He ara hou ka tū mai: NZ institutions of higher learning unpacking demands and facilitating change

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The Virtual Worlds Working Group began with the DEHub research consortium in November 2009. In December 2010, New Zealand joined the VWWG. This paper highlights the current work of the NZ based members of the group and presents the work of 23 authors at 11 institutes of higher education in New Zealand. The scope of the work covered is diverse, and a number of platforms have been used. Virtual worlds enable educators to provide realistic simulations,

engaging role-plays, immersive and genuine tasks, and social interaction that encourages group collaboration, and highlights the ability that virtual worlds have to transform both teaching and learning.

Keywords: virtual worlds, *Second Life, Reaction Grid, OpenSim*, immersion, engagement, VWWG

Introduction

He ara hou ka tū mai means "A new pathway before (us)". This Māori phrase succinctly summarises the position in which NZ educational institutions find themselves. As digital literacy continues to increase in importance as a key skill in every discipline and profession (New Media Consortium and EDUCAUSE Learning Initiative, 2011, p. 3), so the demands of our students and the demands of education precipitate us along this new pathway into virtual worlds.

"Virtual worlds are richly immersive and highly scalable 3D environments. People enter these worlds via an avatar which is their representation in that space". (New Media Consortium and EDUCAUSE Learning Initiative, 2007, p. 18) Virtual worlds offer educators a graphically rich, immersive and engaging environment where students can engage in role-plays, simulations, data visualization and modelling.

Salt, Atkins and Blackall (2008) described the sense of shared experience, immediacy, and the resulting social and emotional sharing, which facilitate group and collaborative learning in Second Life (SL), a virtual world used extensively by educators. In the EDUCAUSE Review, Marina Bers suggested that there is a change and shift in education from the idea that knowledge exists in an individual to a community of learning and this change can be seen in virtual world education. This spirit of educational collaboration led to the birth of the Virtual Worlds Working Group (VWWG).

In November 2009 the VWWG was formed from the initial institutions that comprised the DEHub research consortium: University of New England, Charles Sturt University, Central Queensland University, University of Southern Queensland and Massey University. Other Australian institutions were invited to join and by July 2010, the membership had increased to 22 members. On 7 December 2010, NZ joined the VWWG. Currently the total membership of the VWWG stands at over 150, with New Zealand having 31 members from 16 institutions. Membership is diverse, including lecturers, researchers, technicians, developers and administrators. Members contribute a wealth of expertise in various fields of endeavour, and assist each other in research initiatives, shared classroom experiences, presentations and publication.

This paper outlines the use of virtual worlds in many New Zealand institutions. The examples represent a diversity of research, experience, and perspectives. But the common element is the belief in the efficacy of virtual worlds for education and their potential for meeting the changing demands of a digitally challenging world. Virtual worlds have enabled the provision or resources, experiences, and learning that would have been difficult and sometimes even impossible to provide in the traditional classroom environment.

New Zealand Institution Vignettes

The following table summaries the current work being done in virtual world education by a number of New Zealand institutes of higher learning. Educational demands in New Zealand are changing rapidly and this table suggests ways that institutions are changing directions in response to these demands.

30. **Institution -** ***Where***	**31. Project Intent**	**32. Process**	**33. Outcome**	**34. Future plans**
35. MIT 36. *37. Purpose built sim: Kowhai on SL* 38. *Movement into Jokaydia Grid & NZVWG*	39. Student interview skills for Foundation students 40. Career pathways	41. Interview aspects, dress, simulated interviews in purpose built rooms (as shown in *Fig 1*)	42. Engaged students, retained students, more merit passes	43. Use by other departments 44. Literacy game

