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Effect of the Jigsaw-Based Cooperative Learning Method on Student Performance in the General Certificate of Education Advanced-Level Psychology: An Exploratory Brunei Case Study

Nur Hafizah Azmin[1]

[1] PTE Meragang Sixth Form Center, Bandar Seri Begawan, Brunei Darussalam

Correspondence: Nur Hafizah Azmin, PTE Meragang Sixth Form Center, Bandar Seri Begawan, Brunei Darussalam. E-mail: fizahazman@live.com

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Abstract

The mixed-methods study investigated the effect of the jigsaw cooperative learning method on student performance in psychology and their views towards it. Experimental data were obtained via pre-and-post tests and an open-ended questionnaire from 16 conveniently selected students at one Sixth Form College in Brunei. Moreover, the participants reported that they enjoyed using the Jigsaw method and performed significantly better after the intervention. A large-scale research involving a bigger sample and more schools is recommended to confirm findings from the present study.

Keywords: cooperative learning, jigsaw-based cooperative learning, student performance, A-Level psychology

1. Introduction, Background and Setting

The General Certificate of Education Advanced-Level (GCE A-Level) is also known as Form 6 or Year 13 in Brunei education system. Psychology is one of the subjects taught at this level and is relatively new compared to Mathematics or English. It is taught in Sixth Form colleges or centers and there are currently six such pre-university institutions in Brunei. The present study was conducted at one of these schools. Although interest in the subject of psychology is steadily increasing among Brunei students, performance on both international examinations such as the Advanced Subsidiary Level (AS-Level or Year 12) and the GCE A-Level (Year 13) is not particularly good. This provided the rationale and justification to seek new methods of teaching the subject effectively in the present study. Psychology is a heavy content-based subject requiring students to have deep interest in reading and good writing skills for assignments such as essays. The subject is also research-based requiring teachers and students alike to develop a good understanding of research processes. The problems of doing research in Brunei using school children include the non-availability of suitable instruments written in easy English and that are not too long (Mundia & Bakar, 2010; Mundia, 2011). It is therefore important for psychology teachers to create learning activities that are engaging in order to create and maintain students' interest in the subject and their motivation to learn. Findings from recent previous research have indicated that Brunei A-Level students prefer cognitive-oriented and affective-oriented psychology teachers who use a wide range of teaching methods, learning resources, and social skills (Mahalle, et al., 2013; Omar et al., 2014; Mundia, 2012a). In addition, there is also empirical evidence suggesting that Brunei teachers of exceptional students should have specialized skills for handling students with high support needs (Bradshaw & Mundia, 2005; Bradshaw & Mundia, 2006; Mundia, 2007; Haq & Mundia, 2012; Tait & Mundia, 2012a; Tait & Mundia, 2012b; Tait & Mundia, 2013). In line with the ongoing school curriculum reforms that seek to impart 21st century skills to students, Brunei teacher education was innovated in 2009 to prepare teachers with in-depth content knowledge of their subjects and who possess a variety of teaching skills particularly in challenging subjects like mathematics (Mundia, 2012b). Students do not always know how to resolve their academic and personal problems effectively. There is therefore need to assist them via counselling particularly on personal problems (Mundia, 2010; Shahrill & Mundia, 2014). Teachers and school counsellors also need to have students who have academic problems such as learning and study issues, anxiety, and stress (Shahrill et al., 2013; Hamid et al., 2013; Matzin et al., 2013). One effective way of engaging students in class is to use student-centric teaching methods such as the cooperative learning strategy and the present study was based on this approach. Under collaborative learning environments, studies have revealed that students improved both academically and

socially when they were given the opportunity to interact with each other to achieve a common goal (Slavin, 1996). In addition, the use of student-centered learning decreased the 'teacher talk" by about 50% which facilitated discussions with and among the students (Vermette, 1998). Extensive research has been conducted on cooperative learning across a wide range of subject areas including Psychology (Baer, 2003, as cited in Rodger, Murray & Cummings, 2007). Introducing cooperative learning as one of the instructional methods allows the students to continuously construct their own knowledge and understanding by means of discussion and peer tutoring. This, in turn, discourages passive learning experience and promotes active learning.

