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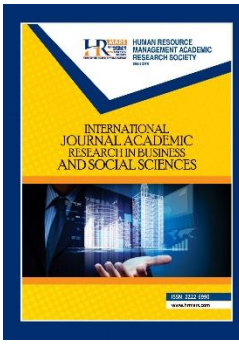
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Technical Skills in Quantity Surveying and Relevant Practices: Discipline Standards

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Abstract

Technical skills in Quantity Surveying (QS) is an essential knowledge. The knowledge is necessary for a quantity surveyor to perform the quantification task with the relevant discipline standards. Without good technical skills, quantity surveyor professionals may feel imperfect on what they are doing and subsequently causing low quality of work. Therefore, from this study, some key warnings on the relevant factors that influence the quantity surveying students' technical skills and knowledge for employment in the industry were further discussed. This research was conducted among the quantity surveying professionals in Malaysian construction companies (northern region of Malaysia). The acquired data were analysed by using SPSS software. The results showed that, for the purpose of solving and improving the technical skills among Quantity Surveyor, most of the professionals tend to agree that it is important to reach the optimal discipline standards. Examples of factors and personal elements that contribute to the technical skills in Quantity Surveying and relevant practices are issues concerning two-dimensional (2D) and three-dimensional (3D) representations, construction quantification difficulties, standard terminology and construction components, quality of construction drawings details, introduction to current practices, construction experiences and current information technology or software intervention. Additionally, the potential solutions have been stressed to promote the most effective learning methodologies that could support the learning and performance framework studies of the Quantity Surveying fields and the relevant quality standards.

Keywords: Achievement, Learning, Quantity Surveying, Quantification, Technical Skills.

Introduction

Nowadays, employers set really high standards for the young employees (Dench, Perryman & Giles, 1998). The scenario is similar for the construction of key players. In order to become a good quantity surveyor in the construction industry, it is no doubt that the quantity surveyor must be equipped with the core skills and able to perform efficiently. Quantity surveyor professionals who fail to meet the

QS discipline standards will not meet the employer satisfaction (Zakaria, Munaaim & Khan, 2006). Therefore, in order to equip young workers with the key skills needed, it is important to determine new strategies for influencing the students' Intellectual performance and educational outcome (Unit, 2015). Having said that, most of the respondents did believe that the basic key skills of the students in construction quantification could be improved through well planned educational training. Some forms of adaptation to the current method of teaching and learning could provide potential graduates with better knowledge and skills that meet the industry and the employer's needs (Klosters, 2014).

Research Background

Lacking necessary technical skills may affect students' performance in quantification course achievements. According to Alias, Black, and Gray (2003) and Hodgson, Sher, and Mak (2008), some students were gifted with a certain standard of abilities. Whereas, some of them experienced greater difficulties in performing a certain task. There is no doubt that each individual was different from one another across many aspects such as understanding ability, environmental adaptation, experience, the action of thinking in a logical way and problems consideration (Neisser et al., 1996). Therefore, to guide this study, as shown in Table 1, the following research questions have been formulated for the purpose of literature development:

Table 1. Summary of Literature Review

Research Question	Author	Core Inquiry
What are the students' specific characteristics?	• Novak (2010) • Mokhtar and Din (2013) • Merchant et al. (2013) • Cassidy (2004) • Rozimah (2014) • Inan and Lowther (2010)	• Individual Differences • Learning • Achievement
How it fits into the construction quantification problem-solving ability?	• Arslan and Dazkir (2017) • Börner, Maltese, Balliet, and Heimlich (2016) • Galesic and Garcia-Retamero (2011) • Lee, Kim, and Kwon (2017) • Osman et al. (2015) • Ben-Chaim, Lappan, and Huoang (1986) • Golledge and Stimson (1997) • McGee (1979)	
What limits the student from functioning?		

What are the available strategies/approaches and support systems?	• Novak (2010) • Ak (2008) • Ainsworth (2006) • Bryant and Bryant (1998) • Malik and Venkatraman (2017)	
What integration and adaptation of instructional should be considered?		
How differences affect the academic achievement?	• McGee (1979) • Witkin (1973) • Witkin (1977) • Paivio (1990) • Atan Long (1980) • Hunter (1986)	
What data should be collected to determine learning and performance criteria?		
Which theory and model to be applied?		

