Chapter 13
Create-and-Learn: Education “in” a Synthetic Learning Environment

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ABSTRACT
The aim of this chapter is to argue how create-and-learn pedagogy can be used to direct and drive the development of virtual reality applications in academic settings. The chapter discusses the development of a synthetic learning environment that provides a context for new learning and twenty-first century education. A case study of an interdisciplinary project by university undergraduates in Japan designing, modeling, and programming a rudimentary virtual nuclear power plant provides the scenario for reflecting on the learning experiences. The chapter attempts to answer the question: How can education-appropriate virtual reality technology support students in their learning endeavors? The participation “in” technology, described in this chapter, advances the development of particular skill sets, applies knowledge to innovative situations, empowers positive attitudes to active learning, and promotes ethical considerations of the impact of technological implementations.

INTRODUCTION
The developments of technology and the ubiquity of digital media in recent years has accelerated the dynamic paradigm shift in education from ‘sit-and-listen’ didactic tuition to a ‘create-and-learn’ discursive pedagogy. To illustrate and make sense of this, the chapter will discuss the design and development of a Synthetic Learning Environment that provides a context for new learning and 21st century education, and subsequently present a case for interdisciplinary education informed by the development of a virtual environment.

The implementation is enacted by a ‘try-and-explore’ approach to support a ‘create-and-learn’ pedagogy. This is supported in Japan. For instance, the Japanese government is concerned about the skill sets of its declining workforce in adapting to the new world of work, despite continuing high Math and Science rankings in the global PISA assessments (OECD, 2016). Accordingly, to implement its ‘Overhaul

CONSIDERING LEARNING

Active Learning

The process of learning is the acquisition of new skills or new forms of knowledge and understanding (Selwyn, 2017). Bloom (1956) described learning in terms of three overlapping domains involving the manual and physical skills of ‘doing’ (the psychomotor domain), emotions, attitudes as ‘feeling’ (the affective domain), and capability and knowledge as ‘thinking’ (the metacognitive domain). Bloom and colleagues subsequently proposed a taxonomy of knowledge consisting of factual knowledge (relating to a specific discipline), procedural knowledge (techniques and procedures), declarative knowledge (relationship between concepts) and meta-cognitive knowledge (knowledge of one’s cognitive demands, limitations and strategies). Anderson et al. (2001) updated the taxonomy by mapping the cognitive processes of creating, evaluating, analyzing, applying, understanding and remembering onto the four knowledge dimensions of metacognitive, procedural, conceptual, and factual knowledge. The rationale is that where the two dimensions intersect, a learning objective can be identified. For example, the learning objective that may be associated with ‘metacognition’ and ‘evaluate’ could be ‘reflect’. The object of the
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