# MULTIMODAL CARTOGRAPHIC MAPPING: ECOPEDAGOGICAL SPACES IN THE EVOLVING AUSTRALIAN TECH ENVIRONMENT

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## Abstract

This paper describes the design and implementation of a project that involved embodied outdoor experiences for mapping Country using ICT. The project was undertaken by preservice teachers learning about the Geography substrand within the Humanities and Social Sciences Australian curriculum as part of the Bachelor of Education, Primary - Aboriginal and Torres Strait Islander Education Program. Results indicate that immersive learning experiences can be embedded authentically with technology to collect and present data. Findings also suggest that pre-teachers can benefit from outdoor experiences utilizing ICT to develop their understanding of symbiotic relationships between technology and immersion pedagogies in teaching practices.

## Background

In the Australian context, a recently released national curriculum points teachers towards a futures-focused learning environment for their students. This direction includes an underpinning of general capabilities across the curriculum and provides teachers with ideas about where the general capabilities can be addressed when teaching subject content (ACARA, 2019a). The prominence of the general capabilities has also transferred into school reporting which further indicates the importance attributed to this aspect of the curriculum (Toon, 2017). The focus on the general capabilities has also resulted in the release of national literacy and numeracy learning progressions which guide teachers in differentiating their teaching and learning to meet the individual needs of students from Foundation to Year Ten. A strong focus on supporting the implementation of technologies also continues, with the address of ICT through two arms: ‘Design and Technologies’ and ‘Digital Technologies’. This is evidenced by a recent initiative of the Australian Curriculum and Reporting Authority (ACARA) on supporting the implementation of digital technologies through a National Innovation and Science Agenda (NISA).

The project reported here focused on the Humanities and Social Science curriculum (HASS) for two overarching reasons. The first being that the inclusion of the Geography substrand within the Humanities and Social Science curriculum is relatively new for Australian primary schools. It is vital for preservice teachers

to learn about the geographic content knowledge and geographic processes of inquiry, particularly with the likelihood of entering schools that have been operating with this new curriculum for limited time. And secondly, the project sought to develop preservice teachers' knowledge about authentic ways to implement place-based outdoor education in an evolving technological world. It thus contributes to new knowledge about ways to implement digital technologies when teaching the Geography substrand of the Humanities and Social Sciences primary curriculum.

Embedding immersive experiences utilizing transformative practices is also a significant point to address with growing concerns that children are increasingly alienated from nature and devoid of outdoor experiences (Charles, 2018; Sobel 2004). This phenomenon is argued to be growing despite research which identifies the benefits of personal lived experiences in the outdoors for building up nature-human connections (Bates, 2018a; Charles, 2018; Chawla, 2007; Gray & Birrell, 2015; Malone, 2016; Louv, 2011). As such, the project focused on weaving eco-pedagogies with ICT capabilities because it involved an outdoor place-based immersion and utilized technology applications as transparent operators for collecting, representing and sharing data collected in the field (Hunter, 2015; Mishra & Kohler, 2012).

As educators know, learning requires the intertwining of many kinds of capabilities in this new intersemiotic space. We need to equip students with the necessary skills to navigate how data is collected, represented and shared. To this end, the project sought to incorporate opportunities to develop and apply ICT skills for thriving in an increasingly digitized world while building nature-human connections in concrete ways.

## Targets and Specifications

The project targeted the development of the Humanities and Social Sciences curriculum content knowledge, pedagogical knowledge and ICT capabilities with preservice teachers. A particularly distinctive aspect of the project involved a group of Aboriginal Peoples in the Bachelor of Education (Primary) – Aboriginal and Torres Strait Islander Education course. The students were actively involved in reflecting on their connection to Country and considering the implementation of a similar project with Indigenous and non-Indigenous primary school children in their future teaching practice.

### The Equipment and Software

The cohort of 15 preservice teachers utilized their own mobile phone devices with photographic and recording capabilities during their data collection stage. Preparation also required them to download 'Cardboard Camera' onto their mobile device and ensure they had set up a Google account to use 'Google My Maps' as one tool for representing their work.

Photos collected using Cardboard Camera were shared in a public learning space using Virtual Reality Goggles, which were provided by the facilitator in the last stage of the project on the university site. The last two stages were also supported by the application of 'Piktochart', which preservice teachers used to present their unit outline about 'place' in alignment with the Humanities and Social Sciences curriculum outcomes.