1.1 Cooperative Learning

Strother (1990) 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. Alternatively, cooperative learning is further defined as a type of student-centered teaching where a group of heterogeneous students work together to achieve a common goal (Kagan, 1994). 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 (Slavain, 1996; Johnson & Johnson, 1999). To be effective, cooperative learning must be well planned and structured with suitable learning materials and guidelines given to all participants. Slavin (1988) reported that there were two essential conditions that must be taken into account for in order for cooperative learning to be effective and successful: (1) group goal or goals; and (2) individual accountability. However, Johnson and Johnson, (1994) came up with five additional main components that a cooperative learning approach should have to be instrumental and these were: (1) positive interdependence; (2) individual accountability; (3) face-to-face interaction; (4) interpersonal and small group skills; and (5) group processing. These authors discuss in detail the characteristics of each of these five components. For example, group processing refers to the students' reflections as a group on what they have done well and what they needed to improve on (Johnson & Johnson, 1999). All of the mentioned components have to be present in any cooperative learning activity for the technique to be beneficial to students. In so doing, students will subsequently increase their interpersonal skills, an important skill required when they pursue further studies or enter the workforce (Jones & Jones, 2008). There are several types of cooperative learning strategies. These include the Student Teams-Achievement Division (STAD), Teams-Games-Tournaments (TGT), Cooperative Integrated Reading and Composition (CIRC), Team Accelerated Instruction (TAI), and the Jigsaw Method (Aziz & Hossain, 2010) on which the present study was based.

1.2 Jigsaw-Based Cooperative Learning

This is one of the learning strategies under cooperative learning in which, just like in a jigsaw puzzle, the content of the lesson is subdivided into different parts of information and then given to groups of students who would later explain to each other their parts and results in the whole jigsaw puzzle to be completed (Aronson & Patnoe, 1997). The Jigsaw instructional procedure is a highly structured cooperative learning method, which was originally created by Aronson (see Aronson, 2005; Aronson & Patnoe, 1997; Heden, 2003). In the application of the Jigsaw Method, the teacher introduces a topic and it's subtopics. The students are then divided into 'home' groups, where they are each given a different subtopic in the group. The next step requires the students to break out of their 'home' groups to form the 'expert' groups where these students focus on one subtopic, researching and discussing it. Therefore, the students become experts on the subtopic that they have been assigned to. Following their discussion, the students from all of the 'expert' groups must return to the 'home' groups and teach their peers based on their findings and discussions. Eventually, all the members of the 'home' groups will have learnt from each expert group discussion and will have benefitted from each other.

1.3 Research on the Jigsaw-Based Cooperative Learning Method

Several previous studies support the efficacy of the jigsaw cooperative learning method (e.g. Hollingshead, 1998). In 27 studies on cooperative learning that were reviewed for the present study, the majority reported positive effects on students' performance while only one (1) study was in disagreement. Most importantly, 50% of the improvements came from the implementation of the Jigsaw-based cooperative learning (Slavin, 1981). A study by Sahin (2010) looked into the use of the Jigsaw II technique, an adapted version of the original Jigsaw Classroom technique, on students' academic achievement and attitudes towards a written expression course. Findings from this study revealed that the Jigsaw II technique contributed to the improvements of the students in their written expression course. In addition, the students perceived the method positively because a majority reported that the method has increased their self-confidence, interest for learning and allowed them to be more active in the classroom. The jigsaw cooperative learning approach was also examined by Huang, Liao, Huang, & Chen (2014) where the participants used Google+, as a learning platform to discuss the approach with other

students and upload materials. The results from this study proved the jigsaw cooperative learning approach to be successful and were favored by both the low and medium achievement students while the high-achievement students preferred individual learning. Honeychurch (2012) conducted a study of the jigsaw method in which the students from the expert groups had to teach other students by posting their discussions online and then meeting up with the tutor to give presentations of their discussions to the class. Overall, the students achieved marks that were significantly higher than before as well as a reduction in the number of failures. The students' feedback was very encouraging as they requested the researcher to continue using the jigsaw method.

Similarly, studies by Aronson (2005) and Dori, Yeroslavski, and Lazarowitz (1995) also found that students who were taught using the jigsaw method excelled better than the others. Furthermore, students have reported an increase in self-esteem when in cooperative situations (Kilic, 2008) and improvement in the social/relationship skills (Johnson & Johnson, 2009). Consistent with the findings above, Fennel (1992) concluded from his study that most of the students enjoyed being in the lesson with the jigsaw method and found it beneficial. In contrast, only 0.05% of the participants stated that they preferred being taught with the traditional lecture style (Fennel, 1992).

