Introduction
Many teachers find the cultural competence and content knowledge required for the cross-curriculum priority areas challenging, and engaging students in real-world, expertise-based learning opportunities can be difficult to source and costly (for example, see: Rickinson, et al., 2004). Despite research showing better learning outcomes in outside settings (for example, see: Santos, Hernández-Leo, & Blat, 2014), few opportunities exist for self-directed exploration of spaces of environmental and cultural significance. As a result, learning is often situated within the classroom and undertaken by teachers with limited expertise.

This article reports on a project which aims to enhance the teaching and learning outcomes of two of the cross-curriculum priorities in The Australian Curriculum: Aboriginal and Torres Strait Islander Histories and Cultures and Ecological Sustainability. This will be achieved through an investigation of the educational and social benefits of self-directed, technology-based outdoor learning materials and experiences relating to nationally important cultural and environmental educational goals.

Significantly, this project will question the benefits of out-of-classroom learning of itself and in relation to classroom learning both with and without the use of digital technologies answering long standing calls for such research (for example, see; Rickinson, 2004).
Challenges learning outside the classroom: What the literature says

Learning outside the classroom (LoTC) has long been a desired feature of many countries’ education systems and school curricula. The concept of school journeys introduced initially from Germany in the late nineteenth century greatly enlarged the range of contexts that children could experience firsthand (Cook, 2001) and was influential in shaping some of the learning experiences of secondary school students (Jenkins, 1980). More recently, the value of learning in different contexts has been highlighted by Australian based researchers who have reported benefits for student learning which occurs in museums (for example, see: Griffin, 2004), botanic gardens (Hofstein & Rosenfeld, 1996) as well as science and technology centres, aquaria, and zoos (Rennie & McClafferty, 1995).

While reinforcing the educational benefits of learning in environments outside the classroom, Dillon and Dickie (2012) also suggest that “contact with the natural environment affords a wide range of benefits, from educational to health and from cultural to social” (p.1). The educational, cultural and social benefits associated with learning undertaken in various settings is reflected in the values and beliefs underpinning the three cross curriculum priorities in the Australian Curriculum: Aboriginal and Torres Strait Islander histories and cultures, Asia and Australia’s engagement with Asia and Sustainability. Each of these areas is particularly suited to experiential learning outside of classroom settings as suggested by the Victorian Curriculum and Assessment Authority (2005) who state “fieldwork enables students to acquire knowledge by making first-hand observations, taking field measurements, mapping and recording phenomena in the real world in a variety of settings” (p.10). Furthermore, Pyle’s (2010) report to the Council for Learning outside the Classroom (CLoTC) in the United Kingdom indicated that teachers also benefited from the different pedagogical approaches afforded to them in LoTC experiences. While there is some consensus in the benefits for students and teachers when participating in LoTC whether in natural or built environments, there is increasing evidence that students and teachers are not participating in out-of-classroom learning experiences.

Scott, Boyd, Scott, and Colquhoun (2014) claim that, in spite of a growing academic focus on LoTC as pedagogy, there has been concern that as a practice it is declining perhaps to the brink of extinction. International research has also confirmed that children are losing their connection with the natural environment and that children in urban environments are particularly disadvantaged with 10% of children playing in natural environments compared to 40% of adults doing so when they were young. Such a dramatic ‘extinction of experience’ for nearly 4 million school students in Australia (Australian Bureau of Statistics, 2014) can have “a detrimental long-term impact on environmental attitudes and behaviours” (Dillon & Dickie, 2012, p. 1) Student visitor numbers from the Royal Botanic Gardens, Melbourne (RGBM) indicate that while overall visitation numbers remain consistent – 38,000 in 2013/14 (Royal Botanic Gardens Board Victoria, 2014) – the number of secondary school students visiting the RGBM continues to fall, despite the $16,000,000 invested in the RGBM by the Victorian Government (Royal Botanic Gardens Board Victoria, 2014).

While the potential value of LoTC has been established, less
research has been conducted on the factors causing the decline in such experiences. While Scott, et al. (2014) have synthesised literature identifying potential barriers to fieldwork linked to primary school teaching in Australia (and for international examples, see: Dillon, et al., 2006; Rickinson, et al., 2004), the research literature examining factors associated with the decline in LoTC in both natural and built environments is notably absent. This is particularly true of research examining LoTC in secondary school curricula, particularly in Australia, which is non-existent.

In their comprehensive review of outdoor learning research, Rickinson, et al. (2004) found that “most research on outdoor learning looks exclusively at what happens out-of-doors” and “leaves unexplored all questions about how out-of-classroom learning can support within-the-classroom learning and vice versa” (p.57). Moreover, Rickinson, et al. (2004) highlight “an urgent need for outdoor learning that takes a more integrated view of learning in different kinds of settings both within and beyond school” (p.57). Despite the identification of such a research imperative a decade ago, this shortcoming persists.

The current project
I am presently conducting a study which is designed to take an integrated view of learning by exploring the connections between out-of-classroom and within-the-classroom learning “fueled by a fundamental curiosity about things and processes – in this instance, emergent pedagogical elements and qualities – that we do not yet understand and that provoke us to think or imagine in new ways” (Ellsworth, 2005, p. 5). Specifically, this research will explore the relationship between within-the-classroom and out-of-classroom learning at the Royal Botanic Gardens, Melbourne. This institution has been strategically chosen as a research site for this project as it not only runs educational programs but encourages teachers and students to focus on both cultural and social aspects involving the natural environment.

