

### 34. EFFECT OF VIRTUAL ENVIRONMENT COURSEWARE IN LEARNING ENGINEERING DRAWING

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#### Extended Abstract

Technology is a product and outcome of engineering and science. It is also application of knowledge of humans by manipulating and modifying nature to meet their needs. These changes can be achieved by transforming and improving the usage of tools, materials and techniques which have their effect on humans and other living creatures as well. Today's technology would not be the same as yesterday and would not be better than tomorrow. Every single day, there will be some improvement on technology which most likely affected on engineering industries (Raymond and Albert, 2009). Thus, the requirement of the industries on engineering graduates constantly changes. Possessing technical skills solely is not enough for engineers in the workforce where most of them using trial and error technique that seem to be effective in the industry (Colwell, 2010). Employers or industries are not only seeking those who are technically skilled but also possess non-technical skills as well, thus making them marketable graduates (Low, 2006; Lee, 2003; Woodward, Sendall, and Ceccucci, 2010). This requirement does not mean that the technical skills are not important, but non-technical skills are additional skills required by engineering graduates for 21st century skills of engineers.

To become an engineer is not difficult, but to be a competent and professional engineer is a tough endeavor. In order to become one, Hasna (2008) reported that engineers must contend with endless societal and technological transformation due to the rapid development. In today's modern world, industries need to compete with each other in order to survive in the global market. Thus, employers are seeking graduates who are able to work immediately after being hired (Azami et al., 2009), and of course, they still require some training before they can perform the job. Nevertheless, the training is not very time consuming and the employers do not need to spend a large sum of money for the training program. In addition, an undergraduate degree status without equipped skills is not the main requirement to get hire. Instead, industries are hiring graduates who have concrete knowledge for both skills since they require a shorter period for training to become effective and efficient engineers (Walther and Radcliffe, 2007). On the other hand, engineering professional body, Board of Engineers Malaysia (BEM) had come out with a list of 10 generic skill attributes which become a guideline to every engineering graduate in Malaysia in order to produce better and competitive engineers.

According to Kolmos, (2009), the solution for the new requirement of skills of undergraduates in engineering education is by implementing problem-based learning (PBL) or project-based learning (PjBL). Both methods emphasizes on student-centered learning and negate traditional approach which is more teacher driven. PjBL and PBL show favourable characteristics which provide motivation and are suitable for the development of non-technical skills. Nevertheless, these two approaches of learning is confusing and people misjudge both methods to be the same thing. The fact is, as the name is different, so is the method. As for PjBL, it is likely to be correlated with engineering and science field, whereas PBL is also implemented in those fields, but is originated from medical and other professional preparatory training (Chakravarthi and Haleagrahara, 2010). This statement is supported by Perez et al. (2010), which stated that PjBL was established in the engineering field to provide experience for engineering students, which is able to promote life-long learning and cognitive abilities. Furthermore, project works are able to retain students in engineering program

(Richardson et al., 1998) and able to improve their motivation to learn future material (McKenzie, Pelliccione and Parker, 2008).

Perceptions of industries toward engineering graduates nowadays do not meet their expectation. Graduates produced by the universities do not possess and meet the requirement of the industries because they lack skills especially non-technical skills such as communication, problem solving, leadership and team working (Nair and Patil, 2008). As the world is moving forward, gaps between expectations and perceptions can be wider if universities use the same approach in teaching. Such problem can be perceived from the perspective of engineers in the industries towards engineering education which asserted that engineering education should put more emphasis on communication skills, leadership and management skills and must put a lot of effort in order to nurture interest towards engineering profession among undergraduates (Mustafa et al., 2008). Kamsah (2004) in his research stated that current engineering graduates are not deficient in technical capability or their knowledge but they are deficient in their soft skills which are important for them to work collaboratively and to use their technical abilities. PjBL seems the best method for engineering education in teaching and learning nowadays, and it is proven that it is effective to develop skills among engineering graduates. The purpose of this study is to investigate effectiveness of PjBL in engineering education at higher institution level in Malaysia. The research project was developed to investigate the use of PjBL on student's satisfaction and the effectiveness of this teaching and learning method in order to increase student's non-technical skills.

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