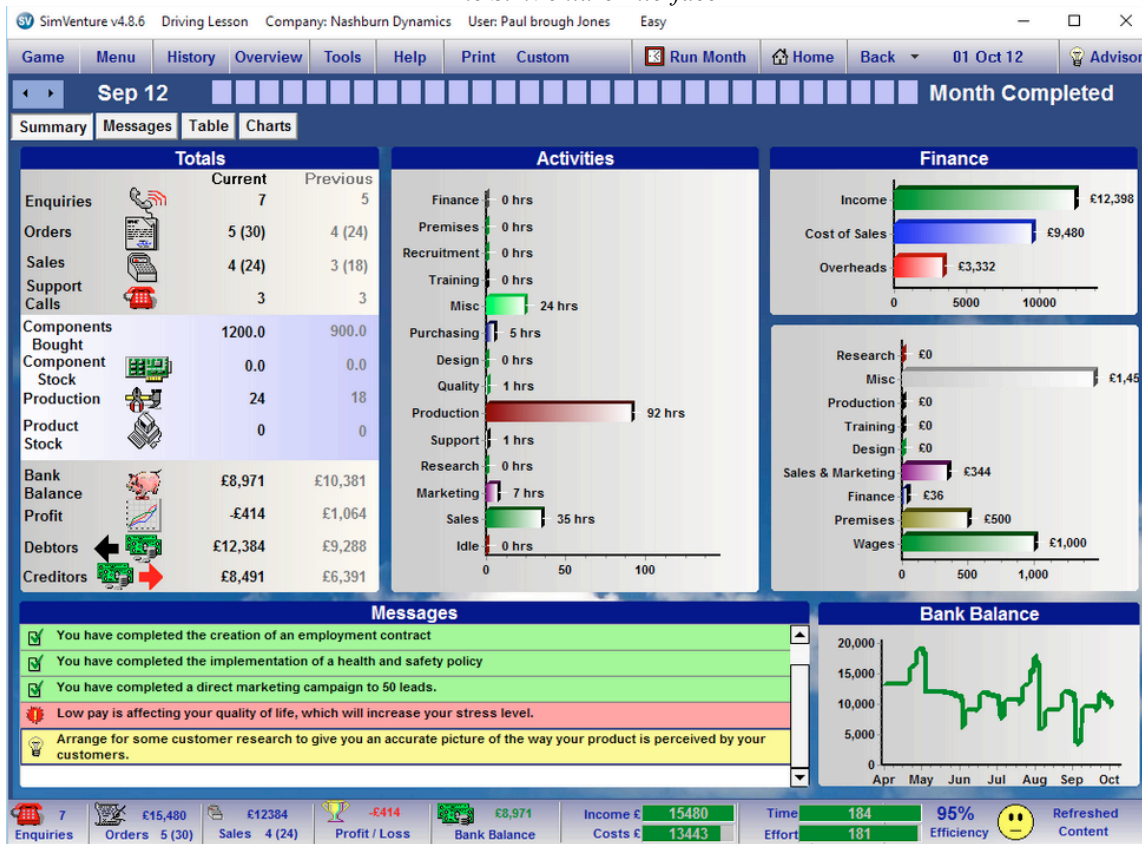
This paper describes a case study of a "Business Simulation" capstone module designed for students in a Master's programme in International Entrepreneurship Management at the University of Limerick. The primary objective of the module is to provide students with the opportunity to integrate knowledge and skills acquired over the previous two semesters in a managerial setting through the completion of an online business simulation or game. The module is designed to reflect the reality of all the issues linked to business start-up and growth. Learners are challenged to think and navigate their way through all the problems and challenges that are presented within the game to integrate concepts successfully, cross-functionally, and from financial and non-financial perspectives.

The Business Simulation module is delivered through a series of lectures, seminars, and lab sessions. By the end of the module, students should be able to demonstrate the ability to select and apply appropriate analytical decision-making techniques in an integrative manner. More importantly, during the game, they should be able to analyze the simulation company, its strategy, the product portfolio, markets, and competitors on an ongoing basis. It is imperative that students critically assess and defend the group decision-making process and reflect on current firm performance and outputs as a basis of refining future decision-making. Long-term skills acquired include being able to categorize and interpret other groups' strategies and likely future actions in devising and modifying a company's strategy and also being able to communicate effectively a firm's performance and management skills to shareholders.

