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EFFICACY STUDY OF QUANTITY SURVEYING SMART LEARNING KIT (QS2LK)

Siti Asmiza Muzafar¹, Muhamad Azry Khoiry²

**^{1,2} Civil Engineering Programme,
Smart and Sustainable Township Research Centre,
Faculty of Engineering and Built Environment,
Universiti Kebangsaan Malaysia,
43600 Bangi, Malaysia**

Abstract

The utilization of the Quantity Surveying Smart Learning Kit (QS2LK) was developed to make it easier for students to gain knowledge through the use of three-dimensional (3D) drawings. The introduction to this development is focused on the problems faced by some Diploma of Quantity Surveying in Polytechnic students who find the design of building elements taught in the classroom difficult to understand. A product of creativity will address the problem of students who are less familiar with building structures to make quantity measurements in order to get a better understanding of the layout and design of building elements. The aim of the project is to assist the process of teaching and learning in the measurement of the quantities of building works and to define the usefulness of using the QS2LK. This kit examines the use of technology as compared to conventional approaches of teaching and learning processes. The kit requires a study of teaching and learning technology in general and questionnaire outcomes. The findings revealed that there was a significant difference before and after using the kit. Furthermore, the measurement subject's achievement was higher before using it. While using QS2LK, this method of learning for all students taking Building Works Measurement subject will be more structured and easier to understand. In conclusion, the utilization of the developed smart learning kit enhanced students' measurement skills and improved the measurement achievement.

Keywords: Quantity Surveying, Smart Learning Kit, Teaching and Learning, Technology.

1.0 INTRODUCTION

Information and communication technology (ICT) has become one of the most important elements that characterize the students' basic skills. If effective approaches are implemented, technology will have a critical effect on learning and teaching. Because of this, the incorporation of ICT resources in the classroom is an effective technique for developing a better understanding of basic ideas for learning. It is the teachers' responsibility to teach students how to use technology as a tool to help their learning. Students use ICT devices to receive and communicate information (Kamal & Preeti, 2017). The teaching and learning method will be most successful with teaching aids capable of transmitting knowledge on topics that have been taught more simply and consistently (So & Kim, 2009; Charlie, 2008; Loveless, 2003; Mayer, 2001). There are two types of teaching aids: electronic (electronic) and non-electronic (print media). Radio, television, video, slideshow slides, and computer aids are examples of electronic aids. For example, non-electronic categories are scanning cards, newspapers, magazines, prototypes, and teaching-related photos (Rusmini, 2012; Fadzli, 2010; Salbiah, 2008). Mohd (2016) points out that teaching and learning creativity is a positive change and the shift that the faculty needs to make in order to achieve its teaching goals as well as to improve the students' entire human capital dimension. Education innovation is also an attempt to change the learning process, improvements in learning situations involving curriculum teaching, and learning, the professionalism of educators, and management of education (Yahya & Lailinanita, 2012).

When information communication technology evolves rapidly, institutions of tertiary education receive different cohorts of students each year with the ability to advance technology (Shahrnizam & Norfadilah, 2015). The new tertiary learning environment has grown and influenced this rapid advancement in media, content and technology. Using ICT can not only support students' cognitive development, but also increase their learning motivation and interaction (Mohamad, et. al. 2019). The students should cognitively retell what happens in the story without the teachers explaining them. They enjoy their learning process motivationally and have fun so that learning is not frustrating and drained. They can collaborate with their teachers and peers in interaction (Adi, 2010). The utilization of teaching aids can have a positive effect on students' academic excellence and the teacher's own teaching method (Zulkifley, et. al., 2019). Using teaching aid in general, the smart learning kit will make use of improving the facilities of the students to improve measurement process skills.

2.0 PROBLEM STATEMENT

Learning kit is a creative way to make teaching and learning more available to students to understand as a teaching tool in polytechnics. This learning kit has the benefit of presenting students with motivation and appeal and encouraging students to participate in the classroom. It can strengthen the comprehension and teaching and learning process of students as such. The QS Smart Learning Kit (QS2LK) or Quantity Surveying Smart Learning Kit is one of the easiest learning tools to support Diploma in Quantity Surveying of Polytechnic learning using the three dimension (3D) model. This learning approach is most effective in getting to know in detail every element of a building without having to look at a project directly. Students are able to imagine the building elements and understand the structure or sections.

