Effective Learning for Higher Education Using Jigsaw Approach

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Abstract— **The use of cooperative and active learning approach is an important role for education system. Although the cooperative technique, Jigsaw have been accepted and applied in many countries' educational environment over the several years, there has been a little applied area in Myanmar educational system. This study has been performed on the first-year students of the University of Computer Studies, Yangon (UCSY) in the course of Principle of Information Technology for first semester in 2018-2019 academic year. As a case study design, a total of 42 students have been participated in this study. The aim of this study was to reveal the effectiveness of Jigsaw technique in higher education system in Myanmar. Experiment was performed using Jigsaw technique and then compared to the traditional teaching technique to the courses. The average score of the students using Jigsaw technique, student centered strategy, is improved over the traditional teaching technique, teacher centered strategy. It was observed that the cooperative and active learning technique, Jigsaw is effective in the learning process of the theoretical courses, in the development of critical thinking skill, communication skills, interpersonal skills and an increases enjoyment of the learning experience. The student interest was significantly improved rather than the traditional learners. Moreover, the students reported that they enjoyed the Jigsaw method and they are willing to apply Jigsaw method to another course.**

Keywords— *Cooperative Learning, Effective Learning, Jigsaw*

I. INTRODUCTION

The traditional teaching approach, teacher centered strategy, in which the instructor is active and the students is passive mostly found in the higher education system in Myanmar. To improve the learning outcome, pedagogical techniques need to change the focus from the instructor to the learner along his intellectual journey. Many researchers and educators have been stating that teaching methods are one of the problematic areas of education. To make the students acquire critical and creative thinking is one of the purposes of the modem education practices. The cooperative and active learning strategies, Jigsaw technique, is an efficient way to learn the course material in a cooperative learning style, in which teacher is not the sole provider of knowledge because learning is done by the students themselves, students become active participants in the learning process, build inter-personal and interactive skills among their peers.

A. Cooperative Learning

Cooperative learning consists of five basic elements: promotive interaction, positive interdependence, individual accountability, teaching of interpersonal and social skills and quality of group processing. Promotive interaction means students are required to interact verbally with one another on learning tasks exchange opinions, explain things, teach others and present their understanding [11]. Positive interdependence means that students are required to work together as a cohesive group to achieve shared learning objectives [12]. Groups should be small when students begin learning together to help them develop learning skills [13]. The third element of cooperative learning is individual accountability which means that students ask for assistance, do their best work, present their ideas, learn as much as possible, take their tasks seriously, help the group operate well, and take care of one another [14]. The fourth element, interpersonal and social skills mean if socially unskilled students are arranged into one group students cannot work effectively. To achieve mutual goals students must trust each other, communicate, accept, support other group member and resolve conflicts [15]. The last element is group processing that helps improve the effectiveness of the group members in contributing to the shared efforts to achieve the group's goals, via reflection on the learning process [16].

Another researchers [17] examined the attitudes of the students towards cooperative learning via jigsaw method on Vietnamese Higher Education Classroom with 40 students within six weeks. Their research was performed by assessing with questionnaire and open questions on students. Their research indicated that most students appreciated the Jigsaw. 77.5% of students liked jigsaw learning a lot, 17.5% liked it a little, only 5% were not sure whether or not they liked this learning, and no-one disliked it. Most students liked working with others and getting help, discussing and sharing information with others, teaching others, helping one another, and enjoying the jigsaw context. The researcher reviews over all the assessment and concluded that 62.5% of students liked working together and getting help from others, 42.5% liked discussing and sharing information with other students, 22.5% liked the effectiveness of teaching others, 22.5% highlighted the extent and usefulness of mutual help among students, 17.5% related to improving learning skills in terms of critical thinking and oral communication, 12.5% to how cooperative learning create friendly relationships and 12% perceived that it improves confidence. The researcher Strother defined cooperative learning as a form of instructional method, which requires students to work collaboratively in small, heterogeneous groups by helping each other to learn a given task [6]. Alternatively, cooperative learning is further defined as a type of student-centered teaching approach where a group of heterogeneous students work together to achieve a common goal [7]. Over the years, research has found cooperative learning to be one of the instructional methods that can improve students' performance in contrast to individualistic learning [8].

