

International Conference on Mathematics Education Research 2010 (ICMER 2010)

Soft Skills in the Development of Team-Based Electronic Learning Portfolio

Azizan Zainal Abidin^{a,*}, Fatimah Saleh^b

^a*Department of Fundamental & Applied Sciences, Universiti Teknologi PETRONAS,*

^b*School of Educational Studies, Universiti Sains Malaysia*

Abstract

The top qualities of an effective engineer include not only technical competence but also soft skills which may be hard to acquire while already on the job. Fulfilling stakeholders' demand, educators design the curriculum for engineering programs with the objectives of producing graduates capable in not only technical competence but also possess the equally important soft skills. This calls for a good variety of assessment techniques of student learning in order to ensure a more comprehensive measurement of performance. With the limitations of the traditional pen and paper assessment approach, the electronic learning portfolio is one alternative that is integrated in the assessment of Differential Equations course in Universiti Teknologi PETRONAS, Malaysia. Two hundred and forty two engineering undergraduates are involved in the study and are randomly grouped into fifty one teams to develop team-based electronic Differential Equations Learning Portfolio, acronym e-DELP. In the process of developing the portfolio electronically, each team strategizes collectively in conformance to the criteria explicitly transcribed on the course e-learning portal. Objectively, e-DELP development creates a platform that provides participants the opportunity to exercise their soft skills while exploring the applications of Differential Equations in the real world and new skills in using Equation Editor and Power Point Presentation Skills. The participants' major task is to design a learning portfolio, team-based and problem-based within 7 weeks of a fourteen-week semester. The deliverable is a four-component learning portfolio, comprising members' demographic details, solutions to five modelling problems involving Ordinary Differential Equations, their evaluation of the course and delivery, and reflections of their learning experience; electronic-based and saved on a compact disc. A questionnaire is employed to measure the general attitude towards the integration of e-DELP, and individual interview sessions are conducted to further confirm the data obtained. The objective of this paper is to present some qualitative findings of the soft skills that participants acquire through the process of working on e-DELP, retrieved from the verbatim written comments in their evaluation and reflections, verbal and non-verbal feedback during the interviews. The results indicate that there is more to the learning than just skills in solving Ordinary Differential Equations which are of great value in the preparation of the future well-rounded engineers.

© 2010 Elsevier Ltd. Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

Keywords: Electronic learning portfolio; Engineering; Soft skills; Qualitative

1. Introduction

The undergraduate and postgraduate programs offered at Universiti Teknologi PETRONAS or UTP a wholly owned subsidiary of PETRONAS, Malaysia's Oil and Gas Company, is focused on engineering and technology, with the

* Corresponding author. Tel.: +0-605-368-7672; fax: +0-605-365-5905.

E-mail address: azizan_zainalabidin@petronas.com.my (A.Z.Abidin)

mission of producing well-rounded graduates defined typically with the seven attributes as noted by A.Mohd Shariff et al (2000), that is, technical competence, lifetime learning capacity, critical thinking, communication and behavioural skills, business acumen, practical aptitude, and solution synthesis ability.

Chapman (2006) noted on Bloom's 'Taxonomy of Educational Objectives' which defines three learning domains: Cognitive, Affective and Psychomotor Domains. The Cognitive Domain involves intellectual capability i.e. knowledge, whilst the Affective Domain involves feelings, emotions and behaviour i.e. attitude, and Psychomotor Domain involves manual and physical skills. Hence, appropriate tools to measure engineering undergraduates' knowledge skills and attitude require more than just the traditional pen and paper. The Engineering School Directory (2010) listed the top ten qualities of an engineer as follows: (1) Possesses a strong analytical aptitude (2) Shows an attention to detail (3) Have excellent communication skills (4) Takes part in continuing education (5) Is creative (6) Shows an ability to think logically (7) Is mathematically inclined (8) Has good problem solving skills (9) Is a team player (10) Has excellent technical knowledge. Clearly, becoming an engineer is not all about acquiring technical skills but soft skills are as important.

How does an engineer acquire those non-technical skills? Kumar and Kent Hsio (2007) noted that currently, engineers learn leadership and management skills while working, and that certainly is learning "soft skills the hard way." It would be much easier for these engineers if they had been trained much earlier, i.e. by learning these skills at the tertiary level before being employed on the job. Engineering programs curriculum at institutions of higher learning is now designed to embed alternative instruments that could appropriately measure the desired soft skills. The paper and pencil type of assessment with its limitations is not able to measure communication skills, teamwork skills, organization and managerial skills, and other soft skills required in the making of an efficient engineer. As a result, educators resort to other options that could provide a more comprehensive measure of learners' performance. Aurbach and Associates (2010) noted the definition of the alternative assessment in Vision (1993) as "The utilization of non-traditional approaches in judging student performance", providing portfolio as an example, which is defined as "A purposeful collection of student work that exhibits the student's efforts, progress and achievements in one or more areas. The collection must include student participation in selecting the contents, the criteria for selection, the criteria for judging merit and evidence of student self-reflection." The learning portfolio comes in paper-based, or now electronic or web-based. According to Batson (2002), since the mid-90s, the term "e-Portfolio" or "electronic portfolio" has been used to describe collections of student work at a Web site. Barrett (2004) distinguishes the difference between the Electronic Portfolios and Online Assessment Management Systems; With regards to purpose, the e-Portfolio is for multiple purposes, i.e. for Learning, Assessment, and Employment, whilst the purpose of the Assessment Management System is for a single purpose, i.e. for Formative and Summative Assessment. Love et al (2004) defined e-portfolios as information that resides on a CD ROM or other physical media. The National Learning Infrastructure Initiative or NLII (2004) defined the portfolios as "collections of work designed for a specific objective-that is, to provide a record of accomplishments".

The large student number and the limitations of the pen and paper assessment approach are the motivation factors that lead the instructor to resort to implementing a team-based electronic learning portfolio. The electronic learning portfolio done in this study is intended to discover the soft skills that participants learn to acquire besides providing participants the opportunity to collectively work as a team, explore the use of differential equations in real life situations and at the same time apply their skills of solving first order differential equations that was taught in the first few weeks of the July 2009 semester. What do these undergraduates feel about such an experience? The focus of this paper is to discuss the students view and reflections of students' learning experience of doing the team-based electronic portfolio in the learning of Differential Equations. The objective, of this study is to capture and assess participants' feelings and attitude towards the development of the electronic Differential Equations Learning Portfolio, acronym e-DELP. The implementation of the team-based e-DELP in the assessment of mathematics for the engineering undergraduates in UTP is a new experience.

2. Methodology

The formation of this group of participants was predetermined by the program of choice by the participants and not manipulated. Two hundred and forty-two engineering undergraduates of July 2009 (first) semester, mainly from the Petroleum Geosciences, Mechanical, and Petroleum engineering undergraduates involved in this study were teamed

Download English Version:

<https://daneshyari.com/en/article/1124810>

Download Persian Version:

<https://daneshyari.com/article/1124810>

[Daneshyari.com](https://daneshyari.com)