

'Learning to be' – Piloting the Use of a Role Playing Serious Game to Teach Operations Management*

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Abstract

Today's constantly changing economic environment demands that graduates possess skills of flexibility and adaptability when launching and managing their careers. Policy documents on employability make specific mention of the *entrepreneurial mindset*, the foundation of which is cognitive adaptability, or the ability to be dynamic, flexible and self-regulating in uncertain task environments. Developing these skills requires that students are offered opportunities to learn how to '*be*' something as opposed to simply learn '*about*' something; essentially experiential learning - that is practising in a real situation. This paper reflects on the use of a role play *serious game* that allows students to *be* Operations Managers. Feedback from students revealed the extent to which they immersed themselves in the game, many confessing to being addicted, losing sleep over deliveries and orders, and generally being 'in the game', evidence that they had learned to '*be*' through the experience of running a business.

Keywords: Experiential learning, serious games role play simulations, debriefing through reflection, operations management.

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1. Background and Context

“What kind of curriculum will prepare graduates for an uncertain global future – a future in which their capacity for commitment, agility and boldness will be tested to its limits?” (Ramsden 2008: 7). This question is arguably more relevant today in 2016 than it was when it was originally posed because today’s graduates can be certain of one thing: that the future is uncertain. They will have multiple and varied careers, constantly learning new skills, and adopting a more entrepreneurial approach to the management of their careers. Indeed there has been a call for graduate employability to be reconceptualised as learning which enables graduates to be flexible and entrepreneurial when launching and managing their careers through the provision of opportunities for developing enterprising skills (Rae et al., 2010). Increasingly, specific mention is being made in policy documents of the *entrepreneurial mindset*, the foundation of which is cognitive adaptability, defined as the ability to be dynamic, flexible and self-regulating in uncertain task environments (Haynie et al., 2010). How, then, can teachers in higher education incorporate the development of the enterprising skills of flexibility and adaptability into their teaching? In this paper, I argue that experiential learning holds the key, and that the use of serious games such as role player simulation can be particularly effective in this regard. The paper reflects on the experience of using a serious game as the core method of learning and assessment in an Operations Management module in an Irish Institute of Technology.

Operations Management is a critical function in all types of manufacturing and service organisations. It involves the systematic planning, designing, operating, controlling and continuous improvement of all the processes that are involved in the transformation of inputs, (labour, materials and capital) into finished goods and services.

Typically, Operations Management in higher education is taught using textbook, lecture and case study. In the past, in an attempt to encourage students to take a more self-directed approach to their learning, I have used both fully online and

blended modes of delivery via the Institute's virtual learning environment (VLE) Moodle. However, despite the many changes and adjustments made over the years, each year's terminal exam revealed yet another cohort of students struggling with assessment exercises that demanded they apply the theories and concepts to real life scenarios. While students could meet the learning outcomes of the module, describing with accuracy the core theories and concepts and mastering the typical calculations involved, they often failed to see how those same theories and concepts would actually be applied in the workplace; essentially they had learned *about* Operations Managers but had failed to grasp what it would be like to *'be'* an Operations Manager in real life. Crucially, students had difficulty with envisioning how and when they would apply acquired skills and knowledge, raising questions as to their ability to transfer their skills into today's demanding workplace.

2. Learning 'about' and Learning to 'be'

What is the difference between knowing *'about'* something and knowing how to *'be'* or *'do'* something? Bruner pointed to the distinct difference between learning about physics and learning to be a physicist, arguing that isolated facts and formulae only take on meaning and relevance when learners discover what these tools can do for them (1961).

If the sole purpose of higher education is primarily to teach students *'about'* subjects, then traditional pedagogies using lectures and textbooks do just that. However, if we are truly to allow students to develop skills of flexibility and adaptability that will prepare them for an uncertain future, then they need to learn not just *'about'* something but rather, how *'to be or do'* something. This requires alternative pedagogies that incorporate experiential learning opportunities. Experiential learning can be described as practising in a real situation, modelling appropriate behaviours and procedures, receiving feedback and reinforcement, and providing opportunities to apply knowledge in new situations. Experiential learning activities are deemed to offer students authentic learning opportunities as they "typically focus on real-world, complex problems and their solutions, using role-playing exercises, problem-based

activities, case studies, and participation in virtual communities of practice” (Lombardi, 2007: 2).