This creative study's insight is focused on the issues some students frequently find in the classroom difficult to understand. The Quantity Surveying Students Diploma is generally less familiar with building element design, particularly for the new intake. Students need to visit the construction site to see the technologies and construction of a building for a better picture. However, before entering the site construction projects, students must first have a green card. The result of this research study will resolve the students' major problem with less knowledge and understanding of the building's structure to accurately measure the significant quantities to get a better idea of the arrangement and appearance of the building's various elements. Thus creating a product called the QS2LK will help students to better understand and apply quickly what they have learned in the classroom.

The aim is to more efficiently and effectively assist the teaching and learning process in the classroom and to determine the efficacy of using the QS2LK. QS2LK will help students or users significantly. It's saving time and money. For all students taking Quantity Surveying or Civil Engineering classes, this form of learning will be more structured and easier to understand. There are also more efficient and active learning sessions. Instead of using resources such as book references or site visits, this learning kit focuses more on communication and information technology today. As well by simply opening one communication device such as a computer and smartphone, all the elements and structures built of each building can be identified more easily.

3.0 METHODOLOGY

This QS2LK is using applications from SketchUp. Developing this learning kit based on the syllabus of Building Works Measurement, which includes quantifying the building elements. The elements involved are substructure which is work below lowest floor finish as well as

superstructures such as frame, staircase, door, window, and roof. Questionnaires were used in this analysis to determine the QS2LK's effectiveness. Using a questionnaire is a way of obtaining a lot of information at a minimum cost. The suggested responses make responding easily simpler for respondents (Ghazali, 2018).

4.0 RESULTS AND DISCUSSION

The use of the QS2LK was tested in order to seek students' understanding of Building Work Measurement courses required students' knowledge of building elements prior to quantity measurement. The use of the QS Smart Learning Kit was tested to measure student understanding for Building Works Measurement 1, Building Works Measurement 2 and Building Works Measurement 3 as the courses were user-aware of building elements prior to quantitative measurements.

The effectiveness of the QS2LK was based the final examination result of Building Works Measurement subjects from semester one until three. For semester one, the percentage of students who passed with grade B and above increased between before and after use of the kit, according to the Table 1. The number of students who obtained outstanding results of Grade B+ to A- improved from 11 percent to 25 percent with the kit, while students who scored more than grade A achieved 17 percent increment.

Meanwhile, for semester two students the outstanding percentage of students who have passed shows the result between before and after. Student achievement for low scores increased from 38 percent to 63 percent for grade C to B- while for below than grade C the percentage dropping from 62 percent to 7 percent. Next, students scored for grade B and above surprisingly increase from 0 to 22 percent and the result more than grade A from 0 to 8 percent. For third semester students, there is none who score less than grade C while grade C to B- from 64% to 36%. Next, students in grade B+ & A increased from 19% to 52%, while students in grade A & A+ also rose from 7% to 12%.

Table 1: The student's result before and after the kit application

Semester	Subject	Grade	Percentage	
			Before	After
1	Building Works Measurement 1	Below C	9	4
		C to B-	75	50
		B+ & A-	11	25
		A & A+	5	21

2	Building Works Measurement 2	Below C	62	7
		C to B-	38	63
		B+ & A-	0	22
		A & A+	0	8
3	Building Works Measurement 3	Below C	10	0
		C to B-	64	36
		B+ & A-	19	52
		A & A+	7	12

