Developing a Business Simulation Game to Improve Student Engagement with Accounting Theory[*]

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Abstract

This paper explores how an intervention research approach has been used to develop a simulation game to encourage active learning for undergraduate business accounting students. Based on the lecturer's reflective practice, it was recognised that many business students struggle to understand the practical application of accountancy theory. It was envisaged that using a virtual gaming environment would help students to contextualise accounting theories by encouraging them to engage in active learning. While business simulation software already exists, the prototype of the game was developed with the learning outcomes from specific accounting modules in mind. The process of game development, like professional development is iterative, and so feedback was sought from accounting students currently enrolled in undergraduate business programmes at the Institute of Technology, Sligo. Their feedback was then used to refine the game to make it more relevant and user friendly. The objective was to improve not only the quality of the learning for the student, but also the quality of the teaching. This paper demonstrates how reflective practice, and the intervention which followed, has resulted in the development of a new tool for teaching and learning.

Keywords: Reflective practice, simulation games, teaching

1. Introduction

This paper explores the intervention undertaken to develop a business simulation game for undergraduate business accounting students. The reported benefits of technology assisted learning are outlined and the rationale for this game development is presented. The methodology examines how the lecturer used his own reflective practice to identify a potential opportunity for improvement in his teaching and his students' learning. The paper is the result of a collaboration among the three authors, each of whom has take the lead on specific aspects of the work. Neil Gannon was the technical developer of the game and provided literature pertinent to simulation for learning. Gary Reynolds is an accounting lecturer and the originator of the idea of developing the game while Carol Moran took the role of principal author, identified the resonance of the intervention with the action learning cycle and wrote the paper to share this knowledge. The distribution of the tasks and shared leadership model, taken together, explain why the paper it is not written in first person. The style was chosen in order to maintain transparency concerning the differing roles in the work. All authors have contributed images and/or text to the final paper and have checked the paper for accuracy. Furthermore it details how students were involved in the development phases to ensure their feedback was used to refine the simulation game and make it more interesting and challenging. It is envisaged that the approach taken can provide a framework for educators wishing to improve their professional practice. The theories explored in the literature review below guided the intervention that is the focus of this paper.

1. ## 2. Literature Review

2.1 Active learning

For the purpose of this research, active learning refers to forms of learning that require the student to be actively involved in the learning process, as opposed to the traditional passive learning achieved through lectures and other traditional teaching methods. The learning pyramid (Dale, 1969) demonstrated average retention rates associated with various levels of activity and passivity in teaching and learning. Active learning such as practice by doing and teaching others are associated with the highest levels of retention; while passive forms of learning such as reading or attending lectures are associated with lower rates of retention. While it is not possible for business student to practice accounting theory by doing in real

businesses, the business simulation software was intended to create an active learning environment for the students which would replicate the learning they could achieve in a workplace. Furthermore, it was envisaged that the use of business simulation software would promote not just retention but higher levels of understanding and an ability to contextualise accounting principles.

2.2 Improving student engagement

Student engagement is difficult to define, let alone measure. Student engagement normally refers to the amount of time and effort that student commit to their study or tasks that can complement their studies; however, when it comes to game development, engagement is associated with the ideas of enjoyment, immersion, flow and presence (Boyle et al., 2012). Using these concepts from the world of gaming educators can integrate gaming elements into their teaching practice in order to try to make the learning experience more active and more enjoyable. "The most important thing the educators can learn from game designers is how they keep the player engaged." (Prensky, 2002: 8). This is particularly of relevance to subjects that are regarded as theory heavy and sometimes have a reputation of being dull or boring. By improving student engagement with a subject, it is presumed they will have greater interest in and thus learn more about a particular topic. Furthermore, by providing a real world context for academic theory, the educator can make the learning experience more relevant for the learner. A simulation game is "a working representation of reality…it purports to have a relevant behaviour similarity to the original system" (Riis, 1995: 13). Using simulation games to improve learning is not a new concept, Greenblat argued in 1971 that they help deliver effective cognitive and conceptual learning, and are especially good for linking abstract concepts to their explicit referents. Albrecht & Green (2008) present a range of benefits associated with simulation games including increased levels of participation, enhanced cognitive growth and affective learning. Additionally they outline how simulation games require students' flexibility in thinking and adaptive responses to a dynamic environment but do so in a way that benefits students with varying skills and experience, as they are able to play at their own level.