Having researched and piloted the role playing simulation game (Practice Operations) in the previous year, I decided to adopt it as the core method of both learning and assessment in the module. It was hoped that the game would prove both an engaging and authentic learning experience for the students, offering them the opportunity to experience what it is like to ‘be’ an Operations Manager and apply their skills and knowledge in a real life simulation. 135 students, drawn from three programmes (two Business and one Engineering) were enrolled on the module at the start of the 2015 semester.

3. About the Game

Practice Operations is a 3D, interactive, game-based simulation that allows students to manage the operations of a clothing manufacturing and distribution company. The game presents players with a series of production based scenarios, with embedded learning objectives, that require the student/player to master the knowledge, skills and abilities necessary to function as an Operations Manager. The game requires the player to take on the role of Operations Manager in an interactive, animated environment where they are exposed to all the elements of operations: production processes, supply chain management, forecasting contracts, human resources and capacity planning in a five module format. The game, like most video games, is broken into five progressively challenging modules; from module 1 where the player is supported in the game and advised on the best decision or course of action to take, to module 5 where the game’s internal support is withdrawn and the player is on their own, tasked with setting up and running their own manufacturing facility. The player at this point has complete control over their own forecasting, purchasing pricing and manufacturing of the processes. A short introductory video about the game can be accessed here: <https://www.youtube.com/watch?v=rBAdjxrGvSk>

4. About the Technology and Licensing

Introducing the game into the module was not without its challenges, and required resilience and perseverance on the part of both tutor and students. Firstly, the publishers of the game - McGraw Hill - require the purchase of an individual student license, the cost of which (\$45 approx.) was a major consideration. There is, however a 'courtesy licence' facility for those who wish to trial the product without committing to outright purchase upfront. However, after discussion with the McGraw Hill representative, who was interested in seeing the product trialled, the company generously agreed to offer free licenses for use by the students during the semester.

The second challenge encountered was that, *at that time*, the game required the use of a 'plugin' called the sandstone player, which had to be downloaded to individual computers, a factor that posed two challenges: firstly the 'player' would have to be manually installed on each computer in a lab by the school's IT technician or by students themselves if using their own personal laptop. Secondly, the desktops or laptops needed to have sufficient capability to run the game. Only two laboratories (40 computers) in the School of Business & Humanities had computers capable of running the game. However, many students had personal computers with much better memory and games cards, so they were able to set the game up on their own desktop or laptop. This set up did require considerable time and effort on my part as the tutor, but it is generally the case that any online learning activity will require extra facilitation in the earlier stages of access and socialisation (Goodyear et al., 2001). It is worth noting here that problems with accessing the game and downloading the plugin did persist throughout the semester and absorbed a lot of time. *However, this no longer poses any challenge, as the publishers have now resolved the issue by moving the game to a web based platform that no longer requires the use of a plugin/player.*

5. Learning and Assessment

Having decided that the game would offer students the chance to experience what it is like to be an Operations Manager, the next step was to design the assessment strategy. Initially, it was intended to use the simulation game as the basis of the students' continuous assessment (50% of the final mark) and to both teach and examine theory from a core textbook when setting the final written examination (also 50%). However, in discussion with the students at the beginning of the semester, it was decided to take the bold step of completely dispensing with the textbook and use the game itself as the core content for the module; rather than prescribe content to help students engage with theory, students were encouraged to use the game itself and the accompanying student manual as their primary source of content; they could supplement this with other content they created themselves in a process of discovery learning. A feature of the game is that on completion of each turn (equivalent of one week of production) students are presented with a theory question to which they type their answers. The questions present an *in-game* opportunity for students to reflect on theory, although it is worth noting here that the answers to the questions are not graded – they are purely a formative assessment exercise. Feedback revealed that students preferred to 'google' these answers, thereby developing their own bank of appropriate content. Gehringer and Miller (2009) argue that active learning exercises need not be created solely by the instructor, and that students may benefit in multiple ways by giving them an opportunity to construct their own activities to master subject content. This type of 'learning on demand' is typical of our modern society (McLoughlin & Lee, 2007) and sees learners seeking out and finding information to solve problems at work, at home or in college. For this reason, as tutors we should see students not just as passive consumers but rather as co-creators of content.