However, with reference to the Huang, et al.' (2014) study, high-achievement students may not find the jigsaw method interesting because the content would be too easy for them. In a similar context, Robinson (1991) stated that the motivation of students could be affected by the type of task given to them depending on the level of difficulty. Thus, the high-achievement students are more likely to enjoy working together if the task is challenging to them. Thompson and Pledger (1998) conducted a similar study on college students with the jigsaw method and results showed that there was no significant difference between groups taught by the jigsaw and traditional methods.

1.4 Objectives of the Study

The main objectives of the present study were to investigate the effect of jigsaw-based cooperative learning method on students' performance and determine the students' views towards this type of cooperative learning. Based on these objectives, the study addressed the following specific research questions:

- Will the students perform better using the jigsaw-based cooperative teaching method compared to the traditional teaching method?
- What are the students' views towards using the jigsaw-based cooperative learning method?

2. Methods

The design of the present study, sample, instruments, procedures and data analysis strategies are explained below under appropriate subheadings.

2.1 Design

This study used the mixed-methods research approach to investigate the problem. This included elements of experimental research, action research and case study. First, a pre-post design was used to compare the effectiveness of the two teaching methods (jigsaw and traditional). Kember (2003) stated that the one group pre-post design was a preferred choice over the control group in non-laboratory educational settings if the data were collected from multiple sources. Second, the research assumed a case study dimension because it used only a small number of conveniently selected students at school. Third, the two participating groups were taught the same curriculum to prepare them for the post-test and other school tests (action research). According to O'Brien (1998), action research is a systematic inquiry that aims to improve the practical needs of people and current problematic situations in the society. In the context of education, action research can be defined as the process of examining a classroom or school situation in order to improve the quality of the teaching and learning experience and solve any related issues (Johnson, 2012). Teachers can benefit greatly by conducting action research as they gain new knowledge about their classrooms and pedagogies, subsequently, becoming continuous learners (Mills, 2011). They are also exposed to new and creative ideas and have ownership over their professional practices (Hensen, 1996). Figure 1 and Figure 2 below are pictorial or visual representations of the design for the present study.

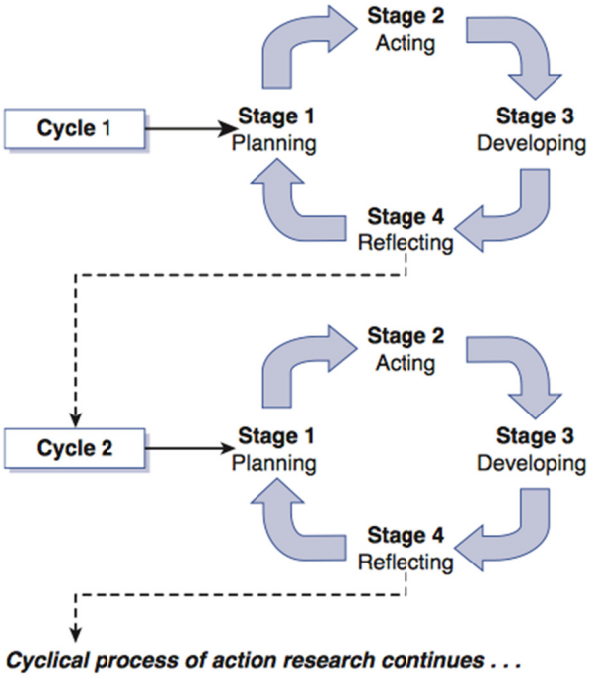


Figure 1. Action research process (Source: Mertler and Charles (2011))

The design of this current study employs the use of an action research cycle as shown in Figure 1. The action research is carried out in a cyclic manner, consisting of four different stages: 1) planning for the action stage by using the information gained such as problems in teaching and learning, (2) acting on the planned lesson, (3) collecting and analyzing the data collected and (4) reflecting on the outcome of the planned lesson by looking at the benefits and possible problems. The stages continue to take place in the cycle until an improved plan of action is achieved. The summary of the action research process in this present study can be seen in Figure 2.