2.3 Importance of challenge

Phillips et al. (2014) believe that educators should examine all types of engagement, including, behaviour, cognitive and affective when evaluating learning from game play. From their studies, they suggest that students who experience frustration during game play reported feeling more determined to finish. This is reiterated by Ebner & Holzinger (2007) who suggest that challenge is fundamental to ensure that computer application are fun to operate; they suggest there must be a clear goal, performance feedback and score setting. Gros (2007) argues that while videogames are not the solution to educational problem, digital games that are designed to create a virtual learning environment can be a very useful tool. "Digital games are user centre; they can promote challenges, co-operation, engagement and the development of problem solving strategies" (2007: 23).

2.4 Preparing students for work environments

The use of blended or digital learning is not exclusive to educational organisations; immersive learning simulations are also being used by firms for training purposes. Hritz (2013: 62) suggests that immersive learning simulations provide a richer training experience. By providing a realistic work-like situation learners are more involved in training and provides "purposeful, cognitive practice" which is as valuable as actual performance when learning. Virtual training environments empower employees; improve their confidence and ultimately their performance in the real world. Given the move towards virtual training in the workplace, students will be best prepared for the work environment by being exposed to learning simulation software as part of the educational process. Loon et al (2015: 232)) found that students who had been using simulation games "made gains in team working, communication, negotiation and conflict resolution skills, as well as overall employability skills and prospects".

Human capital is required to be more flexible and better qualified than ever; and adjacent to this "there is a drive for what is known as lifelong learning, whereby adults are increasingly returning to institutions of higher education to take supplementary courses whilst in full-time employment" (Concannon et al, 2005:502). The market for lifelong learning is becoming more digitised and many students are choosing to study online to develop their personal and their career potential. Therefore, it is essential integrate information technology into the teaching process (Boylan, 2000).

2.   3. Methodology

This methodology section outlines the context and process of the intervention undertaken by the lecturer to improve the level of engagement with accounting theory for his students.
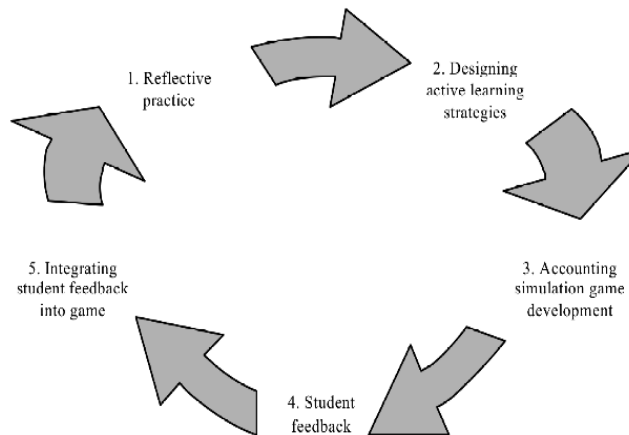
3.1 Reflective practice

Practitioner based research and any subsequent intervention, involves the practitioner thinking about and reflecting on their work. This process of reflective practice helps educators to identify potential areas of improvement in their teaching practice. Teaching can be improved when the educator questions what they are doing and seeks to adapt or develop new teaching strategies to benefit their students. Theories such as critical theory and action learning advocate critiquing normative assumptions to include your own; thus improving thinking and action within a particular situation (McNiff & Whitehead, 2009). 'Practitioners quickly come to see immense developmental potential and possibilities of empowerment through the process of investigating their own practice' (McNamara and O'Hara, 2008: 203) and in doing so can improve student engagement and learning outcomes.

3.2 Continuous professional development for educators

As an accounting lecturer, the concept of continuous professional development (CPD) was inherent, given that accounting professions are required to undertake CPD annually in order to retain membership to the various professional bodies. However, the process of CPD is less defined for lecturing staff in Irish institutes of technology. As such, the motivation to engage in CPD to improve teaching and learning practice tends to be intrinsic, rather than part of an on-going professional development approach at the departmental or organisational level. McGill and Beaty (2002: 3) suggest that "the trend towards student centred learning, transferable skills and closer links with industry… has required higher education institutions to look for more effective methods of student learning". The effectiveness of this method can only truly be tested in time, but in this instance, the lecturer's own reflective learning formed the first phase of the intervention that has resulted in the development of the accounting simulation game.