### Training Preservice Teachers

Preservice teachers were provided with a thirty-minute training session which involved them in learning how to sync their mobile devices and practice using Virtual Reality Goggles. They participated in a joint construction of a Google MyMap during a two-hour workshop prior to utilizing this ICT tool independently and were offered one-to-one support during the creation of their 'Piktochart'.

## Description of the Project

### Definitions

Prior to describing the project there are a number of key terms used in describing the project that require definition.

*Australian Professional Standards for Teachers* are required to be met by teachers in ordered to maintain teacher registration in Australia. They are public statements of what constitutes teacher quality and required to be fulfilled as part of the Australian Teacher Accreditation process (AITSL, 2019).

*Country* is used in this context as an acknowledgement of the First Nations Peoples and their continuous connection as Sovereign people of the land we now call Australia. It is capitalized in all points of use.

*Ecopedagogical Approach* involves educational moves which create opportunities for humans to make conscious connections with the natural world through ecological ways of experiencing, thinking and knowing.

*General Capabilities* are addressed through the content areas of the Australian Curriculum. They aim to address specific skills, knowledge, behaviours and dispositions that equip students in their lives in and out of school (ACARA, 2019).

*Intersemiotic Space* refers to the representation of meaning using two or more communication codes or sign systems. In this project, the preservice teachers interweave oral and written linguistics, still and moving images, and sound to produce their portfolios. Intersemiotic work also encompasses the use of multiple modes to represent meaning. In this project, the groups used digital and paper modes to represent meaning.

*Phenomenological Approach* focuses on the way that the world is experienced by the people who live in it. It focuses on what individuals attend to, take in, interpret from their experiences, and deem as meaningful.

*Reflective Practitioner* in this context involves the participant in reflecting on praxis as an individual and their interaction with collective participants in the practice of teaching.

*Storylines* is a term that can be used to describe stories told by Aboriginal people.

## The Project's Approach

From a phenomenological viewpoint, the project involved preservice teachers authentically in articulating aspects within Geography strand of the Humanities and Social Sciences by researching a personal place of significance. Designed to be participatory, the exploration of curriculum was intended to develop preservice teachers' understanding that the study of place needs to be operational and active rather than a perceived or abstract one restricted by classroom walls (Bates, 2018a; Barford & Bensen, 2018; Gray & Birrell, 2015; Gendlin, 2004).

From an andragogic viewpoint, the project centred around the nature of building preservice teachers' professional knowledge, in particular how this knowledge was construed and constructed. As an imperative, the approach supported the group in using their inquiry experience to inform their teaching using a shared language to talk about their practice (Bates, 2018b; Campbell, 2011; Groundwater-Smith & Mockler, 2015).

### Embedding the project with the Tertiary Course Learning Outcomes

Focused on their future work as primary school teachers, and as adult learners, the project formed part of the preservice teachers' first assessment task and supported the following course outcomes for Graduates of the Bachelor of Education (Primary) – Aboriginal and Torres Strait Islander Education course.

- Demonstrate critical knowledge and understanding of disciplinary content, pedagogical, and technological knowledge, and the relationship between educational theory and practice.
- Reflect on practice and apply appropriate pedagogies and technologies that enhance the learning development of students' diverse needs, including social, cultural, academic, emotional and physical needs.

The project also aligned with the three of the six categories from the Australian Professional Standards for Teachers in order to develop the necessary skills all teachers need to develop and to maintain accreditation for working in Australian schools:

### *Standard One: Know students and how they learn*

- Explain the role and value of Geography in the broader school curriculum and the relationships with literacy and technology general capabilities.

### *Standard Two: Know the content and how to teach it*

- Apply knowledge of the disciplines, theories and pedagogies that underpin the learning area to learning design.

### *Standard Six: Engage in professional learning*

- Present a personal exploration of the local area, using historical and geographical artefacts and apply the research project to related curriculum content.

## The Project Sequence

The project involved six stages and various elements within each stage (Figure 1).