45. University of Auckland – Health *46.* 47. *Purpose built health clinic: SL* *48.*	49. Simulation for undergraduate nursing students	50. Simulation involving three active student nurses with patient and family member, plus other students observing	51. Thoroughly engaged students 52. Debrief ensured learning of key points.	53. Have used the setting for other simulations 54. Waiting for faster broadband before exploring extending further
55. University of Auckland – Architecture 56. *57. Purpose built sim: Putahi on SL* *58.*	59. Give studio based experience to acquire digital skills in a virtual urban-like building site called the Living Sketchbook	60. Creative Digital Studio space for the first imaginative steps needed to design and build architecture	61. To 'get over the interface' and arrangement of the complex information flows of image and building design and construction	62. Ongoing survival and acceptance of virtual worlds/3d web rather than "SL" 63. Continue development of the Living Sketchbook
64. Massey University *65.* 66. *Customised Open Wonderland world hosted on university server*	67. Create a virtual workshop for teaching agile software development methods	68. Run workshops, observe and interview participants	69. Useful feedback for future design iterations	70. Benchmark performance and utility against other open source virtual worlds
71. Massey University – Auckland School of Design 72. *Biofeedback augmentation, (Fig 2) Blender, Unity & Flash in lab & online*	73. Adapting interfaces for virtual world use (Champion & Decker, 2010)	74. 1. Biofeedback sockets to augment gameplay 75. 2. Combining mirror and code 76. 3. Chinese character sketching 77. 4. Unity run inside Moodle	78. 1. Utilised in architecture 79. 2. Projection of virtual environs 80. 3. For learning Chinese 81. 4. Running a virtual world inside an LMS	82. Extending work in creative interfaces 83.
84. Waikato – School of Arts *85.* 86. *Garry's Mod, a modding application for Half-Life 2 & its associated community and wiki*	87. Transferability of learning from creative practice, the role of machinima as a filmmaking tool, and mode of engagement with gaming technology	88. Workshops, utilising regularly updated user-generated content and solution based engagement to realise a film concept	89. Short film as a creative output (*Fig. 3* as an example) 90. Further knowledge of game engines and modding practices	91. Consolidate and shift modding environments into purpose built open-source machinima applications
92. Waikato – Education Faculty *93.* 94. *Intermediate schools in the Hamilton region – MARVIN (Fig. 4)*	95. Classroom-based research exploring using avatars to help develop student key competencies	96. Interviews, observation, screen capture software, video	97. Higher order thinking skill development. Increased collaboration. Enhanced awareness of local issues	98. Extend research to other school levels

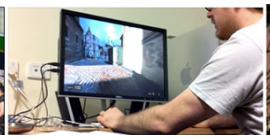
99. University of Canterbury – Computer Science Education 100. *On OpenSim portable server for use within schools*	101. Using virtual worlds to evaluate and deliver CS Unplugged activities (*Fig 5*)	102. School students participate in activities and their actions are captured for analysis	103. Experimental system still being developed for monitoring activity in SL	104. Complete experiments and see if evaluation in SL can inform evaluations in the physical world
105. University of Canterbury – Literacies & Arts in Education 106. *OpenSim Server on campus – nominally part of NZVWG*	107. How to use MUVEs effectively in vocational education contexts	108. A MUVE for temporary traffic management instruction is being developed through design based research	109. This partially developed scenario is part of an on-going research project 110.	111. On going research 112.
113. Wellington Polytechnic *114. SL – Koru Kowhai Island* 115. 116. *OpenSim Server on campus – nominally part of NZVWG*	17. Authentic learning of technology & architecture 18. Exploring dance, human senses and technology 19. Using the virtual environment as a development tool	120. Computer Architecture course 121. Dance - digital sensing of human data 122. Designing prototype environments	123. On going achievement of learning outcomes 124. Performance at Digital Resources for Humanities and Arts 2011, and on going collaboration 125.	126. Continuing current projects 127. Continuing collaboration on an international level 128.
129. Auckland University of Technology– Languages 130. *131. Purpose built sim: Kowhai on SL* *132. & exploration of cultural sims throughout SL*	133. Undergraduate: Experiential intercultural learning and language learning 134. Postgraduate: virtual worlds for language learning, teaching and research	135. Undergraduate: ethnographic studies in a range of cultural sims 136. Postgraduate: enquiry based learning; development of core knowledge 137.	138. Undergraduate: critical awareness of own identity and culture; effective communication for relationships, 139. Postgraduate: educational potential of virtual environments	140. Undergraduate: Develop exchanges with other universities 141. Interdisciplinary studio model 142. Postgraduate: possibly integrate into other courses