B. Jigsaw Method

The Jigsaw method is one cooperative learning strategy invented by social Psychologist Elliot Aronson in 1971 has been employed by hundreds of schools and universities

across all the nations and has been achieved with much success[10]. Students of an average class size (30 students) are divided into competency groups of four to six students to research. Generally, there are six steps fall in Jigsaw teaching method. In the first step, the teacher divides the students into small group of 4 to 6 members called the Jigsaw Group. In the second steps, the contents of articles is divided into 4 to 6 chunks. It is important to divide the content into same number of chunks as the number of students in each group. A chunk of content can be a section of chapter or unit of study into smaller manageable chunks. Each student is assigned one chunk of the content in Jigsaw Group. Each group has one person responsible for one chunk of the content and who would later explain to each other their parts within the group. In third steps, the student study own chunk of the content independently. The fourth step is that, after each student have studied his or her chunk independently, they gather with all the other students who have assigned the same chunk, called "Expert Group". With each "Expert Group," students compare their ideas, discuss and communicate with each other until they all mastered the material to give the presentation or explain in the Jigsaw Group. In the fifth step, students returns to original Jigsaw Group. After studying the "Expert Group," they will return the original Jigsaw Group. Each student takes the assigned chunk to present and explain well. Meanwhile, other student listens carefully, take notes and ask a lot of questions and discuss. Each expert teaches the chunk of content. Finally, assess all students on all the contents. The assessment can be simple question to make sure that all students collect basic understanding of all the contents of material, be sure that all content of chunk in the quiz.

The variation of original Jigsaw Method called the Jigsaw II, developed by Robert Slavin in1986, make one significant treat the basic Jigsaw. The different is that how the assessment is treated. In Jigsaw I, students are assessment individually. In Jigsaw II, quiz questions are given one each individual student, then each group score are averaged to generate group score. This building competition between groups encourages the students to work harder and helping each other learned the material well.

C. Reviews of Literatures

The researcher Durmus Kilis studied the academic performance of the 80 students of the Ataturk University for the course of Principle and Methods of Teaching using Jigsaw Techniques, where he tested 40 students using Jigsaw Technique and the other 40 students using traditional Learning method. The research found that average success of the Jigsaw group to be higher than of the traditional method due to the fact that the students, having lived through the learning process themselves, researching and discussing their assigned topic. The researcher also claimed that this technique should be used in education [1].

Another researcher Mengduo and Xiaoling carried out the research on college English class, including four skill using Jigsaw strategy. They discussed that teacher role in jigsaw group, how to motivate the students to participate in Jigsaw learning activities. The research found that jigsaw technique is an effective way to promote student participation and enthusiasm as well as a useful technique for language learners to accomplish learning tasks in the English classroom. [3] Francis Hull Adams [4] studied that cooperative learning with the use of Jigsaw technique in Basic six of Holy Child Practice Primary School made up of 30 pupils and 10 teachers from the same institution. Their research design was observation and questionnaire. The observation indicate that lower performance of students were poor teaching methods and the inability of teachers to vary teaching techniques. Students also did not know how to learn in groups, lack of understanding of collaborative and cooperative learning was the pupils' deficiency. This paper pointed out that teachers should concentrate on teaching techniques that will enable pupils to properly understand the concepts taught in class. The researcher also discussed that the challenges of Jigsaw method, and gave the suggestions to be more beneficial on Jigsaw technique.

Researchers David Mello and Colleen A. Less [9] carried out the research of the effectiveness of active learning techniques on specific courses of Art and Science in the college classroom compared to traditional lecture model. 384 students formed for traditional lecture-only and 433 students comprised the active learning technique. Students were given the same pretest, and the same post-test multiple-choice question consisting of more than ten questions on each academic discipline including Economics, English, Humanities, Mathematics, Social Sciences, and Science subject. The mean gain, the standard deviations in overall test scores were calculated for each academic discipline and found that the average gain in the standardized test scores of active learners were significantly higher than traditional learners.

II. CASE STUDY DESIGN

The case study was conducted with the participation of 42 first year students comprising 25 females and 17 males, from UCSY who enrolled in the course of Principle of Information Technology and who have never experienced jigsaw. Two chapters were chosen from the course, from which one chapter was applied for Jigsaw method and the other applied for traditional teaching method. There were six tests, 3 tests using Jigsaw technique for one chapter and the other 3 tests using the traditional teaching method for the rest chapter. Each test using the Jigsaw method takes the following procedure within 50 minutes of lecture time included step4, step5 and step6. Step 1, Step2 and Step3 were taken in advance 3 days before of the actual lecture time.

Step 1: Divide the 42 students into 6 Jigsaw groups, each group including 7 students A, B, C, D, E, F and G which is shown in Fig1. One student should be group leader for each group. The groups would be better if diverse in terms of language proficiency, personality and gender.

Step 2: Choose the content to discuss and divide the content into 7 sections and each section has one or two pages of nearly the same length for the jigsaw group in advance. The instructor assigned the content to students.

