



## **Machinima for immersive and authentic learning in higher education**

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The use of virtual worlds have been well documented as a space for immersive participation by students when learning authentic tasks that can be difficult, if not impossible, to undertake in the real world. They have also been used in order to grasp important concepts through machinima (inworld video). A pilot project, “computers@armidale”, explores the use of machinima to explain important concepts in a first year accountancy degree. Often, these concepts are difficult to grasp without taking students through authentic learning tasks. This paper describes the learning concept, the creation of the machinima and how it is used with first year accountancy students through a think out loud protocol.

Keywords: Accounting, virtual worlds, machinima, think out loud protocol

### **Introduction**

Machinima (video created from scenarios acted by avatars in a virtual world) has been used for several years by higher educational institutions to demonstrate procedures, explain concepts, and generally creating learning materials that were resource and budgetary friendly. Creating machinima only requires a few people who control the avatars acting out scenarios, plus someone to record, edit and upload the video. These can often be the same one or two people. Real life video is much more demanding regarding resources and money. Producers, actors, cameras, sound recording equipment, editors and locations are all required for video that is made with real people and in the real world. Machinima is a cost effective way to teach students and, on occasion, the only way to teach students when the creation of the videos is not viable in real life due to monetary or physical constraints.

### **Background and Overview**

A traditional university, the University of New England (UNE), consists of both on-campus and off-campus students. On-campus students live in on-campus accommodation, within the city or close proximity, attending face-to-face lectures and tutorials, using a Learning Management System (LMS) to access supplementary study materials and resources. Off-campus students live anywhere in the world and the LMS provides all their study materials and resources. A range of online tools such as discussion boards, chat rooms, quizzes, videos and downloadable documents are provided through the LMS.

The use of virtual worlds for teaching and learning has been utilised at UNE since 2008. In the School of Education, role-plays, excursions, guest lectures, and the use of machinima are just some of the ways in which a

virtual world has been used for teaching and learning. In 2012, the Bachelor of Pharmacy course began using machinima to teach students concepts that were difficult to replicate in real life teaching scenarios (see Gregory et al., 2011). In 2013, the UNE Business School began using machinima to teach concepts that are difficult to comprehend through traditional methods using textbooks. Machinima has been created to demonstrate scenarios in which the accounting concepts are replicated from real life business. This paper reports on a pilot study to determine the authenticity and appropriateness of using machinima to teach basic accounting principles to first year students. To simultaneously identify the benefits of the machinima and improve student learning outcomes two enhancements will be added to the next phase of the project. These are the use of think out loud protocols and the Moodle Lesson tool.

## Literature Review

Filimon (2009) defines machinima as computer-animated films that combine machine, animation and cinema, filmed in a virtual world to be distributed online. They are used by educators as there are often limitations of traditional delivery modes (Muldoon & Kofoed, 2009) and it is often impractical to create a video in real life due to the cost of production, that it could harm real people, or that it is actually impossible to replicate in real life. Machinima provides an avenue to learn in authentic environments where there is increased levels of engagement and active learning (Muldoon & Kofoed, 2011; Muldoon & Kofoed, 2009). Machinima can influence the “genre, point of view, perspective, set, lighting, characters and objects” (Filimon, 2009, p. 397). It is influenced by the virtual world that it is created in.

Understanding the fundamental basic accounting principles has often been difficult for students. If they do not understand these basic principles, it is difficult for students to progress with their studies and apply their knowledge in the real world. As Muldoon and Kofoed (2011, p. 419) point out, there has been a “long-standing educational problem in accounting education of failing to help students to achieve higher order outcomes” and the traditional delivery mode is a limiting factor. Machinima is a step towards alleviating this problem. There is a small minority of accounting educators using machinima as a teaching and learning tool (Muldoon & Kofoed, 2009). Machinima provides students with the opportunity to adapt to new situations by engaging students in accounting practice and developing skills required for the profession (Muldoon & Kofoed, 2009). As Muldoon and Kofoed (2009) state that often, graduate accountants become technically proficient but find it difficult integrating rule-based knowledge with real world problems and applying their knowledge to real situations.

If students are provided with a spark, their curiosity will enable them to learn with limited assistance (Robinson, 2013). Education is about learning and is an innovative profession where machinima can provide this creativity. Educators who inspire students to learn are mentors who stimulate, provoke and engage students. By creating a meaningful and motivating context for learning, students are provided with a motivating and challenging learning environment so they can see the worth of what they are learning (Muldoon & Kofoed, 2009). Testing is also important but exams should not be the dominant feature, they should assist in learning. Assessment should support learning, not obstruct. The think out loud protocol engages the student in an intense interview with an expert (Olson & Rueter, 1987). This can be a form of assessment, or merely a way in which to gain information on a student’s understanding of concepts. Drennan (2003, p. 59) describes the process where an interviewer (educator) asks the student “to think out loud as they go through a questionnaire and tell them everything they are thinking, with the interviewer asking probing questions of the respondent to find out their thoughts”. The think out loud protocol is used in this pilot study so that students can articulate the learning that they have experienced through the use of computers@armidale machinima.

