The Online Mathematics Diagnostic Tool for Transformative Learning in the Pacific

Bibhya Nand Sharma
The University of the South Pacific, Fiji

Aluwesi Volau Fonolahi
The University of the South Pacific, Fiji

Akeshnil Bali
The University of the South Pacific, Fiji

Swasti Shubha Narayan
The University of the South Pacific, Fiji

EXECUTIVE SUMMARY

With advances in information and communication technology, students can be educated from anywhere at any time at their own pace. Students of the 21st century have different learning expectations. These expectations require the design of smart learning environments to ensure more effective and adaptive learning. This chapter essays an introduction to a new educational tool developed on the Moodle platform by The University of the South Pacific to bridge gaps in mathematics knowledge and skills as students' transit from secondary to tertiary education. The tool, known as the Online Mathematics Diagnostic Tool (OMDT), is an intelligent system which provides online tests and automates personalized remediation. This chapter will include the reasons why this diagnostic tool has been developed for the Pacific region students aspiring for tertiary education. It will also discuss why the tool is considered as a smart learning environment (SLE) and how it ensures effective learning of mathematics.

INTRODUCTION

The rapid growth in information and communication technology (ICT) has given educationists the opportunity to reach a wider audience in an efficient and cost-effective way than in the past. In the late 1900s, many authors wrote about the advantages and capabilities that can be achieved by integrating technology and education, and the excitement that technology has enabled both formal and informal education to be available at anytime, anywhere and any place convenient to the learner (Tucker and Morris, 2011). Due to technological advancement and the integration of technology and education, the learning environment has invariably changed from a physical to a digital one. Huang, Yang and Zheng (2013), have stated that a physical learning environment refers to the traditional classrooms and lecture theatres, learning commons, multimedia sandbox, residential study areas and huddle rooms in schools and tertiary institutions. This is where the teacher, lecturer or mentor provides the knowledge, guidance, motivation and feedback to students' learning. A digital learning environment, on the other hand, is where digital resources can be accessed online. The environment is based on rich media allowing users to select the resources. However, this environment supports only low–order cognition such as knowledge, comprehension and application, leaving out the higher order cognition which are analysis, synthesis and evaluation.

Singh and Hassan (2017) have stated that students of the 21st century have different learning traits and skills, and their learning expectations are also very different as they prefer high degrees of technology-enabled learning with unstructured environment that promotes collaborative learning and guidance of a facilitator. Education institutions thus are now challenged to close the gap between traditional learning environment and students' expectations of learning. Chatti et al. (2010) have mentioned that there is a need to change from traditional learning which promotes one-size that fits everyone, is centralized, static, top down and based on a knowledge-push model to a more personalized, social, open, dynamic, emergent and knowledge-pull model for learning. This gives rise to the need to develop education technology that engages the smart learning environment (SLE) which provides the needed learning guidance, hints, or supportive tools and learning suggestions (Hwang, 2014). The SLE plays the role of a coach or guide and seeks any opportunity to advise learners of their needs and preferences. Thus, it provides self-learning, self-motivated and personalized services (Zhu, Yu & Riezebos, 2016).

An SLE can be developed and used in many facets of education to promote effective learning. Klimova (2015) has discussed in detail how assessment can be carried out effectively in an SLE. Singh and Hassan (2017) have stated that the Hamdan Bin Mohammed Smart University (HBMSU) has built numerous smart technological tools for the purpose of assisting faculties in designing smart learning, to assist the registrar to identify and suggest courses to learners, examination schedules and final grades, as well as to assist the financial systems to check and alert learners on their financial status.

This case study will discuss the development of a new technology tool by The University of the South Pacific (USP) known as the Online Mathematics Diagnostic Tool (OMDT). The purpose of the OMDT is to bridge the gaps in mathematics knowledge and skills of students as they transit from secondary education to tertiary education. The OMDT is developed to create a SLE.

Problem Statement

The University of the South Pacific (USP) is the premier institute for higher education for the Pacific region. Established in 1968, it is co-owned by twelve member countries namely the Cook Islands, Re-