One of the objectives of the research is to identify some key indications on the quantification performance of the recent Quantity Surveying graduates. These indications may suggest potential ideas on improving the methods of teaching and learning of the fundamental course to promote better academic achievement and anticipated skill requirements among Quantity Surveying graduates ('preferred' graduates). The findings obtained via this research will be used for the purpose of enhancing the appropriate discipline standards and best practices for the Quantity Surveying field.

Research Methodology

Theoretically, there are several key factors (personal elements) that may affect the quality standards of the construction quantification skills (Fortune & Skitmore, 1993). For that reason, this research intends to determine and clarify the personal elements involved. Basically, the research method used in this study utilised quantitative research techniques. Moreover, to accomplish the research objective, the following Table 2 specifies the details of data collection.

Table 2. Details of Data Collection

Research Objective	Research Instrument	Research Method
To identify key factors that contribute to the quality standards of technical skills in Quantity Surveying and relevant practices	Questionnaire survey	Quantitative
To determine potential solutions that contribute to the quality standards of technical skills in Quantity Surveying and relevant practices		

In order to obtain the findings, the questionnaires were distributed to the Quantity Surveying consultants in the northern region of Malaysia. Specifically, the questionnaires were distributed among the consultants in the state of Perak, Pulau Pinang, and Kedah. As shown in Table 3, based on registered consultant QS practice registration records up to August 2018, a total of 28 Quantity Surveying consultants were registered with the BQSM (BQSM, 2018).

Table 3. Registered Consultant QS Practice in Northern Region (BQSM, 2018)

PERAK	PULAU PINANG	KEDAH
1. BK QS CONSULT 2. MOKHNAR & ASSOCIATES 3. PERUNDING UKUR BAHAN AKMAR 4. Z QS CONSULT	1. GKG KONSULTANT KOS 2. HKH JURUKUR BAHAN 3. JUB UTARA SDN. BHD. 4. KUANTIBINA SDN. BHD. 5. KUANTIKOS PERUNDING SDN. BHD. 6. NOR AZAH CONSULTANT 7. NSA COST SDN. BHD. 8. OAB QUANTITY SURVEYORS 9. PERUNDING PINANG SDN. BHD. 10. PERUNDING QUANTS UTARA 11. QS KONSULTANT 12. QS PERUNDING 13. UNITECH QS CONSULTANCY SDN. BHD.	1. ILHAM KOS KONSULTAN SDN. BHD. 2. JUB MUTIARA 3. JURUUKUR BAHAN PSZ SDN. BHD. 4. MZAKIHUSSAIN CONSULT 5. MZH CONSULT SDN. BHD. 6. PERUNDING JATI 7. RHQS CONSULTANT 8. SAS QS CONSULT 9. SG CONTRACT SERVICES 10. SG CONTRACT SERVICES SDN. BHD. 11. ZPM CONSULTANCY

Source: https://www.bqsm.gov.my/index.php/en/qs-registry-2/registered-qs-practices

Findings and Discussion

The objective of this research is to identify key factors and personal elements that contribute to the quality standards of the technical skills in Quantity Surveying and relevant practices. Essentially, the questionnaire survey consists of questions using the Likert Scale method. As can be seen from the Table 4, in the questionnaire, the statements were listed out to describe variables involved and respondents were required to state their level of agreement (between 1; strongly disagree to 5; strongly agree). The questionnaire distributed in the data collection procedure consists of four sections. Particularly, every section represents different objectives. However, in this paper, it will only present two of the research objectives.

Essentially, the data were analysed using the SPSS 23.0 version software. Throughout all of the personal elements that were listed in the questionnaire, there were six variables that most favoured by the respondents. As shown in Table 4, most of the respondents agreed that these personal elements were the most critical factors that influence the technical skills preparedness of Quantity Surveyor when performing quantification task.