The Simulation Game

The simulation game used for this module is SimVenture. SimVenture requires logical reasoning to unravel many complex scenarios, while at the same time enabling students to identify how much progress they have been making, print out appraisals of their progress, and save and load simulations. SimVenture facilitates the development of analytical thinking skills by making demands on students in a captivating and real-world manner. Instructors should facilitate rather than teach to foster an inquisitive, creative, and

Figure 1
The SimVenture Interface



analytical mind-set, build self-confidence, and promote teamwork. The instructors on this programme use SimVenture because it can facilitate the development of decision making, risk management, communication and teamwork, and problem-solving skills.

The game enables users to set up and run their own virtual company and test their knowledge about all aspects of a business. At the heart of the game are the decisions made on the part of the user/team. The reality of the simulation combined with the on-screen information makes it a rich learning resource (see Figure 1). In SimVenture, the user is essentially an entrepreneur assembling and selling computers. The game commences at a pre-determined month, when the business is already several months in operation. It is the job of the user/team to generate a profit and a sustainable strategy for the company going forward. The core areas of the business are Sales and Marketing, Operations, Organization, and Finance. When a team plays the game, it is ultimately the team's responsibility to identify individual strengths and weaknesses and allocate roles accordingly. One team member should ideally assume the role of CEO, although the role can also be rotated.

Participants

Table 1 outlines the profile of the students taking the Business Simulation module. In 2015, 23 students took the module, with a fairly even distribution of male and female students. The majority of students (43.5%) were in the 18-34 age bracket, and more than two-thirds (69.5%) of them were under the age of 45. While a significant number of students had previously graduated from a business-related discipline (43.5%), just over one quarter of the students (26.1%) came from science or engineering and just over one fifth (21.7%) came from an arts-related discipline. The remaining students came from an education background (8.7%). It is interesting to note that 26% of the students had experience in a business start-up prior to commencing the program.

How the Data Were Collected

The module comprises two formative assessments, which contain a number of elements:

Table 1
Profile of Students Completing the Business Simulation (n=23)

		Percentage
Gender	Male	52.2
	Female	47.8
Age	18-34	43.5
	35-44	26.0
	45-54	21.8
	55+	8.7
Educational Background	Business	43.5
	Science or Engineering	26.1
	Education	8.7
	Arts, Humanities and Social Science	21.7

- Strategic Review Plan (worth 70% of the final grade)
- Behavioral Diagnosis and Reflective Essay (worth 30% of the final grade)

This paper focuses on data collected from the behavioral diagnosis and reflective essay only. In this assessment, students were required to diagnose and then reflect on their decision making styles and skills, their problem-solving capabilities, their communication and teamwork skills, their attitude toward risk, and ability to deal with uncertainty. To help students diagnose their skills, students were prompted with a number of thematic questions; these questions are outlined in the remainder of this section.

In terms of decision making capabilities, students were asked to consider the following questions:

- What style of decision making did they prefer to use?
- What processes did they go through to make decisions and if the processes differed by task?

The following questions asked students to consider how their problem-solving abilities developed:

- What was their way of responding to problems or unforeseen bottlenecks and if this the best response?
- How did they react to the negative consequences of the decisions made?

We also wanted to determine if and how students developed their communication and teamwork skills and asked the following questions:

- How would they describe their communication style?
- Did they practice the skills of listening?

In addition, we questioned students about their risk management strategies by asking them: What was their attitude to risk and did they consider themselves a “risk-taker”?

Once students had diagnosed their skill levels, students were then asked to reflect on what that meant for them in the role of entrepreneur and owner/manager. They were asked to consider their strengths, the skills that required development, how their strengths could be leveraged in the firm, and how their strengths complement areas of weakness. The next section presents qualitative evidence from students’ reflective essays for each of the themes discussed in the essay.

Results and Discussion

The European Commission’s report on entrepreneurship in higher education (2008) highlighted the important role that education can play in developing students’ “entrepreneurial capacities and mindsets” (p. 7). The report also highlighted the need for “more interactive learning approaches” (p. 8) and cited simulation games as one possible solution.

In the students’ reflective essays, we identified a number of qualitative comments that demonstrate evidence of learning outcomes resulting from engagement with the simulation game. To that end, the following quotes provide some evidence of the value of the game and students’ perceptions of skills development.

Some students commented that the game helped them improve their skills in general, as evidenced in the quotes in Table 2.

It is vital that entrepreneurship courses help students become better decision-makers (Bellotti et al., 2014; European Commission Report, 2008). In this case study students were asked to reflect on their own decision-making abilities and identify which type of decision-makers they were, e.g., were they rational or

Table 2
Qualitative Evidence of General Skills Development

“This week gave me an opportunity to think about how I work within a group, and how this affects my decision-making, risk taking, and general approach to management in the business environment.”

“The game is very true to the real-world and as the week went on, I began to see it as MY real company.”

