THE IMPACT OF UTILISING ACTIVE LEARNING METHODS TOWARDS ECM366 COURSE OUTCOME

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Abstract

Active learning can be defined as a form of learning in which educator strives to involve students in the learning process more directly than in conventional methods. One of the active learning methods is jigsaw classroom. This method require the students to work in smaller interdependent groups, each student is given a part of a topic to be studied and when finished, the students fit their pieces of the subject area together to form a complete jigsaw picture. This study was carried out to identify the effectiveness of implementations of the jigsaw classroom techniques in the theoretical subjects and to compare the student achievement in terms of course outcome by applying jigsaw classroom technique. Depth knowledge of theoretical construction management subject such as types of contract in Malaysia construction industry is important for examination reasoning, problem solving and improvement in technical skills. As a result, 98% students had given response for the advantages of JCL of Teaching-Learning and the common advantages perceived that Jigsaw Classroom Learning can improve their communication skills. However, the general trend of students and faculty towards this subject is; it is dry, volatile and difficult to learn. The reasons could be due to vastness of the subject, effectiveness of student learning, period of study more than one hour/period, physical environment within the classrooms (one-way teaching by instructor) and so on. Student concentration will drop as low as possible in the classes while using one way teaching. Therefore using jigsaw classroom as a cooperative learning technique can develop the teachings-learning to be more efficient of the students and also improve student's academic performance.

Keywords: Jigsaw classroom, Active learning, Theoretical subjects, Volatile, Cooperative learning

Introduction

Johnson and Johnson (2002) had stated that the higher level of education, the higher committed of researching from educator rather than refining their lecturing skills consuming pioneering and instructional strategies. In common situation, using the single method of teaching cannot achieved the effectiveness in variety situation of teaching, also cannot achieve all type of objective and content area in teaching (Kromrey & Purdom,1995) . In order to achieve the wise and effective teaching for students, educator need to aim the related activities that enable students to hypothesize, produce novel concepts, reproduce and unravel difficulties in any area of study (Biggs, 2007). However, there are many factors that should be considered in choosing the suitable types of cooperative learning teaching method. Kromrey & Purdom (1995) agreed in this statement which that different factors affect the selection of the features and logical beliefs of the educator. The successful exploration

instructional strategies need to contribute the achieving of advanced instruction philosophy, communally usual actions, and integrated recognition. (Cohen,1994). The cooperative learning can be define as instructional strategy if students can learn dynamically and firmly organized in trivial groups based on Abrami, Poulsen & Chambers (2004). According to Cohen (1994), definition of cooperative learning can be stated as the learners work organized in trivial groups and everyone can contribute in group assignment that has been allocated. The difference between cooperative learning and traditional learning based on positive interdependence and the individually accountability (Slavin , 1996).Cooperative learning is defined as an active learning approach, where a heterogeneous group of students work in small groups with a set of learning objectives to achieve a common objective (Mutlu, 2017). Jigsaw is one such method which teaches cooperation rather than competition (Rao, 2016). Jigsaw Classroom Learning (JCL) method was created by Aronson E et al., Santa Cruz professor at the University of California (Aronson E et al ,1978). It is a student centered cooperative learning method which guides student to chat, search, learn and train each other (Karimi & Bagheri, 2017). According to Sagsoz O et.al (2017) , this learning method has various advantages for instance through this method students could improve their interpersonal and social skills where student work together, trust each other and resolve the problem constructively in order to achieve the objectives. Mutlu (2017) stated that, most students who involve in this learning method have increased their self-efficacy, and their passive learning attitudes transformed into active ones. This method of Teaching Learning (TL) also improve comprehension, knowledge, critical thinking, problem-solving, clinical skills, self-confidence and communication including listening (Philips J & Fusco J, 2015).