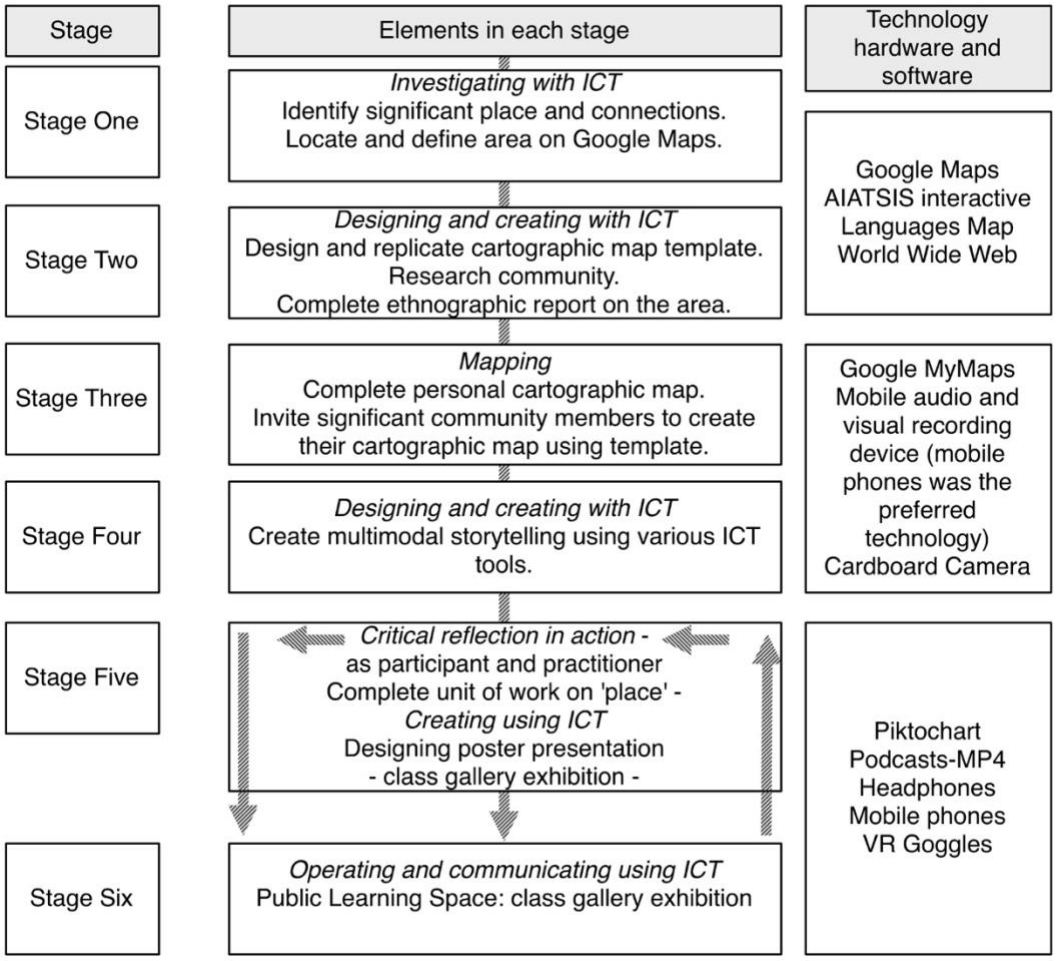


*Figure 1:* The project flowchart

### *Stage One: Investigating with ICT*

The first stage involved the group of preservice teachers in selecting a significant place from their community that was special to them. Each preservice teacher was then involved in researching their significant 'place'. They gathered information from historical societies, library archives, the local community, civics action groups, census data and other relevant bodies to inform the content of a written ethnographic report about their chosen place.

### *Stage Two: Designing and creating with ICT*

The next stage involved each preservice teacher in the design and creation of a cartographic map in the role of map-maker. This stage engaged them with geographical inquiry skills from the Humanities and Social Sciences curriculum (ACARA, 2019). The cartographic maps were initiated by identifying boundaries using Google Maps. Using the digital map, a line drawing using the identified boundaries was created. This formed a template which was then replicated on art paper to create a set of map templates for distribution to other participants during the next stage of the project.

A number of complexities arose during this stage because as map makers they had to decide on the delineations of their map boundaries. These decisions centred around whether their map would be delineated by pre- or post-contact boundaries, language, or cultural groups (dominant or minor). The interactive Australian Institute of Aboriginal and Torres Strait Islander Studies language map (AIATSIS, 2019) created much discussion and highlighted the significant loss of original first language on this continent. Despite this interest, no pre-service teacher utilized the language maps to delineate their boundaries.

### *Stage Three: Mapping*

Each participant then used the map template they had created to complete an artistic representation of what was important to them about the place they shared and how they were connected to their significant place. After they created their own map, they invited people from their community to undertake the same map making process using the template they had designed. One of the cartographic maps that was produced is illustrated in Figure 2.