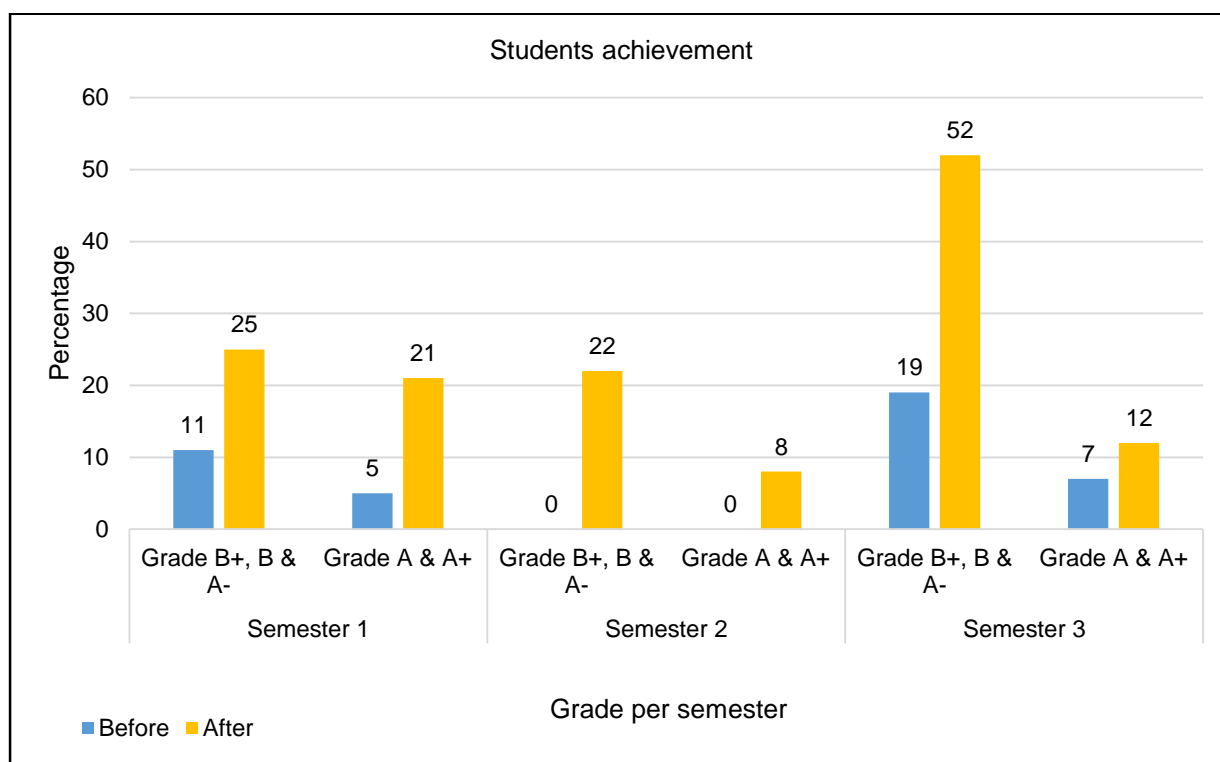


Figure 1: Students' achievement in Building Works Measurement Subject

According to the bar chart in Figure 1, the percentage of students who earned grade B+ and above increased after using it. The number of semester 1 students with outstanding grade performance from grade B+ to A-increased from 11% to 25% with the QS2LK, while the percentage of students with amazing grade above A increased from 5% to 21%. However, semester 2 reveals a remarkable number of well-registered students. There was an increase after using the kit. Student achievement for high grades increased to 22% for grade B+ to A- meanwhile 8% students score more than grade A. The chart also displays the student's success rate as a percentage for the Building Works Measurement 3 course (Semester 3 students). Nonetheless, grade B+ to A- students rose from 19% to 52% and also for students who also rose from 7% to 12% above grade A.

The samples consist of Quantity Surveying Diploma Students, Politeknik Sultan Azlan Shah from first semester to third semester. The overall sample is shown in the Table 2.

Table 2. Sample of respondents

No.	Semester	Sample
1	One	28
2	Two	36
3	Three	36
	Total	100

Table 3 shows the analysis of the responses to the effectiveness of this kit as a percentage. The answer of the respondents mostly agrees with the statement in the questionnaire.

Table 3. Questionnaire analysis

No.	Item	Disagree		Agree	
		n	%	n	%
1	QS2LK saves the cost instead of other references	8	8	92	92
2	QS2LK is convenient to be a reference.	3	3	97	97
3	QS2LK is great learning choice.			100	100
4	QS2LK saves time in learning.			100	100
5	QS2LK is easier to bring along.			100	100
6	QS2LK does not charge for installation.			100	100
7	QS2LK is useful in the learning process.			100	100
8	QS2LK is user-friendly for learning.	10	10	90	90
9	QS2LK contributes to active learning method.	11	11	89	89
10	QS2LK is applicable to students and lecturers.			100	100

Fig. 2 shows the results of the questionnaire as a percentage of this kit performance. Most of the respondents agreed with the statements in the questionnaire.