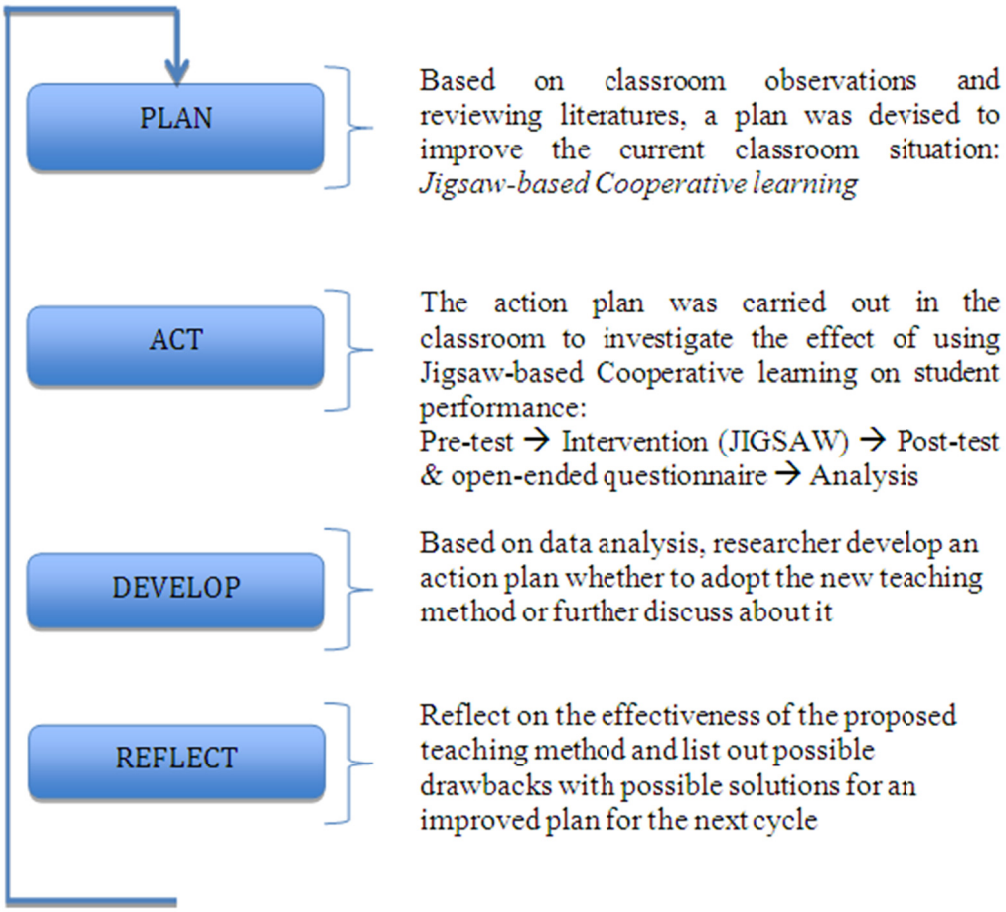


Figure 2. Summary of applied action research process

2.2 Participants

One Psychology class of a form six college in Brunei with a sample of 16 students was selected by convenience sampling. The action research study took place in a Form Six Centre school in Brunei. The participant chosen were 16 students consisting of seven boys and nine girls. The participants' age ranged from 17 to 19 years (Mean = 18.13; SD = 0.47) and came from two ethnic backgrounds; Malay and Chinese. All the participants were in Year 13. This study used one mixed ability psychology class, which was assigned to the investigator for teaching and research purposes. The sample was thus selected conveniently taking one naturally occurring group and dividing it into two subgroups.

2.3 Instruments

The instruments used for data collection includes pre-and-post tests (on population density and crowding) and an open-ended survey questionnaire designed by the researcher. These instruments were used to answer the research questions for the present study as shown in Table 1.

Table 1. Summary of research questions and instruments

Research Questions	Instruments
Will the students perform better using the Jigsaw-based Cooperative Learning than traditional-based learning?	Pre-test and Post-test
What are the students' views towards using the Jigsaw-based Cooperative Learning?	Open-ended questionnaire

2.3.1 Pre-and-Post Tests

A pre-test was administered to the students before the intervention was introduced. The aim of the pre-test was to determine the students' prior knowledge and evaluation skills based on what the teacher has previously taught. After the intervention ceased, a post-test was given to the students to determine whether the intervention had helped them to improve or not. The pre-test and post-test contained short-answer questions and an evaluative essay as part of each student's individual classwork based on the topic 'density and crowding'.

2.3.2 Survey Questionnaire

The questionnaire survey consisted of two open-ended questions. The items were designed to measure the students' views towards the jigsaw method in the Brunei context. This questionnaire was given to the participants at the end of the final lesson before the post-test.

