# ASCILITE 2024

## Navigating the Terrain:

*Emerging Frontiers in Learning Spaces, Pedagogies, and Technologies*

# Designing-in WebGIS Tools for digital learning terrains in Natural Environments

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Authentic learning environments (Herrington et al., 2014) have been widely acknowledged in creating engaging, meaningful and deep learning experiences, including for “novice” first-year undergraduate students (Roach et al., 2018). Natural Environments (ENVS10001) is a first-year undergraduate subject (unit) that aims to deliver foundational understanding of earth systems and processes to support studies in agriculture, natural resource management and civil engineering. One main obstacle to facilitating understanding in this domain is the unfamiliar scales of the landscape processes and phenomena (Resnick et al., 2017). Natural Environments has been using the granitic geology dominated landscape of Glenrowan in northeastern Victoria (Australia) as an authentic case study.

In this presentation we explain how and why we re-designed authentic learning aligned tutorial interactions by integrating student-driven navigation of WebGIS tools such as Geoscience Australia and NatureKit portal to: (a) enable students to build understanding of how geology, geomorphology and ecology interact to result in the dynamic landscapes in the environment; (b) equip students with fundamental and valuable knowledge and skills in accessing free and publicly available datasets useful in their academic and future professional work; (c) demonstrate the authenticity of the curricular content to establish higher levels of learner engagement. The current learning design where dynamic control and interaction with spatial data is central, is just one iteration in the series of previous designs that moved from non-digital to static-digital resources in the learning environment.

Generally, an anchored instruction aligned approach (The Cognition and Technology Group at Vanderbilt, 1990) was adopted. Prior to the tutorial, students attended two one-hour lectures explaining the structure of the earth, plate tectonics, and global-scale structural (volcanic and tectonic) landforms. We wanted students to develop an understanding of how, over “unfamiliar” geological (time) and spatial scales, geomorphological processes operating across different rock types resulting from geological processes (e.g. granite pluton emplacement amongst sedimentary rocks) result in the landscapes observed presently. During the class, with tutors as guides, students worked in groups and learnt how to use the Geoscience Australia portal to explore the Glenrowan region, centered around the Warby Ranges and the surrounding plains. Professional instructional videos developed in collaboration with the University of Melbourne Learning Environments media team were used to demonstrate how to use the portal to find geological and geomorphological information. Students were guided in the use of Google Earth to visualise terrain in pseudo-3D and using elevation transects.

The spatial correlation of landform patterns and elements with different surface and subsurface geologies was key to unlocking students’ abilities to explain the “why” and “how” of landscape evolution, albeit at the basic level. Students had mostly positive experiences and learning outcomes shown in the post-subject survey (n = 30; scores of 4.6 to 6.0 for 12 questions on 7-point Likert scale) and comments. Technical issues encountered due to simultaneous class access to the portal, and gaps in explaining specific functionalities and their potential for further understanding, were highlighted. The authors acknowledge the strong support for this work through the University of Melbourne’s FlexAP programme.

*Keywords*: WebGIS, authentic learning, geology, geomorphology, ecology

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