In this method of teaching, the topic is divided into many subtopics (jigsaw pieces). The students are divided into small groups called home group with each group member responsible for learning one subtopic. Students from different groups having the same subtopic meet and form expert group and learn together and become experts in that particular subtopic. The students return to their home group and each student teaches the part of jigsaw puzzle (subtopic) in which they have become expert, to the other members of the home group completing the jigsaw puzzle (Singh & Gupta, 2013). Depth knowledge of theoretical construction management subject such as types of contract in Malaysia construction industry is important for examination reasoning, problem solving and improvement in technical skills. However, the general trend of students and faculty towards this subject is; it is dry, volatile and difficult to learn. The reasons could be due to vastness of the subject, effectiveness of student learning, period of study more than one hour/period, physical environment within the classrooms (one-way teaching by instructor) and so on. Student's concentration will get low in the classes as using the traditional method. Added to this there may be ineffective instructional methods with major mode of instruction as lecture class with monotonous classroom environment leaving the content to the imagination of learners. This result in inadequate and sketchy knowledge of the subject leading to poor association with clinical concepts (Mutlu, 2017).Extensive research on Jigsaw method of learning across a wide range of education starting from elementary high school to higher education that has been carried out. (Souvignier & Kronenberger, 2007). The method has shown to be an effective teaching method, but student's perceptions have appeared to be mixed (Persky & Pollack, 2009). Also, whether or not Teaching Learning tool can improve the understanding and comprehension of volatile subject like Construction contracts needs to be tested. In this course, student needs to understand the fundamental of contract management and explore the construction contract process in construction either in pre stage and post stage of construction project .Generally, a construction contract contains general and special conditions of agreement, details of construction project work, their specifications, time limits, payments and penalties for delivery delays, etc. and ensures every party's rights and obligations. A construction contract

document is a valid document that can be enforced under a certain authority or law. Hence the present study was undertaken to assess the learning experiences and perceptions of this instructional method among third year civil engineering undergraduates in construction contracts teaching.

Methodology

The topic chosen for this teaching learning technique was on types of construction contracts; Bill of Quantities contract, Lump Sum contract, Schedule of Rate contract, Turnkey contract and Traditional contract. The topic was priory taught in a lecture class by one of the faculty during didactic lecture class. The Jigsaw Classroom Learning tool was adopted for the reinforcement of the topic in the lecture class. During construction contract class attended by one batch (150 students), they are required to follow the following instructions.

Step 1: After explaining the TL technique, the 25 students were grouped as five home groups, I to V of five students each according to their role numbers. In each group, the students were numbered as 1 to 5 as shown in **Figure 1**.

Step 2: Then the students were re-grouped to form expert new group labeled as A to E consisting of the common numbers from home group as shown in Figure 1. This new group was given one subtopic to prepare from various resources (class notes, textbooks, online resources etc.,), discuss and debate for 30 minutes

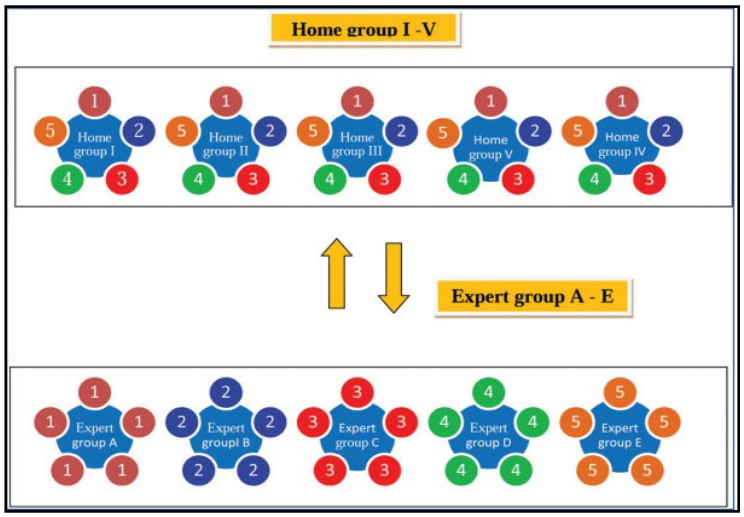

Figure 1 Formation of home groups (I to V) and expert groups (A to E) during each class (n=25)

The subtopic distribution was as follows:
Expert group A- Bill of Quantities Contract
Expert group B- Lump Sum Contract
Expert group C- Schedule of Rate Contract
Expert group D- Turnkey Contract
Expert group E- Traditional Contract

Step 3: After 30 minutes, each student returned to home group. In home group, each student was an expert in one subtopic. The students taught each other, had discussions and debates such that all students in the group were well versed with the complete topic. Time allotted was 60 minutes.