2.3.3 Reliability and Validity

The researcher ensured that this research was reliable and valid by taking several considerations. The reliability of the pre-test and post-test was measured using the parallel-forms (also known as equivalent or alternate forms) method where both tests measured nearly the same knowledge and skills on population density and crowding within a time-interval of two weeks while the students were being taught under the traditional method before introduction of the jigsaw method. The pre-and-post tests were administered to a different Year 13 psychology class who were studying the same psychology contents as the research participants. A different equivalent group was used for reliability analysis to eliminate the influence of test-retesting. Score distributions based on the two groups yielded a Spearman rank-order pre-post correlation of $Rho_{15} = 0.86$ with a power of 0.73% (Rho^2). The rank-order correlation was preferred to see if the tests ranked the participants in the same fashion on two occasions. The tests had good internal consistency reliability. The validity of the pre-and-post tests was measured in terms of its content validity by using the judgmental method. During the pilot testing phase, the pre-and-post tests were passed to two senior psychology teachers in the school for them to provide suggestions and feedback on the content of the tests and determine whether they reflected the given course syllabus. There was a high inter-judge agreement proportion or percentage of 0.81 (81%) between the two teachers/judges attesting to the tests' content validity. To ensure the trustworthiness of the results, the researcher also used triangulation by collecting data via open-ended questionnaires in addition to the academic tests. In addition, the study had adequate ecological validity since the entire research was done in the same classroom (environment or habitat) where the students regularly attended their psychology lessons.

2.4 Procedure

A pre-test was given to the students as part of their individual classwork after the teacher had completed teaching one topic under psychology and environment. The pre-test required the students to evaluate the psychological studies that the teacher had taught them and to respond to some short answer questions. The first step of the intervention required the formation of 'home' groups as explained above. Although this was not the original procedure of the jigsaw technique, the researcher made adaptions by including a presentation similar to Honeychurch's (2012) jigsaw method to ensure that the information provided was accurate and the teacher could correct any mistakes before the students returned to their 'home' groups to teach their peers. Figures 3 and 4 below depict the grouping procedure for the Jigsaw-based cooperative learning technique. After the presentation by each expert group, the students returned to their 'home' groups to teach their peers, combining all their discussions to make up the final jigsaw. In this case, they had to discuss and combine four of the evaluative points from their discussion in their respective 'expert' groups to create their own personal notes. A post-test was administered in the last lesson in which the students had to work individually and use the knowledge that they have learnt during the Jigsaw-based cooperative learning technique.

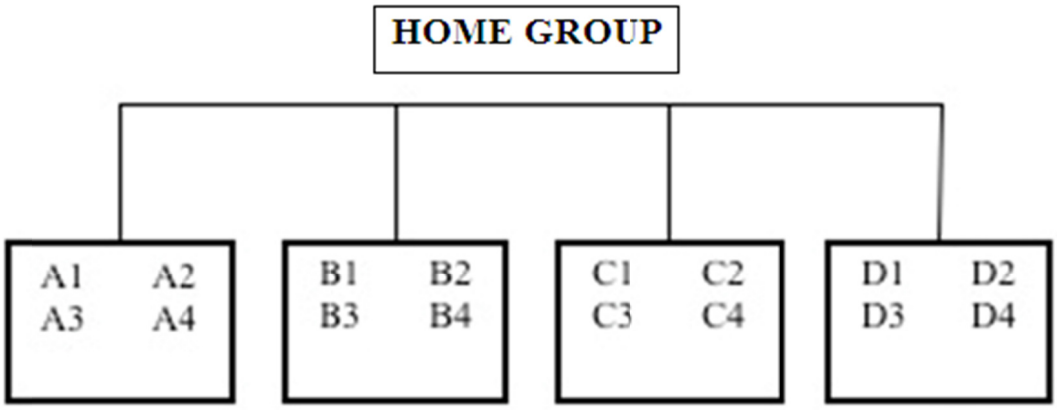


Figure 3. The distribution of the students in the home groups where Jigsaw technique was applied