On one level, this research is about the temporal (in) consistencies of student and teacher beliefs about learning in different physical contexts. To this end, this research aims to address the call for “research projects that look at the before, the during and the after” (Rickinson, et al., 2004, p. 57) of out-of-classroom learning opportunities. On another level, this project aims to determine the extent to which teaching and learning with digital technologies needs to be understood in similar or different ways within variable physical and temporal contexts by questioning the purposes of out-of-classroom learning of itself and in relation to classroom learning both with and without the use of digital technologies.

In contrast to simply aligning LoTC experiences within curricular goals and objectives that often drive within-the-classroom pedagogies, this project aims to develop new knowledge by thinking experimentally about out-of-classroom pedagogies and their possible connections to within-the-classroom pedagogies in an attempt to take on what Rajchman (2000a) calls an “experimentalist relation to the future” (p.76). In contrast to predicting or programming the connections between these differing pedagogies, I am going to look at these anomalies as harbouring and expressing forces and processes of pedagogies “as yet unmade, that provoke us to think or imagine new [pedagogies] in new ways” (Rajchman, 2000b, p. 15).

Connections to the Australian Curriculum
The Australian Curriculum stresses the importance of cross-curriculum priorities being embedded into all learning areas, including Aboriginal and Torres Strait Islander Histories and Cultures and Ecological Sustainability. Many teachers find the cultural competence and content knowledge required for these priority areas challenging, and engaging students in real-world, expertise-based learning opportunities can be difficult to source and costly. As a result, learning is often situated within the classroom and undertaken by teachers with limited expertise.

Despite research showing better learning outcomes in outside settings, few opportunities exist for self-directed exploration of spaces of environmental and cultural significance. This is particularly the case for secondary students who are generally more disengaged from outdoor learning opportunities, but more engaged in technologically based learning. By developing technology-based outdoor learning materials, Victorian students will access more engaging, personalised learning experiences relating to these nationally important cultural and environmental educational goals.

This project uses existing but as yet untested Augmented Reality technology developed at Monash University to enhance the educative experience of the 38,000 annual student visitors to the RBGM.

About the technology
Augmented reality (AR) offers the potential to transform an inert version of everyday spaces for learning into rich, interactive sites and objects for innovative pedagogies by overlaying multi-media (audio, video and interactive models) on top of, in this case, plants in the Botanic Gardens.

Through this process, students and teachers will be provided with access to unique educative materials highlighting connections and tensions between Aboriginal ecological and cultural perspectives and Western ecological sustainability science. Students and their teachers will gain a deeper appreciation and understanding of the richness of Aboriginal knowledge and cultures, and, through this, a broader understanding of the principles of environmental sustainability across cultural worldviews.
in a unique setting. Aboriginal people will also benefit as recognition of cultural heritage is an important determinant of health and wellbeing for Aboriginal people.

Significantly, this project aims to establish understandings of the most effective ways in which mobile technologies can be included in LoTC programs in other contexts such as Zoos, Museums and Aquaria.

Ways in which you can augment your own teaching

While AR may be a new form of digital technology there are a number of different pieces of software that allow teachers to augment their own teaching. Using freely available software such as Aurasma, teachers and students are able to record their own audio or video content. Using a ‘trigger’ image such as a diagram in a textbook or poster created by students, the software is able to be programmed to retrieve a particular audio or video file.

This simple process allows teachers to provide explanations for conceptually difficult content to students irrespective of time or physical location. A student is able to add additional information to a poster or written piece of work allowing others to gain a greater insight into that student’s understanding of a particular topic.

Using AR in LoTC settings is more challenging as ‘triggers’ in the natural environment such as plants are less stable – they move in the wind, they flower, they grow and are pruned and so this option for many schools is currently too technologically demanding; however, it is hoped that the current efforts developing AR applications at the RBGM will make this option more accessible to schools in the very near future.

References


Griffin, J 2004, Research on students and museums: Looking more closely at the students in school groups. Science education, vol. 88, S1, S59–S70. doi: 10.1002/sce.20018


Johansson, R 2003, Case Study Methodology Key note speech given at Methodologies in Housing Research Conference. Stockholm: Royal Institute of Technology in cooperation with the International Association of People–Environment Studies.


Hofstein, A, Rosenfeld, S 1996, Bridging the gap between formal and informal science learning.

Merriam, S 1998, Qualitative research and case study applications in education, Jossey-Bass, San Francisco.


Quotes on virtual reality

As the Internet of things advances, the very notion of a clear dividing line between reality and virtual reality becomes blurred, sometimes in creative ways.

Geoff Mulgan

It could always all be unreal – how could you ever tell otherwise? You took it on trust, in part because what would be the point of doing anything else? When the fake behaved exactly like the real, why treat it as anything different? You gave it the benefit of the doubt, until something proved otherwise.

Iain M. Banks

The fact that all of this was happening in virtual space made no difference. Being virtually killed by virtual laser in virtual space is just as effective as the real thing, because you are as dead as you think you are.

Douglas Adams

Was it Laurie Anderson who said that VR would never look real until they learned how to put some dirt in it?

William Gibson