143. AUT - Computing & Mathematics *144. 1) Prototype Java 3D CVE 'Teamlink'* *145. 2) UpStage an open source web-based platform for cyberformance* *146. (http://upstage.org.nz/blog/)*	147. Aid learning and research into global virtual teams and collaborative technologies	148. 1. Global virtual collaboration – ongoing development 2.Undergraduate projects working in partnership with the UPStage Virtual organization to extend UpStage software	149. 1. Challenging learning experiences in CVE development, and collaborative technologies 150. 2) Intriguing learning experiences, including open source development 151.	152. 1. Possible porting to a browser based technology stack - new global collaborations 153. 2. Continuing developments and enhancements for annual performance festivals
154. Auckland University of Technology– VR Suite 155. *156. AUT VRSuite, Colab* 157. *http:// vr.colab.org.nz/*	158. More effective VR research by sharing of resources and expertise 159. An interface to aid industry in undertaking 'research of value' in interactive 3D	160. Exploration of varied 3D applications in a number of contexts such as rehab, advertising, interactive art, etc 161. Complex data visualisations of natural disasters	162. Enjoyable learning experiences, clever algorithms and visualisations, useful research outcomes linking 3D technology and contexts	163. Industry linked research - human full-sensory perception and interrogation of complex information driving complex processing and modelling
164. University of Otago 165. *166. Otago Virtual Hospital (OpenSim)*	167. Professional identity development of medical students	168. Medical students solve clinical cases while role-playing as junior doctors in virtual emergency department	169. To solve clinical case, students needed to notice clinically salient elements by themselves (Blyth, Loke, & Swan, 2010)	170. Assessment of dispositional behaviours as a measure of professional identity

171. Nelson Marlborough Polytechnic – IT *172. Koru and Kowhai in Second Life,* *173. Korako on JokaydiaGrid,* *174. NMIT sim on NZVWG,* *175. Sim on a stick* *176. Kitely* 177.	178. 1. How to build and script virtually, create communities of practice, and create machinima 179. 2. Studying Systems Development Methodologies 180.	181. 1. Investigate viewers and grids, taught in SL how to build and script 182. Final assignment built in chosen environment 183. 2. Design & build a complex virtual word build 184.	185. 1. Understand the purpose and affordances of virtual worlds 186. 2. Complex development process using established methodologies and adapting and innovating where necessary 187.	188. More of the same. Keeping abreast of this technology and its implications (e.g. 3D web sites etc) is essential for future IT professionals
189. NMIT – Languages *190. As above*	191. Students learning English (at NMIT)	192. Early stages - using NZ themed immersive space for conversation	193. More comfortable role-playing and trying new skills as an avatar	194. Provide 'authentic' spaces for language learning 195.

Table 1: Current work being done in virtual worlds by some VWWWG NZ institutions

196. **Figure 1: MIT interviewing**



197. **Figure 2: Massey biofeedback augmentation**

198. **Figure 3: Waikato machinima**

199. **Figure 4: Waikato - MARVIN**

200. **Figure 5: UoC – Unplugged activities**

Themes

Several themes emerge in the work of the institutions reported in Table 1. These include the following:

The students who are working in virtual worlds demonstrate a high level of immersion in the tasks they are challenged to complete. MIT report that students involved in the SLENZ (Second Life Education NZ) Project reported a sense of immersion which was supported by anecdotal evidence (Winter, 2010) and this immersion was reported in SL classes subsequently. Waikato Faculty of Education describe improvements in student social interaction, and the increased involvement of 'peripheral' students in general classroom activities.

A common theme in the majority of the vignettes in this report is that what is impossible for students in the real world, becomes possible in the virtual world. Making the impossible, possible, is often associated with simulation builds. The University of Auckland has simulations for maternal haemorrhage, paediatric bereavement, nursing and pharmacy and the University of Otago has a virtual hospital in which medical students play the role of junior doctors/housemen. Students are provided with safe and authentic learning experiences.