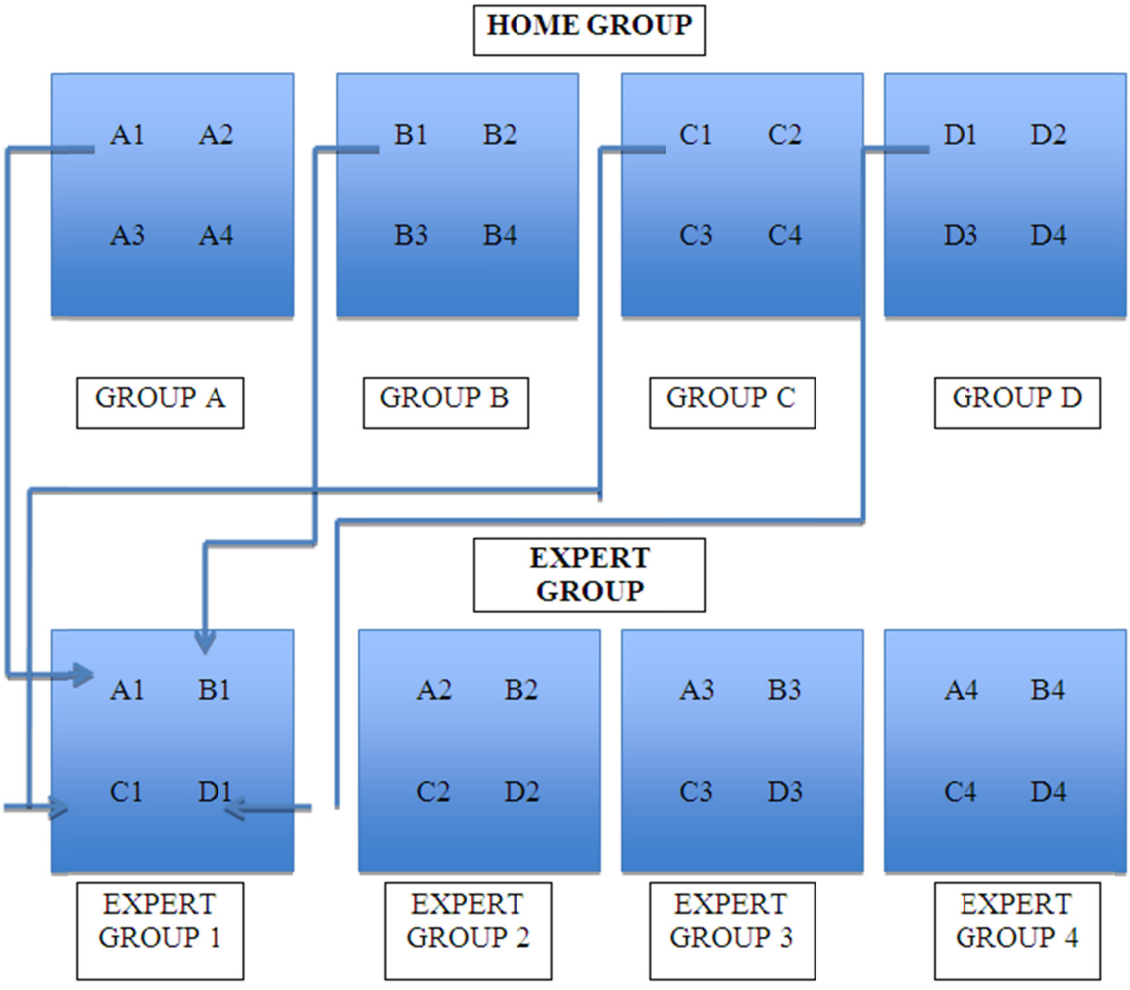


Figure 4. The distribution of the students from the home groups into the expert groups where Jigsaw technique is applied

2.5 Ethical Consideration

The ethical considerations for this study mainly focused on the confidentiality of participants and informed

consent. The researcher obtained permission to conduct the research in the school and was approved by both the school and the Department of Schools. Written informed consent as well as the verbal consent was obtained from the students to ensure that the research protected the rights of the participants and keep their information confidential.

2.6 Data Analysis

The quantitative data collected from both pre-and-post tests were analyzed by descriptive statistics (measures of central tendency and dispersion) as well as inferential statistics (rank-order correlation and t-test for paired/repeated groups). For the qualitative data collected via open-ended survey questionnaire, a thematic analysis approach was used. Thematic analysis is a method of identifying, interpreting and coming up with themes of the qualitative data (Braun & Clark, 2006). Hence, several themes pertaining to the students' views towards the jigsaw-based cooperative learning technique were derived from the analysis.

3. Results

The data collected from the pre-test and post-test and the open-ended survey questionnaire are presented below by table and figures. The first research question will be answered by analyzing the results of the pre-tests and post-tests of the students to see if there is a significant difference between them after the implementation of jigsaw-based cooperative learning. Furthermore, the second research question will be answered from the thematic analysis of the qualitative data collected from the open-ended questionnaires.