Step 3: Different student within the group is assigned different section of the content. The student and section of the content were sent via their email to study the assigned section independently in advance. Some students may be weak students to present assigned articles. To avoid this weakness, step 4 is performed.

Step 4: After each student have studied his or her assigned section independently, temporary expert groups is formed in which one student from each jigsaw group joins other students assigned to the same topic. With each "Expert Group", students discuss other groups members working on the same section until they feel comfortable with presenting the material to their jigsaw group and summarizing the main idea. Fig1 show the Expert group in which Expert Group 1 (EG1) discuss the content A, about the security safeguards, (EG2) discuss the content B, about Identification and Access, etc..The discussion time within the Expert Group was allowed 15 minutes.

Step 5: After studying within the "Expert Group", each member became an "expert" on the assigned topic and they .

return the original Jigsaw Group. The members of each jigsaw group teach each other well their assigned topic respectively. The total discussion time within the Jigsaw Group was allowed 21 minutes and permitted 3 minutes for each member. Fig1 shows Jigsaw Groups (JG3) discuss all the content.

Step 6: The Jigsaw groups needs to be assessed on the content to assure everyone's participation. This assessment evaluates the cooperation of the students while working in these small groups. To evaluate the assessment, the instructor developed quiz questions which cover all the contents to check the students they actually understand the content.
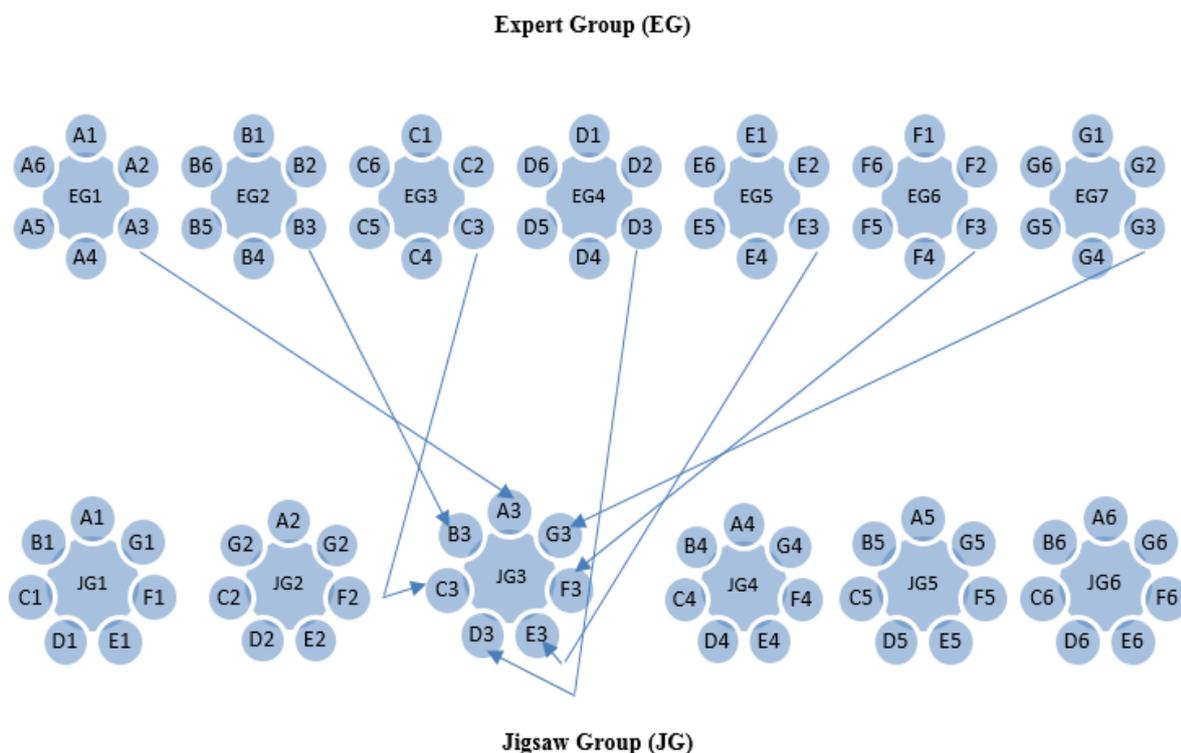