The ability to provide the previously impossible is also indicated in many Arts courses, eg. the architecture students from the University of Auckland, Computer Science students at Canterbury University, WelTec, and NMIT are all able to pursue projects made possible by virtual worlds. Language tutors report this same advantage of virtual worlds. Japanese students at AUT are able to go to the Japanese sim (virtual build) to interact with native Japanese speakers for an engaging and very real experience. It is possible for these students to not only engage in the previously impossible, but build networks and establish a sense of community at the same time.

The sense of community is another main theme indicated by the work of these NZ educators. There is group connectivity between educators and students in virtual worlds. This is seen in the VWWG itself where collaboration and community is seen in the huge growth of participating institutions. Links are reported between architecture students at Auckland University and Technology students at WelTec and between WelTec students and NMIT students. Several projects reported in Table 1 are part of international collaborations, eg, WelTec with dance instructors and students in Portugal and Japan, and AUT 'Teamlink', a global collaboration including NZ and Sweden. The sense of community is vital for students in the performing arts, with AUT students involved in UPStage relying on an online audience that participates via a browser, and the machinima (derived from machine and cinema) produced by arts students from Waikato Student is exhibited publicly online (e.g. www.selectparks.net, www.machinima.com).

Designing creative software solutions is another theme that is evident in the work reported in Table 1. Examples of this work include many of the IT courses, eg. Massey University examining techniques of agile software development in a game based activity, Massey's Auckland School of Design researching interfaces that can be adapted for virtual worlds, WelTec using virtual worlds as a development tool for creating prototype 3D interactive environments, the AUT Faculty of Design and Creative Technology's continuing investigation of 'Teamlink', a prototype Java 3D CVE, developed to aid research into global virtual teams and collaborative technologies, AUT's VRSuite, CoLab examining the use of interactive 3D technologies to aid industry, and NMIT where students are creating applications in complex immersive MUVEs as well as gaining an understanding and appreciation of the communities, the potential benefits and issues of working and operating in these environments.

Higher level critical thinking and reasoning skills can be developed within virtual worlds, as indicated by the work in creative software solutions. Real-time problem-solving is a common theme in virtual world education. Virtual environments that contain game elements frequently rely on real time problem solving. MIT's proposed literacy game will challenge students to solve grammatical problems. MARVIN, utilized by the Waikato University Faculty of Education, when used in small group settings, supports discussion, debate, critique, organisation and presentation of researched information through the exercise of higher order cognition (analysis, evaluation, creation) (Falloon, 2010). The prototype traffic management scenario being tested by the University of Canterbury requires surveyors to produce a traffic management plan for when they are working on a road.

It is also important to note that a number of tertiary institutions working in virtual worlds are working in conjunction with other sectors. Waikato University Faculty of Education has used MARVIN in trials with two Intermediate schools (Years 7/8) in Hamilton. The trials have concentrated on identifying any role the application might have for supporting the development of selected key competencies as outlined in the revised New Zealand Curriculum (2007). The Computer Science Education group at the University of Canterbury is interested in using virtual worlds to collect information about how learners interact with educational material. The main focus of the group is the CS Unplugged project (csunplugged.org) which exposes students to

advanced concepts in Computer Science without using computers. Prototype Unplugged activities built in virtual worlds are on a local server as they are designed for the use of primary school children.

Conclusion

Virtual worlds are being used in New Zealand institutions of higher learning. Although Second Life still plays an important role in education, educators are looking into alternatives. The NZVWG is an OpenSim platform that is NZ based and has an academic focus. It operates on servers hosted by Auckland, Otago and Canterbury Universities, and Wellington Polytechnic. NZ educators are using a variety of other virtual worlds and challenging their students to use and create unique 3D interactive environments.

At ascilite2009, Scott Diener from The University of Auckland made the comment that everything in education would change with the use of virtual worlds. “They provide a real sense of self and the suspension of disbelief, a sense of place and sense of emotion.” (Diener as cited by Waugh, 2009). These qualities of virtual worlds allow students to become immersed in active, problem-based learning. New Zealand has invested heavily in change with research and practice in virtual world teaching and learning. The evidence is seen in the work discussed in this paper.

The technology and the virtual worlds NZ educators use may change but the one thing that will not change is the commitment of these educators to provide their students with the best learning experiences possible.

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