“Successfully managing a small business has much to do with being open to continually learning from new situations and all those around us. In developing a management style I have found that prevention is better than cure and that keeping composure, good communication and gathering information are vital to decision making.”

“For me this was a wonderful experience of the daily life as an entrepreneur/owner manager. My strengths in sales, marketing, and financial management came (sic) were enhanced as well as my communication skills.”

“As an entrepreneur, I need to consciously take the time to get to know people that I am working with to learn what is of interest to them, so that their contribution is optimized. By ensuring that strengths are recognized and optimized, the business will benefit, and conflict will lessen as a result.”

Table 3
Qualitative Evidence of Decision-Making Skills Development

“Every business decision that resulted in a poor outcome was a success because it helped us learn how that variable worked and what it impacted.”

“The ability to make decisions in the midst of this uncertainty and limited resources is core to the change management small businesses require.”

“I realised that as my decisions usually tend to be very well informed, they can come at a cost of time and efficiency.”

intuitive decision-makers, dependent or led by others, or spontaneous decision-makers. We also wanted students to bear in mind that some decisions will be so routine that they can be made without much consideration. However, other more complex decisions may involve some uncertainty, greater risk, and/or more serious consequences. A number of students commented on how the game facilitated the development of decision-making skills (see Table 3). Students also developed problem-solving capabilities, which were also identified as crucial skills for entrepreneurs (Bellotti et al., 2014; European Commission, 2008). In our case study, the simulation game has been designed to replicate some of the problems and challenges that entrepreneurs might encounter when setting up a new business. Table 4 provides some evidence of problem-solving approaches and skills development.

Communication and teamwork have also been identified as critical skills for entrepreneurs (Bellotti et al., 2014; European Commission, 2008). In our case study, students were encouraged to reflect on how their individual communication style ensured their ideas were listened to

and acted upon. If they encountered conflict, they were asked to comment on how they managed the conflict and if their approach achieved the desired result. Some students' quotes provided evidence that they recognized the importance of communication and teamwork (see Table 5).

A key skill for entrepreneurship is the ability to be more risk tolerant and able to live with uncertainty (Bellotti et al., 2014; European Commission Report, 2008; Hisrich & Peters, 2002; Segal, Borgia, & Schoenfield, 2005). The simulation game provided students with opportunities to experiment with various risky strategies and evaluate the outcomes. Some students provided evidence on their approaches to risk management (see Table 6).

The next section presents the conclusions and limitations of our case study.

Conclusions and Recommendations

This paper described a business simulation module whereby postgraduate students used a game to simulate managing and running a business. Simulations are

Table 4

Qualitative Evidence of Problem-Solving Approaches and Skills Development

“For me the best is to learn from the experience of others, apply this knowledge and mixed (sic) it with my own knowledge.”

“If the best possible outcome from the problem did not outweigh the difficulty needed to achieve that outcome, then the problem was not tackling. This I feel is not to be confused with a tendency to concede on difficult issues but should be viewed as a logical decision, made for the advantages of the overall group.”

“A method of problem solving I used was assigning weightings to criteria that affect a problem. In doing this, a clear understanding of how important the variables effecting the business decision were [*sic*]. Therefore, I could try to maximize or minimize the effect of this criteria, depending on the desired outcome.”

“Instead of panicking, blaming myself are unproductive ways of responding to problems, I am in the process of discipline (sic) myself by taking a problem-solving approach. More important, I need to work on my weakness and learn to ignore things that upset me.”

Table 5

Qualitative Evidence of Communication and Teamwork

“The first major step we took as a group was to ensure that we understood each other.”

“I have learned to surround myself with positive competent people who have similar interests and passions, and who can help me stick to my commitments.”

“Hiring the right people is paramount. I know that now.”

“Communication is so important within a team. Misunderstandings can very easily get out of hand if conflict is not resolved early.”

“I learned so much from the others in my team – we all had different but complementary skills.”

Table 6

Qualitative Evidence of Risk-Taking Approaches

“This project has taught me to be more calculated and prudent in relation to risk.”

“This... taught me so much about running my own business. I underestimated the whole concept of risk.”

“I am a natural risk taker – this taught me to slow down and think about my potential losses before rushing into a decision that may be to my detriment.”

“From experience in life, I have taken that risks needed to be taken as the (sic) will bring you to stages you never imagine before. They do create a little bit of fear though. In this exercise the risk taken gave good results and sales were generated from them.”