Table 4. Quantification Skills Among Quantity Surveyors (Personal Elements)

Quantification Skills Among Quantity Surveyors (Personal Elements)	Mean Score	Ranking
Lack of ability to draw 2D & 3D sketches	4.14	1
Difficulty in carrying out quantification and limited time	4.05	2
Unable to understand standard terminology (construction components)	4.05	3
Poor quality of drawings (incomplete drawing details)	4.00	4
Lack of introduction to current practices/experiences	4.00	5
The intervention of current information technology/software such as BIM	4.00	6

For the purpose of solving the task of quantification, most of the respondents satisfied with the importance of 2D and 3D representations. The data showed, lack of ability to draw 2D and 3D sketches having the highest rank with the mean score of 4.14. Other factors such as construction quantification difficulties and standard terminology understanding were ranked second and third. Both factors were ranked second highest with the mean score of 4.05. Subsequently, poor quality of drawings, lack introduction to current practices/experiences and the requirement of current information technology/software such as building information modeling (BIM) intervention were ranked fourth, fifth and sixth with the mean score of 4.00.

Generally, in order to quantify construction elements correctly, there is a requirement of having an ability to read and thoroughly understand the construction drawing (McDonnell, 2010). In general, construction drawings will have a complete set of several different kinds of construction plans that contains standard view such as the floor plan, site plan, elevation and cross-section detail drawing (2D representation). According to Fortune and Skitmore (1994), without the ability to draw 2D and 3D sketches will influence the capability of the quantity surveyor to visualise the graphic images from the construction plan. As a result, it might prevent the quantity surveyor from producing better output in the task of quantification (project cost and price forecasts).

This opinion is supported by others. Most of the previous researchers agreed that visualization ability is crucial in quantification task. Apart from that, it is important in many technical occupations (Greene, 2001; Osman, Sharifah, Syed, & Razaksapian, 2015). Similarly, most of the students become fully aware of the fact that they must possess the skill because it is an important factor for students' technical estimations proficiency (Hodgson et al., 2008). In view of that, most of the respondents agreed that there are few recommendations that should be done in order to improve the technical skill. Findings from the questionnaire survey suggested several ways of learning to encourage a better students' outcome and reduce the skills gap (as shown in Table 5).

Table 5. Learning Methodologies

Learning Methodologies	Mean Score	Ranking
3D modeling exposure	4.33	1
New learning framework (workshop environment)	4.29	2
Develop an ability to formulate calculation in numeracy	4.19	3
Construction industry involvement and support (Consultant, contractor, and developer)	4.19	4
Active learning opportunities (site visits and guest lecturers)	4.14	5
Active learning (Group learning)	4.10	6
Problem-based learning, simulation exercises and role play	4.10	7

The following strategies for learning methodologies that were ranked from first to seventh can be considered as a compliment for conventional methodologies. The respondents' view that 3D modeling exposure is the most important learning method to be adopted. It had been pointed out at the highest rank with the mean score of 4.33. While problem-based learning, simulation exercises

and role play method was ranked at the lowest with the mean score of 4.10 in the list of potential solutions to reduce the quantification skill gap. Besides these two methods, the research data had outlined other learning methods. The data showed, learning methodologies such as new learning framework (workshop environment), develop an ability to formulate calculation in numeracy, construction industry involvement and support (consultant, contractor, and developer), active learning opportunities (site visits and guest lecturers) and active learning (group learning) were ranked second, third, fourth, fifth and sixth with the mean score of 4.29, 4.19, 4.14 and 4.10 respectively.

Conclusion

In conclusion, there are six factors that have the highest votes by the respondents namely lack of ability to draw 2D and 3D sketches, difficulty in carrying out quantification, unable to understand standard terminology (construction components), poor quality drawings (incomplete drawing details), lack of introduction to current practices or experience and intervention of current information technology or software. These factors have been identified as contributors to the quality standards of quantification skills among quantity surveyors. Specifically, the highest factors chosen by the respondents would provide a valuable framework to improve learning outcomes and performance relationship. Furthermore, effective feedbacks, both positive and negative from Quantity Surveying professionals are anticipated to improve the learning and performance framework studies of the Quantity Surveying fields. Essentially, in this research, most of the respondents contributed positive responses to the new teaching approaches such as the intervention of 3D software packages to help students' limitations of 2D drawings.

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