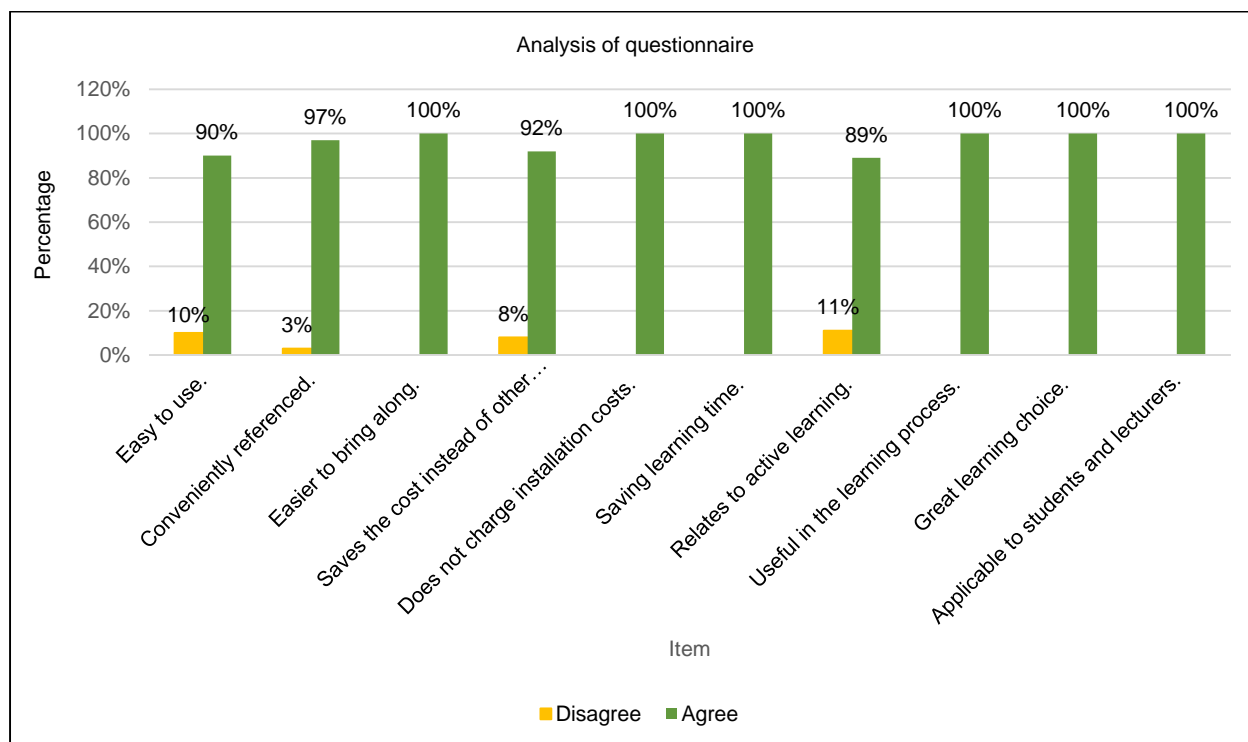


Figure 2. Analysis of questionnaire

This clearly demonstrates the effectiveness of using the QS2LK on students' achievement in Building Works subjects as compare with the conventional method. This finding is in line with the results of the questionnaire which stated agreement on the aid aimed at increasing the achievement of learning. They found that the utilization of smart learning kit in the classroom sanctions the students to cerebrate at a higher level and not just solely memorize the facts given. The above findings showed the effectiveness of QS2LK in enhancing students' measurement achievement.

The use of this QS2LK was developed not only for student usage but also for lecturer use in the teaching and learning process as well as for anyone involved in the construction industry. This kit is linked to learning approaches that use a more effective, easy-to-understand, and organized way to identify student problems in buildings that are not visible to the naked eye to understand structures. The product also provides students with the ease of learning. Among this product's added value is the use of software for more efficient measurement, which is more time and cost-effective due to free of charge.

5.0 CONCLUSION

After discovering a common learning problem for students, this product developed to recognize the concept and function of each building element in the drawing. This QS2LK provides proven efficacy through the students' achievement in the final examination of the subject of building works measurement. The kit can potentially enhance the problem solving, reasoning and connecting skills of the measurement process among the students. The use of the developed QS2LK engenders creative thinking among students in making connections of ideas in measurements. To render quantity measurements, students will be able to identify and visualize each element of the building. Thus, the product also has a high degree of marketability and is attractive and shows creativity in teaching delivery. The design will be updated to other designs for the future and greatly expanded if can involve civil engineering works, and building services works. In conclusion, the use of the developed QS2LK in the teaching can enhance measurement process skills and hence improved the achievement among students in polytechnics.

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