It should be noted here too that more than half the students on the module were in the final semester of an award year and, therefore, I had to ensure not only that the assessment was valid, fair and reliable, but also that the use of new or novel methods of assessment would neither impose additional time burdens on what are already heavily assessed students, nor adversely affect their overall level of award.

6. Grading the Game

The Practice Operations game has five modules with each module having specific learning goals, expressed as a number of contracts to be completed on time and also in terms of the profit that had to be achieved before the game goals were met. On *achievement* of the game goals, the game awards the player a *weighted score* comprised of Goal achieved (10%), net worth (50%), reputation score (20%) and timeliness (20%); the weightings of these scores can be adjusted by the tutor if required. Tutors can also adjust both the number of turns (a turn represents one week of production) in each module, and also the number of attempts that each student can take. Multiple but limited attempts have always been a feature of the CA element of the Operations Management module as research shows that this encourages students to self-regulate towards mastery. Providing students with multiple attempts at multimodal assessment tasks has been previously shown to improve student performance and knowledge retention (Cook, 2001; Karpicke & Roediger, 2008).

7. Debriefing through Reflection

The scoring in the game offers a simple means of grading performance, but from a teaching perspective, the score in itself offers few insights into the challenges that students encountered during play and the strategies they employed to overcome them. Furthermore, in order to encourage students to reflect on their learning and to engage in information seeking behaviours to improve performance, it was decided to award the bulk of the marks to the written reflective feedback element, which each student uploaded in Moodle on completion of each of the five modules. Students had to include their scores for the module and mention also how many attempts they took. Requiring the students to upload all their scores - that is the individual scores for net worth, reputation and timeliness - forced them also to interpret the scores in their feedback. *Reflection on and in learning* is considered essential to experiential learning. Kolb describes learning as a cycle of sequential stages of direct experience, reflective observation, abstract conceptualisation and active experimentation that allows learners to develop personal interpretations (1984). Rieber (2002) when discussing serious games states that serious play must create

an environment which allows its players to "experience first, explain later" (2002: 5). Accordingly, marks for the module were awarded thus:

Game Modules – Continuous Assessment (50% of final mark)	Marks Breakdown
Module 1	<i>No marks</i> awarded but students must complete this introductory module, achieve the module goals and upload individual reflection on their learning in Moodle
Module 2 10 marks	Weighted Score (40% max) Reflective Feedback (60% max)
Module 3 10 marks	Weighted Score (40% max) Reflective Feedback (60% max)
Module 4 20 marks (most challenging module)	Weighted Score (40% max) Reflective Feedback (60% max)
Module 5 10 marks	Weighted Score (40% max) Reflective Feedback (60% max)
Final exam (50%)	Theory based exam testing based on core content of Practice Operations Simulation game

Figure 1. Module assessment breakdown

As had been the practice in previous years, the online assessment exercises opened and closed on specific dates, encouraging students to engage with the game modules in a timely manner. That said, repeat opportunities for the modules had to be offered for students who missed deadlines. While students played the game outside of class time, face to face classes were also scheduled each week. Initially these classes focused on core concepts in Operations Management and also on the assessment of the game modules. As the weeks progressed, lectures were devoted to discussing strategies that might be employed in each of the game modules, and also any technical issues that students were having in their play. Students compared strategies and exchanged tips on how best to maximise net worth and timeliness. In addition to the face to face lectures, I made myself available in the laboratories where the game had been installed at times when both tutor and students were free. Although only a small number of students (5-15) attended these sessions, they were

particularly useful for students who were struggling with the use of the technology.