3.1 Pre-Test and Post-Test Results

Table 2 and Figures 5-7 show the findings from the two tests scores (pre-test and post-test). The results indicated a significant improvement in students' performance after the jigsaw method was implemented as evidenced by the gain scores. The relationship between the pre-test and post-test scores was as follows: Pearson correlation – r (15) = 0.501, p = 0.057, r^2 = 0.251; and Spearman correlation – Rho (15) = 0.489, p = 0.065, Rho^2 = 0.239. These correlations only accounted for 24-25% of the variance in the two score distributions for the two tests (pre-post). Only one student maintained the same score on both occasions of testing. Four students out of 15 obtained full marks on their post-test, indicating superior improvement from their previous pre-test results. In addition, all of the students managed to attain marks equal or above the passing mark of 50%.

Table 2. Pretest and posttest descriptive statistics in percentages (N = 16)

Statistic	Pre-test	Post-test	Gain Scores
Valid	15	15	15
Missing	1	1	1
Mean	52.500	80.000	27.500
Std. Error of Mean	3.847	4.364	4.127
Median	50.000	87.500	25.000
Mode	43.750[a]	62.500[a]	25.000[a]
Std. Deviation	14.902	16.903	15.986
Skewness	0.398	-0.256	-0.073
Range	50.00	50.00	56.250

a. Multiple modes exist. The smallest value is shown

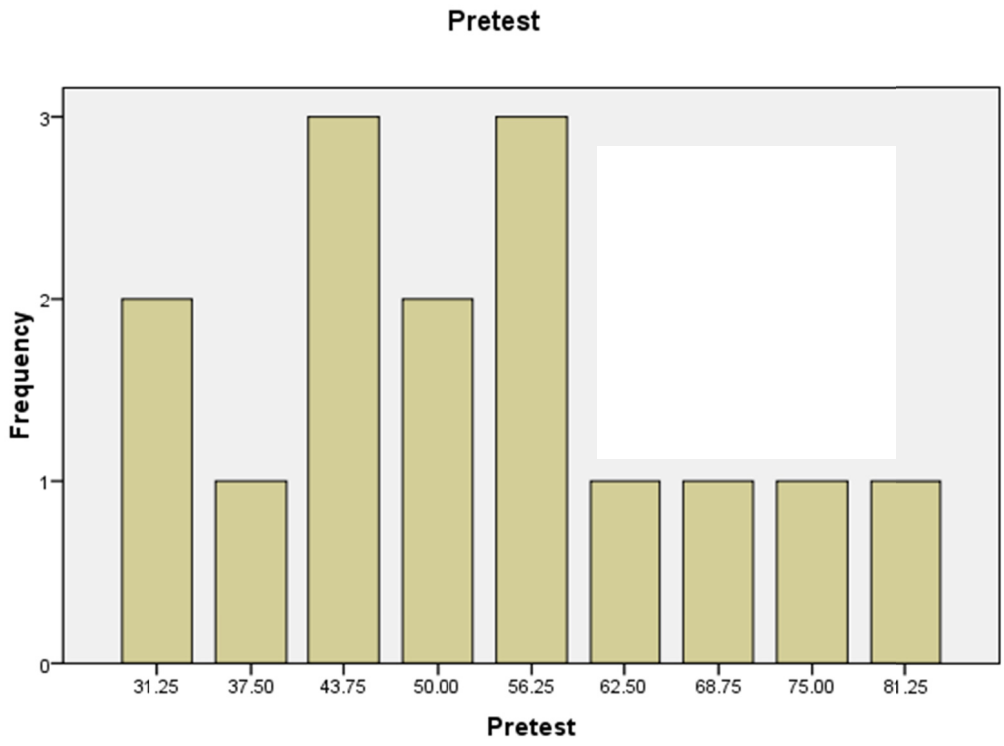


Figure 5. Pre-test distribution (n = 15due to list-wise deletion)