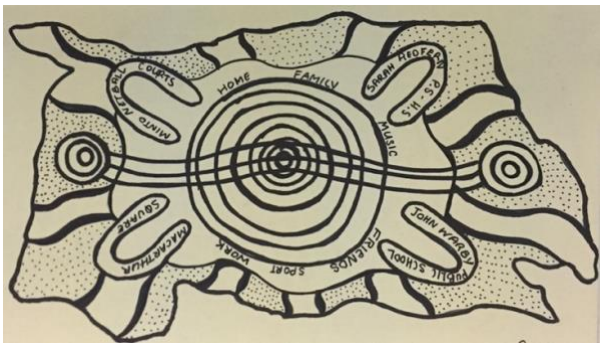


*Figure 2.* Donna's cartographic map

### *Stage Four: Creating and designing with ICT*

At the core of the project was the intent of providing platforms for creating multimodal storylines using ICT. As such, the preservice teachers were also involved in collecting multiple artefacts to be part of their digitized storyline. The photographic artefacts collected using Cardboard Camera were added to their Google MyMap. Labelled layers were added on these digital maps to locate places and activities that were important to them. These were accompanied by linguistic recounts, descriptions or poems (Figure 3). A personal podcast was also created during this stage and shared during stage six of the project.

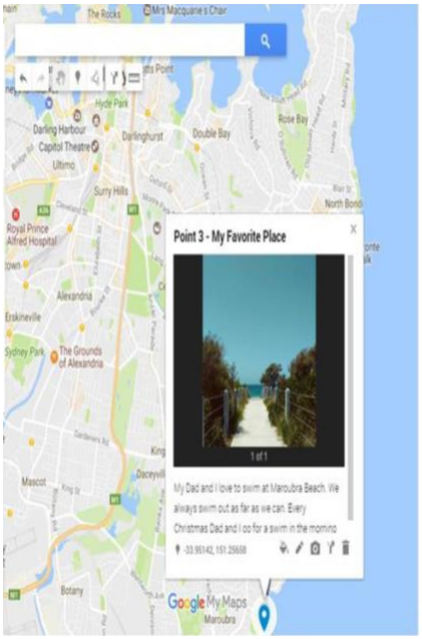


*Figure 3.* Utilizing Google MyMaps

### *Stage Five: Creating using ICT*

The reflexive inquiry approach focused this stage of the project. It involved preservice teachers in discussing and reflecting on the challenges and opportunities they experienced in the role of practitioner during the data collection and creation stages.

The Humanities and Social Sciences curriculum outcomes were then drawn on to guide a discussion about potential challenges that primary students might experience when undertaking a similar project in the primary classroom. Post this discussion, each person designed a unit of work that aligned with the Humanities and Social Sciences curriculum. Participants were required to represent their ideas on a poster using the Piktochart application.

### *Stage Six*

This final stage provided an essential step in sharing constructed knowledge in a public learning space (Hunter, 2015). The exhibition engaged the group in sharing

their portfolios set up as a gallery exhibition. Photographs that were collected using cardboard camera in stage two were synced to virtual reality goggles and shared amongst the group. Sets of headphones were set up where personal podcasts were listened to as individuals viewed using VR goggles. At the end of the exhibition, the preservice teachers were asked to reflect on the process.

## Looking Back on the Project

### Opportunities

The project demonstrated how to apply rigorous and engaging learning that connects with the underpinnings of the Australian curriculum. In particular, it addressed authentic ways for incorporating the General Capabilities in content learning when designing learning tasks. As such, the task design purposefully incorporated five of the seven General Capabilities (ACARA, 2019a) being:

- Literacy – writing personal reflections and informative texts
- Numeracy – reading and composing maps
- Information and Communication Technology (ICT) Capability – process of researching and product creation
- Intercultural Understanding – making connections with their world and the world of others
- Critical and Creative Thinking – applying thinking skills for inquiry, interpreting, analysing, sequencing content and in appraising tools, tasks, processes and performance. Applying skills in scaffolding this type of learning for students in primary school.

The second dimension centred around the Australian curriculum's commitment to designing personalized learning programs in order to cater for student diversity. The learning task provisioned preservice teachers with choice, various modes and degrees of scaffolding to support their learning needs. The choices around the design of cartographic maps resulted in the representation of various geographical urban, rural and remote regions in various visual designs thus replicating aspects for addressing student diversity in the primary school setting (ACARA, 2019c).

