Educating for sustainability in virtual worlds: Does the virtual have value?

Two key elements of education for sustainability (EfS) are action-competence, and the importance of place and experiencing the natural world. These elements emphasise and depend on the relationship between learners and their real world contexts, and have been incorporated to some extent into the sustainability cross-curricular perspective of the new Australian curriculum. Given the importance of real-world experiential learning in EfS, what is to be made of the use of multi-user virtual worlds in EfS? We went with our preservice secondary science teachers to the very appealing virtual world *Quest Atlantis*, which we are using in this paper as an example to explore the value of virtual worlds in EfS. In assessing the virtual world of *Quest Atlantis* against Australia’s Sustainability Curriculum Framework, many areas of coherence are evident relating to world viewing, systems thinking and futures thinking, knowledge of ecological and human systems, and implementing and reflecting on the consequences of actions. The power and appeal of these virtual experiences in developing these knowledges is undeniable. However there is some incoherence between the elements of EfS as expressed in the Sustainability Curriculum Framework and the experience of QA where learners are not acting in their real world, or developing connection with real place. This analysis highlights both the value and some limitations of virtual worlds as a venue for EfS.

Central to current articulations of Education for Sustainability (EfS) is the notion of action-competence; that learning to implement real world actions is essential to a sustainable future (Jensen, 2002). Achieving sustainability requires socio-scientific understandings and pro-environmental attitudes to be translated to actions with beneficial consequences for our world. Action competence has been, at least on paper, integrated with the sustainability cross-curriculum perspective of Australia’s first national curriculum (Australian Curriculum Assessment and Reporting Authority, 2012) via the underpinning Sustainability Curriculum Framework (Commonwealth of Australia, 2010).

Another emphasis in EfS is the importance of nature experiences and connections to place; in helping children to appreciate biodiversity, the interconnectedness of life, and in promoting attitudes of environmental stewardship and pro-environmental behaviours (Bugeholz, 2006; Dillon et al., 2006).
Both of these imperatives of EfS are linked by their emphasis on experiential learning in the real world, with students acting in and on their world and thereby developing the willingness and competence to act that will facilitate a more sustainable future.

Given the importance of real-world experiential learning in EfS, what is to be made of the use of virtual worlds in EfS? Multi-user virtual environments (MUVEs) comprise 3D graphical computer interfaces and chat tools that facilitate synchronous communication between multiple networked users represented by avatars (Dieterle & Clarke, 2009). A range of engaging, sophisticated and powerful MUVEs for educational purposes is emerging and becoming more widespread in schools (Hew & Cheung, 2010; Johnson, Adams, & Cummins, 2012). These educational MUVEs integrate strategies of online gaming and narrative with curriculum-based meaningful content, including science, socio-scientific issues and sustainability (examples include River City and Quest Atlantis).

Clearly there are advantages of using virtual worlds for learning and teaching. Engaging narratives blended with curriculum content can immerse children in their learning, enhance the cross-curricular links so important in EfS and have provided documented learning gains in concepts relating to science and sustainability (Barab et al., 2007). From a more pragmatic perspective, real world field trips are increasingly difficult in schools in part because of transport costs and risk management compliance requirements – neither of which is a problem in virtual worlds.

However despite these advantages the emergence of educational MUVEs poses important questions about the evidence-base of teaching EfS in virtual worlds, particularly its coherence with the action-orientation and connections to place and nature that are such strong themes in EfS research and practice. Hence this paper aims to examine the coherence of one of the most appealing of the available educational MUVEs with an EfS perspective. Quest Atlantis (QA) is an educational curriculum-based 3D MUVE developed by Sasha Barab and colleagues at Indiana and now Arizona State University in the USA, and used in schools across 18 countries (Atlantis Remixed Team, 2013) including Australia. It is a useful exemplar in considering the value of virtual worlds in EfS, because of its resonance with the ethos of EfS. For example, it is underpinned by familiar EfS themes such as “Social Responsibility”, “Environmental Awareness” and “Personal Agency”. In the QA narrative students exercise these social commitments while undertaking quests and missions to save Atlantis – ‘a beautiful blue-green world (not unlike our own)’.

The potential of QA in EfS is examined below against the Sustainability Curriculum Framework for the Australian Curriculum. The framework consists of three interrelated components, each of which is outlined alongside a brief discussion of its coherence with QA.

1. Repertoires of practice (world viewing, systems thinking and futures and design thinking)

   World views that recognize and foster social justice and responsibility are core to many QA activities and some of the missions explicitly focus on systems thinking. For example, In the Taiga unit students conduct a virtual scientific investigation in trying to solve a complex environmental problem involving
interrelated social, economic and ecological aspects. The students have to take account of the diversity of points of view and the ‘best’ decision is difficult to determine because of potential social and economic consequences. Futures and design thinking is fostered by complex decision making, implementing changes and examining their long term consequences via time travel.

2. Knowledge of systems (ecological and human)

Ecological and human systems, and their interrelationships, can be explored by learners in a range of sophisticated activities on Ecology Island. The issues parallel real-world problems and these quests provide engaging and powerful learning opportunities in assisting students to develop the conceptual and scientific understanding of complex systems and ecological relationships. Nonetheless, the ecological systems are mostly Northern Hemisphere landscapes, which bear little relationship to the Australian context (although as the interface is customisable this could be modified). On Ecology Island ‘questers find ways to celebrate the beauty of nature’, but it is difficult to see how these virtual experiences would assist Australian students in developing the deeply felt personal, emotional, and aesthetic connections to their own place and to their own natural systems that are so important to pro-environmental attitudes and behaviours and that can be promoted by experiences in real world systems.

3. Sustainability Action Process (making a case for change, developing the scope, defining the proposal, implementing, and evaluating and reflecting).

QA aims at ‘inspiring a disposition towards social action’ and this action-orientation is expressed in its ‘personal agency’ commitment and in the requirement in various missions for students to decide on, implement and reflect on actions (Barab, Pettyjohn, Gresalfi, Volk, & Solomou, 2012). The action process differs in important respects to that outlined in the Sustainability Framework, but again with the customisable interface this gap could be narrowed. However, virtual actions have only virtual consequences, and the real world is in dire need of action. A ‘disposition’ to action, desirable though it is, does not necessarily equate to action competence in the messy argumentative real world when dealing face to face with real people, power imbalances or conflicts, inertia, apathy, turgid bureaucracies and the other impediments to changing established practices.

References


ESERA2013 is the 10th biannual Conference of the European Science Education Research Association (ESERA).

The theme of this ESERA conference is Science Education Research for Evidence-based Teaching and Coherent Learning, underlining aspects of great relevance in contemporary science education research: the need to reflect on different approaches to enhancing our knowledge of learning processes and the role of context, designed or circumstantial, formal or non-formal, in learning and instruction.