3.3 Implementing the intervention

There were five phases involved in the intervention that the lecturer undertook, which resulted in the development of the business simulation game. The phases are outlined below.

Figure 1 – Intervention Process

3.3.1 Phase one – reflective practice and problem identification

Having lectured undergraduate accounting students for almost a decade the lecturer had identified both anecdotally, and through the correction of continuous and terminal assessments, that many students struggled to understand accounting theory. Having identified this issue, the lecturer wanted to find a way to make accounting theory more real for his student and to help them engage with the theory in a manner that would be more active than simply learning how things "should be done". Primarily his objective was to help students understand the context in which the accounting principles they were learning would be used, and how they would influence business outcomes.

3.3.2 Phase two – designing active learning strategies

In order to engage accounting students, the lecturer along with other colleagues in his department had organised field trips to various businesses premises with a view to helping students see how various accounting concepts and theories are realised. While such trips were successful and motivated the student to engage with accounting theory they were only a temporary solution to the on-going issue of increased engagement.   The lecturer was aware of existing business simulation technology that can be used for teaching and learning,

however, he was also aware that any existing software had not been specifically designed with the learning outcomes of the undergraduate accounting programmes he teaches on in mind.

3.3.3 Phase three – accounting game development

Having established the need for an engaging teaching tool, and being aware of the existing literature which promotes the use of gaming and simulation for active learning, he approached a colleague in the computing department with a view to developing an accounting game. Once the brief had been discussed an initial prototype was developed based on the initial list of requirements and desired game play features. The prototype was developed iteratively and regular reviews to ensure features were meeting expectations. Following this development stage the game was then piloted with a group of undergraduate business accounting students.

3.3.4 Phase four – student feedback

Undergraduate accountancy students (*n*=40) were given the prototype – a virtual coffee shop where they were required to put their accounting theory into practice, and were asked to provide feedback using SurveyMonkey™ online questionnaire software. A number of dichotomous questions were asked and a summary of the responses are listed below in Table 1 (percentage figures are rounded to the nearest whole number).

Question	% Yes	% No
Do you play videogames via PC or smartphone?	65	35
Would you play a virtual game to help assist learning of financial accounting or business related subjects?	90	10
Does the game allow you to understand the key accounting terms of a business with the on screen key business indicators?	98	2
Does the game make it easier to understand the implication of accounting with a real life business simulation with live onscreen updates?	98	2
Would you be willing to play the game for ten minutes per week over four weeks?	95	5

Table 1 – Quantitative results of student feedback

It is evident from the data that the students surveyed were interested in engaging with the technology and the vast majority indicated they believed the simulation game would assist their learning.

Students were also asked to state a preference for one of three assessment options; a Moodle quiz, in-class assessment or playing a virtual game with inbuilt assessment. 62% opted for the virtual game assessment, followed by Moodle quiz (28%) and in-class assessment (10%).

Qualitative data were also gathered by simply asking the students to add any additional feedback; half of those surveyed provided additional feedback, which was very positive in terms of how they were engaging with both the simulation and the process of its development. Feedback regarding the both the look and feel of the game was recorded, but also crucially the students themselves were reflecting on how their learning could be improved:

"When you click on the terms it would be good if a definition comes up. Help to stick in your head better."
"Maybe you can ask simple questions, like when a customer comes in, is this asset or a liability."
"Have an aim with the game, say with a target profit, so your [sic] aiming to an objective."
"Being able to increase staff as well as potential business expansion over time could create extra risk which would make things interesting."
"Improve the difficult of the game and the possibility to invest in other assets."

These quotations demonstrate the level of interest that students had in the process and they also demonstrate the extent to which the students want to be challenged and want to have motivation beyond simply learning and regurgitating theory e.g. having a target, increasing risk and greater difficulty – thus creating a challenge for the student as outlined by Ebner & Holzinger (2005).

3.3.5 Phase five – integrating student feedback

The next phase of the intervention involved integrating the feedback received from the student regarding the simulation game. The input from the students is fundamental as they are participants in the learning cycle; using their feedback for subsequent iterations of the simulation game demonstrates the student centred approach adopted by the lecturer.

Developments ranging from an in-game store of assets, services and employees that can be purchased by players, to an employee training feature that allows players to improve the efficiency of their staff, were included. In addition a more user friendly interface was developed – all of which aim to provide a more challenging and educational gaming experience.

