

# Chapter 26

## Design–Based Research with AGILE Sprints to Produce MUVES in Vocational Education

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### ABSTRACT

*An innovative approach to effective design, development and testing of Multi-User Virtual Environments (MUVE) in vocational education is provided. It blends Agile software development with design based research (DBR), seeded with educational frameworks and theories relevant to vocational education. Legitimate peripheral participation was used as a filter to inform design thinking for authentic vocational contexts because moving towards being work ready increases the student's legitimate practices particular to a vocation. Technological Pedagogical Content Knowledge TPACK (Mishra & Koehler 2006) provided a framework to link content and pedagogy with the MUVE technology. Software development techniques for MUVES are shown to have characteristics compatible with design based research. A design based methodological process that introduces software development within phases is described. The approach is illustrated in the design of two MUVE to simulate (1) the hazardous situation of temporary traffic management and (2) communication on a maritime ship's bridge.*

### INTRODUCTION

Multi-user virtual environments (MUVES) or virtual worlds have been shown to be valuable for use in education, including preparation for challenging and hazardous vocational contexts (Gregory et al 2013; Hew & Cheung 2010). MUVES can effectively recreate hazardous or emergency scenarios and

DOI: 10.4018/978-1-5225-3422-8.ch026

allow participants to practise problem solving and communication skills prior to these being enacted in real situations. For example, developing the particular knowledge, skills and teamwork required among professionals working on the bridge of a ship to ensure the safe navigation of large vessels that can dwarf the ports in which they dock. Rigorous protocols for language and other practices have evolved for such contexts to increase efficiency and safety. It can be very challenging for learners to develop the competence to join such professions through training in contexts that are authentic for colleges but not for their chosen profession. However, there has been little research into the processes of designing MUVE for vocational contexts. The objective of this chapter is to present an innovative approach to effective design, development and testing of Multi-User Virtual Environments in vocational education. The approach is illustrated in the early phases of design of two MUVES. One was being designed to simulate the hazardous situation of temporary traffic management and the other the bridge of a maritime ship so that the students operating through their avatars can better develop legitimate behavior that is required of professionals in the field.

## **BACKGROUND**

Multi-user virtual environments (MUVES) or virtual worlds have been shown to be valuable for use in education. For example, in her scoping study on the use of virtual worlds to support learning and training, de Freitas (2008) identifies 80 MUVE applications available for education at that time. De Freitas (2008) asserts that MUVES “in the future may provide a ‘wrapper’ for sets of educational services including e-portfolios, e-learning materials, assignments and class sessions, course module materials, learning games, tracking and monitoring assignments, communications between tutors and learners and e-assessment.” De Freitas is supported by Kirriemuir’s (2009) report of virtual world activities in UK universities and colleges. The growth of this approach in New Zealand is described by Hearn’s et al (2011) review of teaching and learning through virtual worlds within seven New Zealand higher education institutions and Gregory et al.’s (2013) expanded review of Australia and New Zealand higher education that concluded the emergent phase of such an innovation that is often characterized by hype was maturing to recognize the many challenges that come with such innovations in education and training.

MUVES are successful in vocational education and these include a number of simulations. For example, Hudson and Degast-Kennedy (2009) describe a Canadian border simulation in the Second Life® MUVE that was created when post-9/11 security restrictions led to limitations on access to the border. This simulation was used by students preparing to apply to become border security officers. The students practiced interviewing travelers crossing the border using the MUVE. The student outcomes were above expectations when compared to previous classes that had not used the MUVE. Hudson and Degast-Kennedy (2009) observed an improvement in students’ grades. They also noted students had a sense of accomplishment of having experienced ‘real world’ border crossing situations. The students also gained confidence in their capacity to interview travelers and saw themselves as having an advantage in the highly competitive screening process undertaken for these border security officer positions.

Australian Flexible Learning Framework (2006) provides a resource that describes how to use virtual worlds in competency based learning. Experiences of teachers and students from three trials are presented. Two trials were undertaken by teachers and students studying towards a Victorian Certificate in Applied Learning in tourism courses. The other trial was undertaken by students and their teacher in a painting and decorating course. The tourism courses allowed students to practice with ‘tourists’ represented by

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