Step 4: The students from each home group was randomly selected to present randomly one subtopic for five minutes followed by two minutes of questioning and debate by other home groups and the facilitator. Time required to complete this activity by all groups was 25-30 minutes.

Step 5: Finally the students were asked to fill a feedback questionnaire consisting of both closed ended and open ended questions. The questionnaire had 8 statements for perception of students on jigsaw technique on a five-point Likert's scale with least score of 1for strongly disagree to maximum score of 5 for strongly agree (**Table 1**). The second part of questionnaire had open ended questions to obtain the students' opinion on advantages, disadvantages (optional) and preference of jigsaw technique as teaching learning method. The final assessment will be assessing in order to show the effectiveness of Jigsaw Classroom Learning (JCL) method.

Table 1 Questionnaire on perception of students on jigsaw technique

		Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Code	**Items**	**1**	**2**	**3**	**4**	**5**
I1	The activity helped in enhancing communication skills.					
I2	The activity enabled in-depth coverage of the topic.					
I3	The activity helped in overcoming shyness and hesitation in the class.					
I4	The activity covers many topics in a small or limited time					
I5	The exercise was enjoyable					
I6	The activity increases confidence					
I7	Faster/rapid learning/learn easily					
I8	This is an effective way of learning.					

Results and Discussion

The study had 150 participants divided into six groups and JCL was conducted in six consecutive classes of 25 students each.

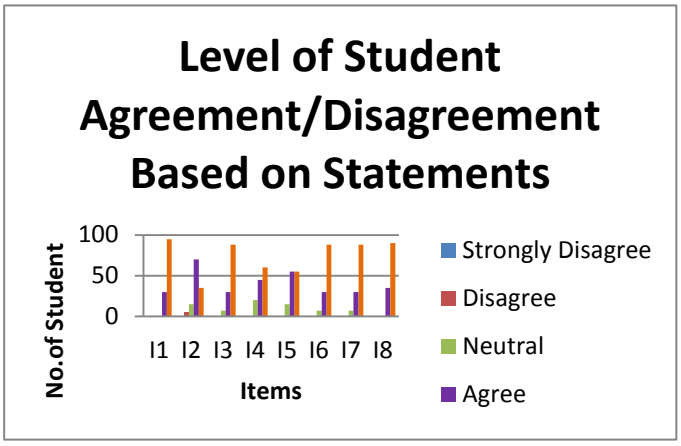

Figure 2 Level of Student Agreement/Disagreement

The mean score for I1, 0.63 of total students strongly agree and 0.2 of total students agree with the "The activity helped in enhancing communication skills". This is because the main component in the JCL is communication skills, so in order to achieve the objective of the task they need to communicate. For I2, only 0.23 total of students strongly agree and 0.47 of total students agree with the JCL activity enabled in-depth coverage of the topic. It is because of time limitations, where they must be able to manage time during this JCL session. In spite of that, a small number of students unable to show their effort to participate in this method of learning because they more prefer "spoon feed" methods for their learning method. Instead of an alternative to traditional learning method, this kind of cooperative learning was implemented for 2 years. I3 stated that 0.6 of total students strongly agree that JCL activity helped in overcoming shyness and hesitation in the class as they need to talk and discuss each other to overcome the problem given in JCL activity. JCL activity covers many topics in a small or limited time is the statement for I4 which is 0.4 of total students strongly agree and 0.3 of total students agree with the statement. This is because of their cooperation and sharing knowledge to each other rather than study by their own. Besides that, 0.6 of total students also strongly agreed with item's I6, I7 and I8 which are JCL as an effective way and faster in learning theoretical subject especially in construction contracts topic. Through JCL also can help students to build self-confidence especially among shyness and hesitation students in the class. As a result, 98% students had given response for the advantages of JCL of Teaching-Learning and the common advantages perceived by the students are given in (**Table 1** and **Figure 2**). All students agree that Jigsaw Classroom Learning can improve their communication skills as shown in Figure 2. Comparison between Jigsaw Classroom Learning (JCL) method and traditional learning (TL) method was analyzed.