Figure 2 shows an initial screen shot of the simulation game, and figure 3 shows how the imagery was improved following student feedback. The improvement in the visual aspect of the simulation game is clear to see. In addition a number of new features were added to the game including those suggested in the qualitative date related to including key definitions and a new question daily. These features are intended to improve engagement and also can be used for formative or summative assessment.
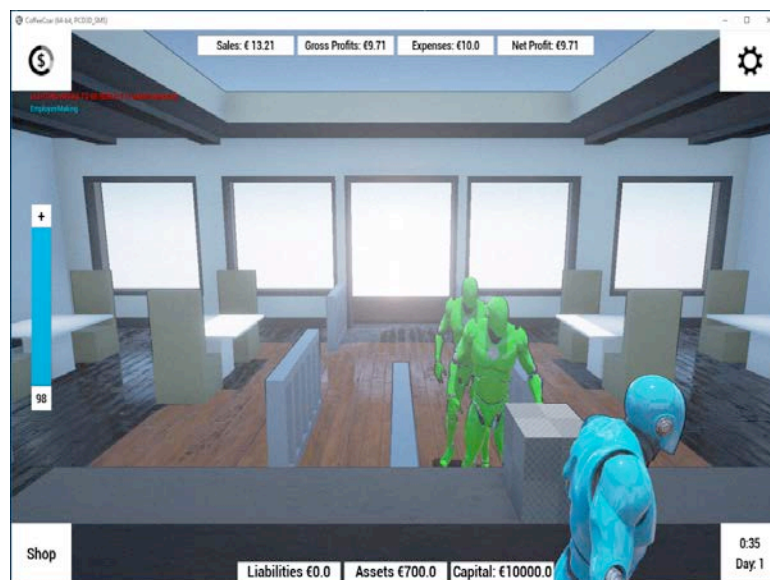

Figure 2 – Initial screen shot from simulation game

Figure 3 – Revised screen shots from simulation game

This intervention which began with the *reflective* practice of the lecturer has resulted in the development of a simulation game. While not all reflective practice can or should result in such an elaborate development, it is an essential component of the competent educator's toolkit. It is only through questioning the education process and ones involvement in it that meaningful improvements can be made; explaining why McNiff (2002) refers to it as an essential tool for educators.

Roffey-Barentsen and Malthouse (2013) argue that reflective practice is beneficial in helping us to understand why a situation has occurred, the reason for an incident and the extent to which we can control it. This is important because "we can learn from our reflections link this learning with professional practice and then consolidate this as we decide on a suitable action plan" (2013: 36). In this instance, the lecturer knew that students were struggling to contextualise accounting concepts and with the assistance of his computing colleague created an intervention to address this obstacle to learning. While he could not control exogenous variables such as level of student participation, hours spent studying outside of timetabled lectures or interest in the subject generally, he recognised that he could develop an action plan to try to create context for students through the use of a business simulation game.

Existing literature had clearly outlined the benefits of technology assisted learning and the findings from the student survey reinforced this by indicating a willingness on the part of the students to engage with the simulation game for the purposes of both teaching and assessment. While technology is not a replacement for traditional lectures and tutorials it can offer complimentary learning experiences for students, and the active learning component can improve retention and understanding. The contextualisation of theory heavy subjects is

perhaps one of the most important aspects this particular simulation game can offer.

5. Conclusions And Future Work

The iterative nature of this intervention will continue to ensure that the maximum educational benefits are achieved from the business simulation software. Currently additional features including animated revision videos of approximately one minute are being integrated into the game, intended to reinforce accounting theory covered in class. The process of reviewing and monitoring the game will continue and additional feedback will be sought from students who will have the opportunity to use this business simulation as part of their continuous assessment. The results achieved by students will be reviewed in order to try to determine the depth of learning that has been achieved using this learning tool; and thus the effectiveness of the intervention. It is envisaged that real time feedback for the lecturer will be developed to complement the simulation game. This will allow the lecturer to monitor how often students are engaging with the game, how long they are spending during each visit and track their progress in terms of achieving learning outcomes.

While simulation game development may not be practical or even desirable for all forms of learning, pedagogy can be improved through increased levels of reflective practice by educational practitioners. This paper demonstrates one such manifestation. Continuous improvement in education can only be achieved when those involved in its provision are willing to question their own contribution to the education process and undertake interventions accordingly to try to improve the process; and as much as possible to ensure increased engagement and positive learning outcomes for their students.

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