The use of machinima through the ‘think out loud’ interviewing process can assist students in this learning to gain insight into the cognitive processes (Drennan, 2003). This metacognitive control enables the students to direct the reasoning process (Duffy, Roehler, & Herrmann, 1988). It makes “visible invisible mental processes” (p. 675). This process must provide opportunities for students to express their thoughts and opinions. However, Drennan (2003) states that this can be problematic as students may not be able to articulate their thoughts and it may affect their thought processes, it also provides a distraction and can be subjective.

## Pilot Study: Conceptualising and creating computers@armidale machinima

A pilot study called computers@armidale was undertaken in 2013 where machinima was created to support student learning through a practice set. This practice set was trialed with academics and students in the accounting discipline. A practice set is one of the key learning opportunities in the unit. It is an attempt to replicate what happens in practice. Students are provided with financial reports for the beginning of a period, proforma accounting records and a list of transactions and other events. Based on this information they are

required to work through the steps in the accounting cycle so as to prepare the financial statements and then analyse the performance of the business.

While the machinima could potentially suit a wide range of accounting tasks, it will be used initially to replicate the recording of transactions and the posting of those transactions to the various ledgers. The potential difficulties are that the machinima needs to be used judiciously because they do take longer to watch and replicate as they are covering the full context. While this is clearly beneficial for students who have not had exposure to business and are having trouble comprehending these concepts, it does not necessarily provide added value for students with certain types of work experience or who adapt quickly to this type of material.

Students that have some work experience are at a significant advantage in working on the practice set and accounting in general because they have opportunity to better visualise what is going on behind the transaction. One option to help students, and particularly those with little or no work experience, would be to take them on a field trip to watch a stocktake, observe an actual sale, and see what happens in order to make visible all of the changes that have occurred. (For instance, when a credit sale is made, not only do we need to record the sale and recognise any Goods and Services Tax (GST) collected, we need to record that our accounts receivable has increased, update our accounts receivable subsidiary ledger, and we also need to record the reduction in stock levels and recognise the cost of the goods sold). However, this is neither cost effective nor practical. Indeed, for off campus students it is generally not possible. A cost effective and practical substitute for the field trip is producing a set of machinima that highlights the process and what is involved.

The first machinima (see <http://www.youtube.com/watch?v=PDY9KiTzcPk>) opens as a stocktake and is completed in the retail business computers@armidale. The first image (Figure 1) shows the two shop employee avatars completing the stocktake. A customer then enters (see the second image) to purchase 15 computers on credit. This provides the vehicle to examine how this transaction will be recorded in the various accounting records.



**Figure 1: Screen shots of accounting machinima used in the research (i.e., still shots from the machinima)**

The use of a fictional character, such as Fred Flintstone, enables the students to easily differentiate between the characters – shop owners and customers. Once students had viewed the machinima, the students were invited to participate in the think out loud protocol. The results of the think out loud protocol are not reported in this paper.

### **Future Directions and Conclusions**

This paper describes a concept that has been introduced in an introductory accounting unit. An initial machinima has been created that follows through one transaction. Student results in related quizzes are higher than equivalent results in previous offerings of the unit, however a number of enhancements have been added to the unit and these results do not signpost the cause of the improvement. The enhancements are in two key areas – providing rapid and targeted feedback to students and employing some basic ideas from gamification. The feedback relates to online quizzes and instant feedback. Scaffolded quizzes and the results from those quizzes are used to direct students to targeted resources. As well, there are practice set enhancements including instant

marking of all answers, and the provision of a student dashboard to report on their progress and inclusion of leaderboard on the Moodle website to highlight the highest performing students.

In testing how people used the machinima, it was revealed that while the video was valuable to people that watched it, people did get different things from the one video. As a result, two enhancements were planned for the project.

1. Using think out loud protocols to help understand what is really happening inside a student's head as they engage in accounting activities that are new to them; and,
2. Using the Lesson Tool in Moodle to test students on what they have learned during each segment of the video and if there are things unlearned from the segment they have been tested on, they are then diverted back to cover those sections again in the video.

These enhancements will not only help pinpoint the contribution of the machinima but are also likely to enhance the student learning experience.

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