The task also specifically engaged preservice teachers in learning about the curriculum content. Investigations that ensure students develop "a sense of wonder, curiosity and respect about places, people, cultures and systems" are a mandatory part of studying the Humanities and Social Sciences in the Australian curriculum (ACARA, 2019b). This project successfully demonstrated an opportunity to enact factual informative texts about place utilizing ICT to inform teaching the Humanities and Social Sciences. Moreover, this project offered more than the opportunity to explore the historical and geographical aspects of place involving population data, employment statistics, latitude or longitude marks on cartographic and Google maps. Interpersonal connections with place were significant with preservice teachers utilizing personified language to infer concepts of Country as "mother,

nurturer, teacher and protector." Commentary by preservice teachers looking back at the assignment task also indicated that the assignment assisted them in developing their understanding of the place they grew up in (Personal communication, December, 2017).

Interpersonal relations were also demonstrated between preservice teachers through high levels of social interaction, empathy and collaboration in the development, setting up of 'Pictochart' displays and when listening to each other's podcasts. The presentations demonstrated that place connections were distinctly personal and 'place' was described by one preservice teacher as holding "a great power…providing strength physically and mentally (Student response, December, 2017)." These results demonstrate the interpersonal value of incorporating place-based inquiries in contemporary teaching and learning practices.

Finally, I purposefully designed the project to include explicit models, participatory experiences, responsive constructivist learning as students designed their maps together and reflected on their experience. These aspects were included with the desire to inspire preservice teachers to actualize this pedagogy and build their capacity to be responsive and successful future practitioners.

### Challenges and limitations

The project with 15 preservice teachers offered many opportunities for participatory and reflective practice. However, I experienced an unexpected challenge when implementing this project. The challenge centred around my presumption of a collective high-level tech 'savviness' amongst the group. Despite research arguing that text savvy millennials are shaping tertiary education (McHaney, 2011), a number of preservice teachers in this group were challenged by the more academic use of technology applications that stretched them beyond their 'social media' scope. This impacted on the degree of tenacity for experimenting with technology applications, the time required to practice the ICT tools, the end results involving technology and, the confidence in sharing their maps as a public display.

## The Evolving Tech Space Across the Curriculum: Through, in and out of the Classroom

From an educational premise, embodied experiences in the outdoors are critical to foster because they nurture a bond between the human and more than human world (Gray & Birrell, 2015; Sobel, 2004). A relationship edifice of this type not only incorporates current ecopedagogical approaches for investigating local place but is critical in these unprecedented times where the world finds itself faced with precarious environmental issues. It is one that can be supported by engaging

students in collecting, designing and operating with ICT in outdoor spaces for working in the Humanities and Social Science curriculum.

Educational moves which create opportunities for connecting with the natural world must also involve key elements to ensure teaching practices are future-focused. I therefore argue that teaching and learning about the world must be underpinned by approaches that are contemporary relevant, creative, active and interactive but also ecopedagogically robust, culturally sensitive and ethical (Groundwater-Smith & Mockler, 2015; Hunter, 2015; McKnight, 2016; Moore & Cooper-Marcus, 2008). Cartographic mapping projects are examples for encouraging these types of approaches to ensure students' learning experiences are in-depth, with-nature and on-point. Moreover, creating early connections in the locale with students, builds stronger foundations towards their broader understanding of community, national and global environmental perspectives (Bates, 2018b; Grienswald, 2003; Hung, 2014).

Furthermore, this project also demonstrated that authentic technology integration can accompany a participatory ecopedagogical approach in schools. It is immersive and metacognitive rather than being a mere abstract propagation of nature through a virtualized world (Bateman, 2015; Bates, 2018b). It shows one way to bridge the growing divide between outdoor immersive experiences and the growing indoor technological and media-based recreational pursuits (Bates, 2018a; Andrejewski, Mowen & Kerstetter, 2011).

## Teachers of Tomorrow: Place-based Pedagogies in a Technological World

Central to the effectiveness of embedding transformative technologies in the learning is the role of the teacher (Brady & Kennedy, 2019; Hattie, 2018). As a critical factor in students' learning, teachers are not conduits to using devices but channels for ensuring technology is applied authentically to capture different modes of learning, ways of knowing and creative productions of knowledge (Hunter, 2015). These types of designed learning experiences not only offer opportunities to build preservice teachers' pedagogical knowledge and capacity but their confidence to use technology in transformative ways for their future work in schools.

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