Technology Adoption in Engineering Design for Distance Education

Amanullah M.T.O., Deakin University, Burwood, Victoria, Australia

Jaideep Chandran, Deakin University, Burwood, Victoria, Australia

Alex Stojcevski, Deakin University, Burwood, Victoria, Australia

ABSTRACT

Technology plays a critical role in delivering modern education to the next generation. Proper and effective use of technology is extremely important especially for distance education. Students who enrol in distance mode have a number of limitations as most of them work full time along with the commitments to the family. Distance education in engineering has its own unique set of challenges; it has to ensure the learning outcomes are met through the content, delivery style and assessment strategies. It also has to ensure the distance students are provided a learning experience at par with on campus students in terms of access to laboratory facilities and hands on experience. The Project Oriented Design Based Learning model drives the learning through a design based project and employs a blended learning environment to address the challenges faced in distance engineering education. This paper discusses technology integration for the distance students based on the Project Oriented Design Based Learning.

Keywords: Cloud Learning, Distance Engineering Education, Engineering Design, Engineering Education, Industry Projects, Online Assessment, Project Oriented Design Based Learning (PODBL)

INTRODUCTION

The School of Engineering in Deakin University has committed to adopt a new learning model Project Oriented Design Based Learning (PODBL) and dedicated to use this model in delivering a more effective distance education. This new learning model encompasses design based learning as the key driving force along with the principle of project based learning. This change was followed with another change bought by Deakin University bringing about a change in the delivery of education across all disciplines affecting every aspect of the student learning experience described as Cloud and Located Learning.

DISTANCE ENGINEERING EDUCATION

One of the achievements in the field of education is the ability to provide education at a distance and this ability has helped attract a cohort of students who previously did not have access to education. This cohort of students consists primarily of professionals who seek advanced degrees but don't want to return to school full time or part time students with full time employment commitments requiring them to subscribe to the distance mode (Pester et al., 2011; Roberts, 2010). The rise in technology has also helped the growth in distance education and has opened new avenues for both education providers and seekers. Technology has revolutionised the delivery of content and the mode of delivery has evolved from printed and mailed material to video resources to eLearning courses which are internet based courses sometimes delivered in real time. Distance education has separated the teacher and the student in space and time and has given the students flexibility in environment and time. The vast rise in internet technologies has also allowed students continuous communication with the staff (Roberts & Owen, 2011; Watson et al., 2004).

The recent growth in technology has allowed providing an engineering course through a distance education program and the rise in networking capabilities has allowed the offering of an online engineering course and brings it to students who were disadvantaged by time or distance or by finance. The acceptance and utilization of online engineering education has been determined the quality of the online course compared to the traditional course; the availability and accessibility of courses and material to any number students and the availability of topics across the engineering disciplines. Providing a distance course also brings forward many challenges and the distinguishing challenges is the lab requirements for an engineering course; along with this the other challenges is to make sure the content is taught effectively to meet the learning outcomes, ensure the assessment is aligned with the learning strategy and importantly ensure the technology works and is resourced properly (Aktan et al 1996; Agadas, 2013).

The need for hands-on experience (also includes laboratories) critical to the development of engineers, is one of the primary challenges in providing a distance engineering course. There are several strategies proposed including the use of laboratories at the work place or partner institutes and the use of simulated laboratories where students can run simulations modelling the real processes or use facilities which can be remotely controlled by the internet. Another challenge unique to engineering education is the rapid change in technology in the various disciplines in engineering which has to be catered for requiring the use of advanced visualisations and animations to aid in understanding the technology (Baukal, 2010; Bourne, 2005).

TECHNOLOGY INTEGRATION IN DISTANCE EDUCATION

Technology has always played an important role in the delivery of distance education, the first instance being the use of the correspondence model and the print technology to deliver content and communication between the student and the staff. The second stage involved the use of developed and refined resources which included study guides, selected reading, audio-video course material via tapes and audio/video broadcasting. The use of audio-video resources and broadcast channels provided a more satisfactory performance than the print correspondence but the communication was still asynchronous and the access to material was limited (Harris & Krousgrill, 2008; Taylor, 1996).

The advent of networking technologies and the World Wide Web and virtual reality has further enhanced the offerings allowing them to go online taking the delivery of distance education in the third stage. The internet facilitated distance instruction gives the students flexibility and ease of access and it also lowered the cost of providing resources for distance students. The use of internet based or eLearning based

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