8. Results

Incorporating reflective feedback into the module assessment provided a wealth of insights into how students were engaging with the game. Their reflective writing in Moodle revealed overwhelmingly that students found the game challenging but fun; frustrating but rewarding. Students found the first module relatively easy and usually achieved the goal in one or two attempts and in what might be viewed as '*surface*' engagement with the game. This was evidenced in the large number of students uploading feedback that was short, descriptive and lacking in any real reflection on the learning experience. At this point also, it was notable that very few students took the opportunity to use the multiple attempts facility to try various strategies to see what different outcomes would ensue; most logged off the game once the goal had been achieved and duly uploaded short descriptive feedback. However, as students progressed on to subsequent modules that were being graded, students both needed to and took advantage of the multiple attempts to maximise their scores; on many occasions, particularly on Module 4, the most difficult module, extra attempts had to be set up. Module 4 requires that students manage the human resource and production capacity; students hire, fire, train up, deploy and redeploy staff whilst bidding for and completing six contracts. Students must complete all six contracts and finish up with a minimum of \$25,000 in their bank account. For many students this proved very difficult but surprisingly with encouragement both from myself and, crucially, their classmates, most students spent hours persevering until the goal was achieved. Feedback on their experience within the module became noticeably longer, more detailed and reflective as students mastered the more difficult modules. It was notable that the international students – those whose first language was not English - often submitted 800 word reflections on the game experience.

While reading, grading and giving individual feedback on the submissions from 135 students on five game modules was time consuming, it was correspondingly rewarding. However, this type of personalised feedback for a large number of students is not sustainable. Perhaps in the future, students should be required to

upload their reflections at the end of each module and receive feedback and, perhaps, a grade on just two occasions on completion of the first three. One final collated submission covering all five modules could then be submitted. While providing individual feedback following the completion of each module is time consuming, it is also highly rewarding when the effects of that feedback are reflected in a student's improved efforts and performance in subsequent game modules. For that reason, I believe it is necessary to continue to seek ways to offer the same level of feedback.

9. Evidence of Learning to 'be' an Operations Manager

Ethical approval had been sought at the start of the semester from the School of Business & Humanities' Ethics Committee to solicit and use feedback from students at the end of the semester. Feedback from both online submissions and informally in class discussions provided evidence of the extent to which students had learned to 'be' as opposed to learned 'about' Operations Managers. Students generally derived both enjoyment and achievement from the game with many mentioning the addictive nature of the activity, and others referring to losing sleep worrying about orders not being delivered on time. There was ample evidence of player total immersion (Brown and Cairns, 2004), a feature that is often viewed as critical to game enjoyment and characterised by a lack of awareness of time, a loss of awareness of the real world, and a sense of being *in* the task environment.

Students wrote as if they 'were' the Operations Manager and not simply role playing; they described 'losing' themselves in the game, that sense of finding a game so engaging that they did not notice things around them, almost all of their attention is focused on the game; many described themselves as being "in the game" (Jennet et al, 2008) . There was evidence that the game was discussed at length outside class, with student family members also getting drawn into the challenge. One lady reported that her children would constantly look over her shoulder, looking at her scores and encouraging her to do better. Despite the stress associated with the many challenges and 'curve balls' that the game threw up, almost all of the students enjoyed the game and, in particular, the sense of achievement they experienced when, through

perseverance, they succeeded; developing these skills of perseverance and resilience will help prepare students for the workplace. Other students referred to the relief at being able to 'do something different' in their assessment, with many saying that they used the game as a break from 'studying' and a means of relaxation, confirming the engaging nature of the exercise. One student commented: "There is something great about learning in this way other than looking through a book, which we do for all our other modules and it is pretty monotonous, particularly for our other management subjects, ...it is a bunch of writing and *in this game you can see on the screen what you are meant to do and how things are meant to be.*"

10. Concluding Thoughts

Designing learning and assessment that encourages students to be entrepreneurial demands that the tutor, him or herself is entrepreneurial in the use of creative solutions to solve problems and is willing to take calculated risks, while still maintaining rigour. Practice Operations is a serious game that offers students the chance to develop their skills of creativity, problem solving, flexibility and adaptability, and it is indeed rigorous. The detail included in student feedback revealed the depth of their understanding of the day to day challenges encountered in Operations Management; as a teacher, I was able to see evidence of students being able to apply and transfer their classroom learning.

Having worked as an Operations Manager myself in the past, I found this game highly challenging, particularly module 4 which involves capacity planning and human resource management; similar to many of the students, I too struggled with this module and required additional attempts to achieve the goals. I would highly recommend the use of this or similar games as experiential learning. I cannot finish this paper without mentioning that students actually posted messages of thanks to me for the assessment, with one student commenting that: " It was the most challenging module I've had in the past 3 years, and I've learned so much from it and I will always have this. Thank you!"

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