UNIVERSITI TEKNOLOGI MARA

CONSTRUCTION QUANTIFICATION COMPETENCY: EFFECTS OF 3D REPRESENTATION IN THE SUB-PROFESSIONAL SKILLS AMONG STUDENTS

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ABSTRACT

Problem-solving competency is a significant part of professional skills talent, especially for technical education of job-specific skills like the construction professionals. Hence, in the quantity surveying (QS) competency-based training, the initiative in searching for the most effective means to improve students' construction quantification problem-solving ability is critical. The study investigated whether using a new instructional format of 3D representation could improve students' technical skills in construction quantification course learning. The data for the study was collected from two public education institutions students (N=390) in Malaysia. Five research instruments were used, namely demographic questionnaire, spatial visualisation ability test (SVAT), group embedded figures test (GEFT) and construction quantification test (CQT). A descriptive and inferential statistical test revealed that students with different cognitive abilities, styles, and demographic factors (gender, age, and cultural environment) categories had used the 3D representation instructional format in a different pattern. Interestingly, the findings obtained from the correlational and group comparison analysis between variables contributed to diverse effects, except for different age categories. The research results emphasised that the intervention of 3D representation instructional format in the construction quantification course learning could significantly improve students' competency in construction quantification learning. The findings revealed that at-risk students with low spatial visualisation ability (SVA), being female, novice, and lacking involvement in spatial activities, need maximum interactions with the intervention of 3D instructional format. On the other hand, students with high SVA, being male, skilful, and more involved in spatial activities, need minimum interactions with the 3D representation instructional format. The findings showed that individual differences impact the interaction with the learning instruction to a different level. Consequently, the 3D representation instructional format should be developed progressively and implemented in construction quantification course learning because lack of thought on individual differences' aspects such as cognitive, demographic, and instructional format could influence the quality of technical skills. The critical contribution of this study is the positive implications from the intervention in suggesting a more meaningful approach that could assist the lack of skills students to enhance understanding and the construction quantification competency. To improve the skills and knowledge, both the at-risk and typical students could benefit from the 3D representation instructional format intervention. In addition, the positive findings from the practical competency-based training guideline could profit the educational and industrial stakeholders in solving the construction quantification learning problems.

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CHAPTER ONE
INTRODUCTION

1.1 Research Background

In the house of commons, the Prime Minister of Malaysia has emphasised increasing human capital development (Economic Planning Unit, 2016). Thus, it has been made one of the thrusts in the six strategic thrusts of the Eleventh Malaysia Plan 2016 – 2020 (Economic Planning Unit, 2016). Essentially, the government has set the goals to produce outstanding human capital with the best benefits package, such as one with related knowledge, skills, and attitudes. In short, contemporary standards expectation is to produce great human and multi-talented individuals who fit industry demand. To achieve the goals and agenda, the government has taken the necessary actions by improving the quality of the education system in Malaysia through (a) strengthening lifelong learning for skills enhancement and (b) improving the quality of the education system for better student outcomes and institutional excellence (Economic Planning Unit, 2016).

Richardson (2007) claimed that the quality gap is one of the skills shortages classifications. He proposed two categories of people in the quality gap scheme, people who possess essential technical skills but are not using them and people who are willing to work but lack certain core expectations that employers look for potential workers. The Department of Employment and Workplace Relations (cited in Richardson, 2007) pointed out those skill shortages:

> *"Exist when employers are unable to fill or have considerable difficulty in filling vacancies for an occupation, or specialised skill needs within that occupation, at current levels of remuneration and conditions of employment, and reasonably accessible location. Whereas skill gaps occur where existing employees do not have the required qualifications, experience and/or specialised skills to meet the firm's skill needs for an occupation. Workers may not be adequately trained or qualified to perform tasks or may not have upskilled to emerging skill requirements (p. 15)."*