“I believe in taking calculated risks... I will weigh up the pros and cons and find out all the information before taking the leap into what may seem a risky (sic) situation to others.”

increasingly being used in both academia and business to encourage the development of entrepreneurial skills. Such skills include decision-making, risk management, problem-solving, communication, and teamwork. Extracts from students' reflective essays demonstrate some evidence of learning outcomes resulting from engagement with the game. A similar study by Garalis and Strazdiene (2007) revealed that the majority of students they surveyed considered entrepreneurial skills to be very important for starting one's own business. Interestingly, of those students intending on setting up their own business, the students in

the Garalis and Strazdiene study significantly rated the impact of simulation in developing the essential entrepreneurial skills.

While this case study describes qualitative data from a full student population, the small class size ($n=23$) impacts the generalizability of the findings. This study does not compare the impact of the game on the skills development of students who already had prior entrepreneurship experience with those who had no prior experience.

Furthermore, as we provided students with guidance for their essays in the form of themed questions that they

should address, this guidance probably influenced their reflection activities and the content of their essays. While there are clear advantages to providing such guidance, in terms of focusing students on specific themes, it may also have hindered students' efforts to comment on *other* aspects of skills development.

While the use of business simulations has been found to be effective (European Commission Report, 2008), we have yet to evaluate other business simulation software packages. In their review of two business software applications, King and Newman (2009) reported that Marketplace was more suitable than SimVenture as regards pedagogical and technical requirements.

We have some recommendations for other teachers who are thinking of integrating simulations and collaborative project work into their modules, regardless of discipline. From a teaching perspective, we agree with Bellotti et al. (2014) who argue that teachers need to have experience using the simulation tools in order to ensure they can maximize their use in the classroom.

Furthermore, we recommend that teachers give students some guidance on what constitutes a reflective and deep response, to ensure students properly address and reflect on the questions in the assessment brief. In the case study described here, despite our efforts to provide reflection questions, many students tended to answer each of the questions on a consecutive basis, and did not attempt to reflect on or present the "bigger picture."

Also, it can be helpful to give students some guidance on how to work effectively in teams. Tuckman (1965) describes a number of phases that learners go through when forming and working in teams. For students to work effectively, they need to set clear guidelines and goals, they ideally need to appoint a team leader, and they need to trust one another. Flammia, Cleary, and Slattery (2010) recommend encouraging students to engage in some non-task communication also, to facilitate team cohesion. It can also be helpful to give students guidelines on how to communicate online (netiquette), seeing as much of their collaborative work will take place through the medium of technology. It would be interesting to evaluate how students work in teams to solve problems using games such as the one outlined in this paper.

Moving forward, we would like to measure the impact of the simulations on students' entrepreneurial skills development. To do so, we would need to evaluate skills levels before students undertake the simulation module and again afterwards, to identify if skills have been developed as a result of the engagement with the game, the collaborative strategic planning, and/or the private reflection. Ideally, we would measure, both quantitatively and qualitatively, when, how, and where students developed the necessary skills. Various evaluation frameworks are currently being investigated, including Bellotti et al.'s

(2014) skills and competencies strategic axes and the Brookes et al. (2012) model for designing a pervasive learning activity.

It would also be interesting to evaluate motivational factors, i.e., do the students feel sufficiently invested in the game? Brookes et al. (2012) talk about the importance of "willing suspension of disbelief" (p. 3) and the impact this has on student learning.

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DR. YVONNE COSTIN is Programme Director for the Masters in International Entrepreneurship Management at the University of Limerick. Yvonne's research interests lie in entrepreneurship education, where her research investigates different

pedagogical approaches to teaching entrepreneurship across disciplines. A second stream of her research interest explores female entrepreneurship and small firm growth. Yvonne's teaching extends the area of entrepreneurship and small business development to include Enterprise Formation, Enterprise Development, and International Business Consulting. Her teaching experience spans undergraduate, postgraduate and post-experience groups and includes the design and delivery of business development programmes for owner-managers.

DR. MICHAEL P. O'BRIEN is a Lecturer in Information Management at the Kemmy Business School, University of Limerick, Limerick, Ireland. He holds a PhD in Computer Science from the University of Limerick. His research and teaching interests include information and knowledge management, technical communication, cognitive and educational psychology, software comprehension strategies, and software evolution. His award winning research has been published at international conferences, workshops and seminars in this domain.

DR. DARINA M. SLATTERY is Head of Technical Communication and Instructional Design at the University of Limerick, where she has also directed graduate programs. Her research and teaching interests include e-learning, instructional design, content analysis, learning analytics, technical communication, and virtual teams. She has published her research in international conference proceedings and in refereed journals. She is a reviewer for several international journals, including the British Journal of Educational Technology, IEEE Transactions on Professional Communication, Computers and Composition, and Communication Design Quarterly. Her co-authored book *Virtual Teams in Higher Education: A Handbook for Students and Teachers* was published in 2016.