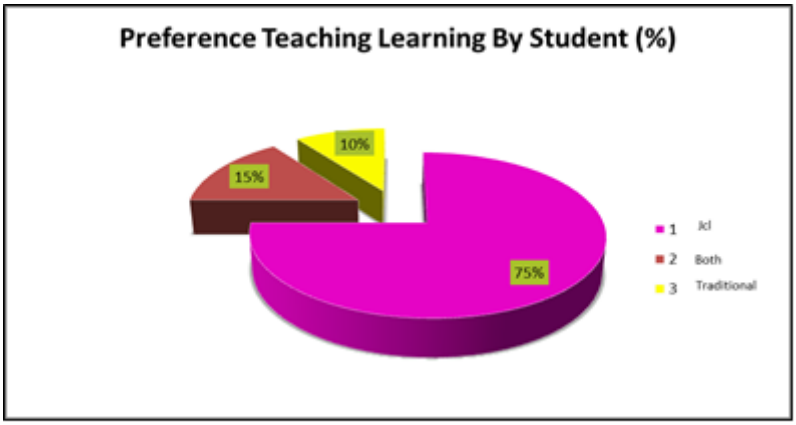

Figure 3 Percentage of Preference Teaching Learning

In the present study, 75% students preferred JCL similar to a study by Varma SR, who reported 90% of the participants being comfortable with this method (Varma S, 2017). However, 10% of the students preferred traditional method and 15% students preferred both methods of learning as shown in [Fig.3].In the study by Persky AM and Pollack GM, 55.4% of the participants felt, they learnt less during this technique (Persky AM and Pollack GM, 2009). Further another study among nursing students reported preference for traditional methods especially in older students (Levya-Moral JM and Camps MR, 2016).

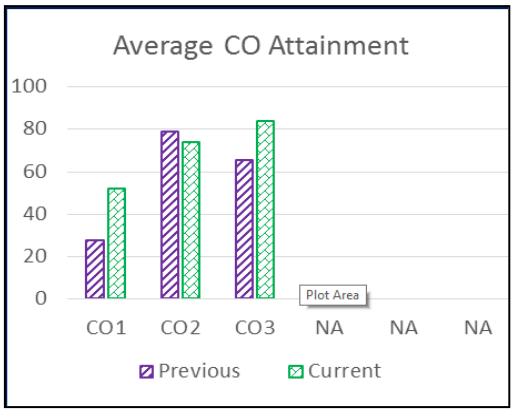

Figure 4 Comparison between JCL and TL method on student achievement

Table 2 Assessment on Course Outcome

Assessment Type	CO for Assessment (Current)						
	CO1	CO2	CO3	NA	NA	NA	ASSESSMENT
Test		58					
Assignment		86					
Project		83	84				
Final Exam	52						
Assessment Type	CO for Assessment (Previous)						
	CO1	CO2	CO3	NA	NA	NA	
Test		55					
Assignment		80					
Project		73	65				
Final Exam	41						
Assessment Type	CO for Assessment (% Difference)						
	CO1	CO2	CO3	NA	NA	NA	
Test		6%					
Assignment		6%					
Project		13%	22%				
Final Exam	20%						

Based on **Figure 4** and **Table 2**, only CO1 has covered topic construction contracts. Table 2 also shows that the percentage of student achievement was increased by 20%, which are just 41% student achieved on CO1 in previous and 52% in current semester. This record gave a figure that student learning and understanding on this topic also increase as in the previous semester, we just using traditional method in teaching which is one way teaching method, compare to current semester that using the JCL method. This method encourages them to cooperate among team members in order to complete the tasks. In spite of that, JCL method also improves their self-esteem as stated in Philip & Fusco (2015) studies.

Conclusion

In a nutshell based on student's preference, positive acceptance of the method and possessive performance, authors recommend that this interactive and proactive technique can be adopted in teaching at least few selected topics of civil engineering quantities and estimation course.

It is also important that faculty should be sensitized and trained to effectively implement this method. To overcome the disadvantage of time-consuming process the topics can be priory intimated to the students for the step of expert group preparation as has been followed in some studies.

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Conflict of Interest

The authors declare that there are no conflicts of interest associated with this publication, and there has been no significant financial support for this work that could have influenced its outcome.

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