Chapter 1
Problems Faced by Educators and Students in Teaching and Learning Engineering

ABSTRACT

In this chapter, the author presents the problems faced by educators and students in teaching and learning engineering courses. In general, teaching of engineering courses are relatively challenging due to the nature of the courses that are perceived as "difficult courses" by a number of students. This course is built upon the strong fundamental knowledge in physics and mathematics. This course requires the students to have a strong abstract thinking, reasoning, and problem-solving skills. Due to this problem, a further research study (a continuation from previous study) was embarked at the National Energy University, which is also known as Universiti Tenaga Nasional (UNITEN), Malaysia. Selected lecturers and students were randomly selected and interviewed to find the reasons for this problem.

INTRODUCTION

The purpose of this research was to explore the problems faced by mechanical engineering (ME) lecturers teaching the course and students studying difficult topics i.e. four link bar (4BL) mechanisms, shaft crank, motions such as linear, projectile and curvilinear, spur gear design and rotational of x and y axes. In response to the new paradigm shift in engineering education that emphasizes

DOI: 10.4018/978-1-7998-0465-9.ch001

on the use of Information and Communication Technologies (ICT) to facilitate the teaching and learning for tertiary education, there have been numerous studies that proposed the solutions utilizing the Computer Aided Learning (CAL) platform. The usability of the CAL software to facilitate the learning of the students need further investigation empirically. In this research, several advanced technology assisted problem solving (ATAPS) packages which can be considered as a branch of CAL was enhanced with simulations and augmented reality (AR) technologies. Additionally, this research was also aimed at identifying the students' attitude towards outcome based education (OBE). Literature has shown that OBE could enhance students' understanding and make the learning more meaningful. The theoretical framework of this study was based on selected learning styles instruments and software measurement inventory such as Honey and Mumford, Felder and Silverman, the Ogden's Personality and Learning Styles Questionnaire. The research study further investigated the usability of the enhanced ATAPS packages. Through the usability testing, two of the usability evaluation instruments namely (i) system usability scale (SUS) and (ii) post-study system usability questionnaire (PSSUQ) were employed which will be further discussed in other Chapters of this book.

One of the major key to serve the nation's development is the technological advancement especially Information and Communication Technologies (ICT). Apart from this, systematic knowledge of engineering (gained through appropriate structures) signifies a major role in the attainment of a high level of technological advancement. Most developing countries however faces difficulty to impart adequate knowledge and training to engineers at different levels of education due to lack of supporting infrastructure and modern technological teaching aids.

According to Lee (2018), in the era of knowledge driven society, changes occur rapidly throughout the industries and the marketplace. Two main factors that drive the rapid change in the market environment and the society are the globalization and the revolution of ICT. Knowledge has played an important role as a sustainable competitive factor for survival in the dynamic marketplace (Bhatti et al., 2016; Hana, 2013; Li & Liu, 2014). As mentioned by the well-known management expert, Peter Drucker (1993), the main challenge in the knowledge-based economy is how to make the information and knowledge productive enough to compete in this constantly changing environment. The globe is moving towards the era of post-industrial knowledge society where the future will be essentially determined by the ability to utilize knowledge for unique ideas, products and services that emphasize on innovation efforts