Fig. 1 Forming of The Jigsaw Group and Expert Group

Table I: SAMPLE TOPIC ASSIGNED TO STUDENTS

Jigsaw Group	Group Member	Topic
JG1	A1	Security Safeguards: Protecting Computer & Communications, Page :472
JG1	B1	Tools For Fighting Fraudulent & Unauthorized Online Uses, Page :472~473
JG1	C1	Identification & Access Page: 473~474
JG1	D1	Encryption Page :474~475
JG1	E1	Protion of Software & Data Page Page :475
JG1	F1	Disaster Recover Plans Page :475~476
JG1	G1	Thuth Issues: Manipulating Digital Data Page 459~461
JG2	A2	Security Safeguards: Protecting Computer & Communications ,Page :472
JG2	B2	Tools For Fighting Fraudulent & Unauthorized Online Uses, Page:472~ 473
JG2	C2	Identification & Access Page: 473~474
JG2	D2	Encryption Page :474~475
JG2	E2	Protion of Software & Data Page Page :475
JG2	F2	Disaster Recover Plans Page :475~476
JG2	G2	Thuth Issues: Manipulating Digital Data Page 459~461

The assessment quiz questions involved multiple-choice, blank, true and false questions. Each quiz consisted of more than ten questions. These quiz was given each individual students, then each group score are averaged to generate group score. Peer group correction was performed in order to save the time. The correct answers are declared by instructor on projector and the correction process was performed by leading of the group leader. This building competition between groups encourages the students to work harder, helping each other and learned the material well. The assessment and correction time was allowed 12 minutes. During 50 minutes class meeting, this activity was consume a minimum of about 48 minutes. Table I shows sample content from the Principle of Information Technology course given to Jigsaw Group Members. These group member lists and their assigned topics were sent to their email last three days ago of the actual class time in order to finish all jigsaw activities within 50 minutes of lecture time in class.

III. RESULT AND DISCUSSION

In this section, the result and discussion of the study will be presented.

A. Result

The experimental results were carried out traditional teaching method and Jigsaw method. There were three quiz tests for traditional method and Jigsaw method respectively. The average marks of three quiz for each methods were calculated to measure the performance of the student understanding of the content. From the Fig (2), it was observed that there was a successful and meaningful achievement in student understating of the content using Jigsaw method over traditional method. It was found that the level of student involvement in the learning process is increased rather than upon the instructor and responsibility for learning had a significantly improved on learning outcomes. Some students who can participated in group activity achieved the highest score.
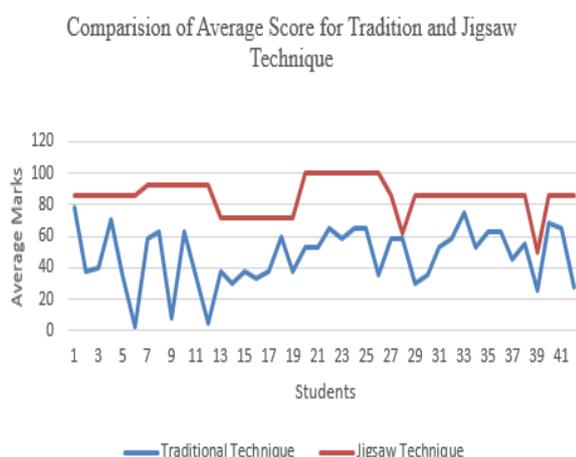

Fig.2. Comparison result of Jigsaw and Traditional Teaching Method

B. Discussion

In a jigsaw technique, teacher need to choose learning material, structure the groups, explain the group activities, monitor group activities, assist students in working with the learning material and observe every group in the classroom. It is necessary to motivate the students at the beginning stages of jigsaw activities since most of the Myanmar classroom teaching styles are teacher centered approach. Group size should be formed as smaller size since the individual accountability is important and students should be sit face-to-face to carry out the classroom tasks as expected. By moving and changing the group, students could learn group activities with different people. Teachers also should not always use lecturing method because it leads to poor participation of learning process. Educational stakeholders should encourage this student-centered learning which involves 21st century skills such as discussion and presentation.

IV. CONCLUSION

The study reveals that Jigsaw is a very useful technique that it makes courses more interesting for students and improving learning outcomes. The result found that the entire student actively involved in this learning strategy and achieved higher score than traditional learning strategy. Students become eager participants and get more chance to appreciate differences in their learning process. Jigsaw technique motivates the students and increases enjoyment of the learning experience. It makes the students taking responsibility for the work, good attitudes from each other, improving the social skills, problem solving skill, interpersonal and interactive skills because learning process involves round interaction with peers. It also helps students clarify concepts and ideas through discussion and debate, and students receive immediate feedback. Jigsaw learning reduces students' reluctance and anxiety to participate in the classroom activities while increasing self-confidence. From this study, the students in this course also reported that they learned effectively and appreciated this active learning approach. More and more universities, college and high schools need to be done teachers and students involvement in this student centered approach in Myanmar.

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