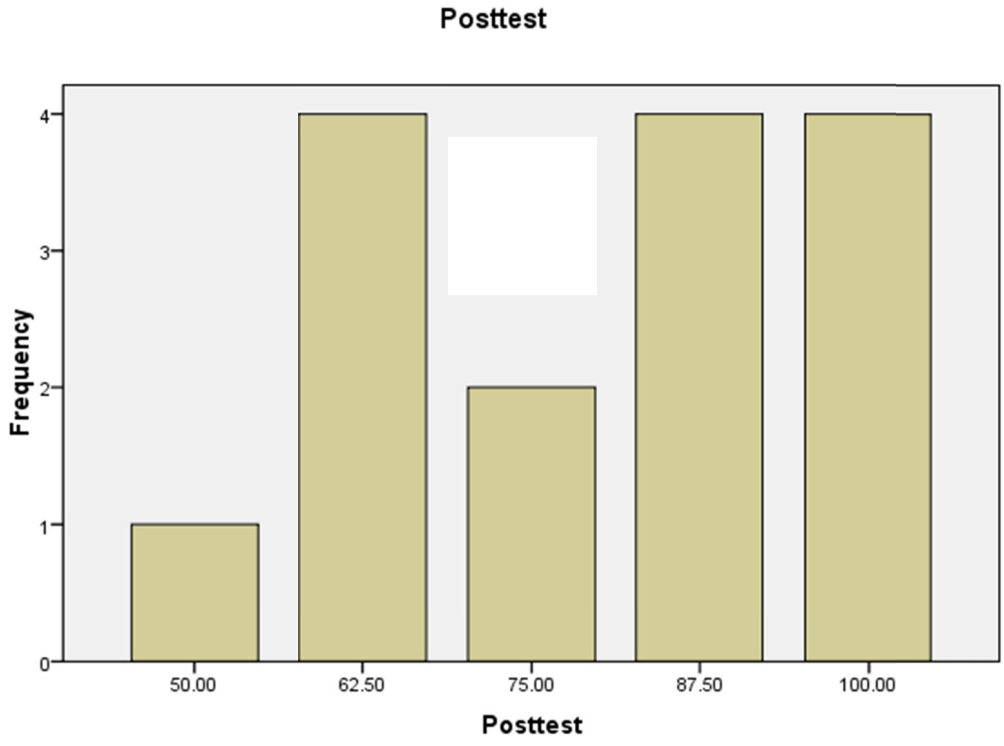


Figure 6. Post-test distribution (n = 15due to list-wise deletion)

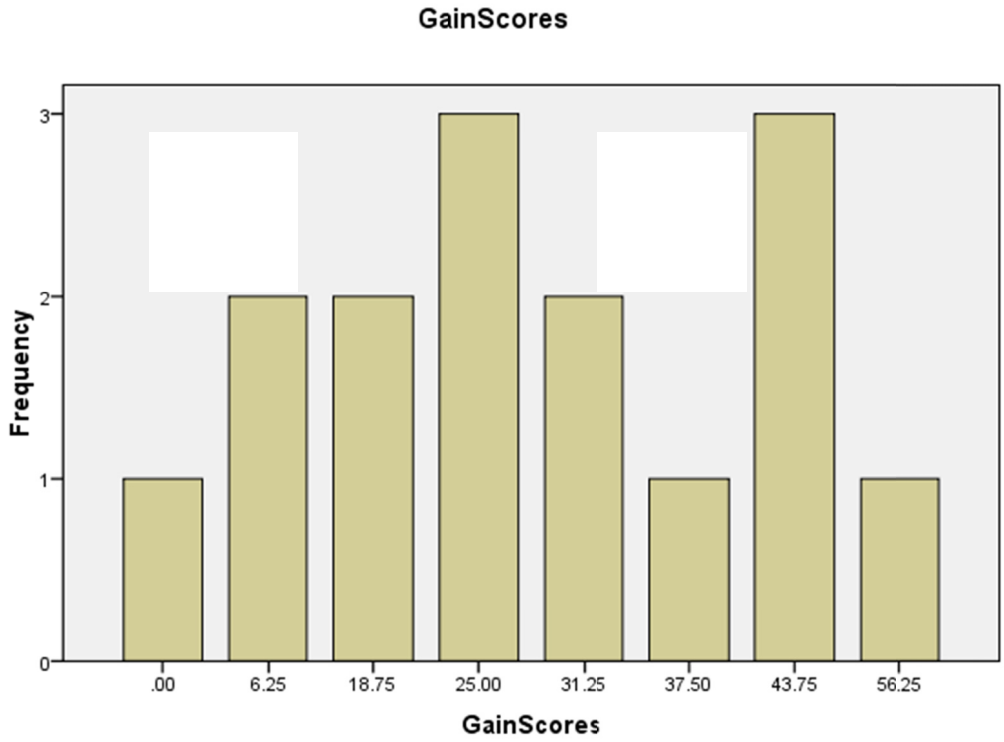


Figure 7. Gain scores distribution (n = 15due to list-wise deletion)

In order to see whether there was been a significant difference between the pre-test and post-test scores, the results were further analyzed by T-test for related pairs using SPSS software (Statistical Package for The Social Sciences) version 22. The Levene's test showed that the two distributions of scores (pre-test and post-test) had equal variances in the population (ANCOVA F = 0.946, p = 0.339) indicating that the equal variance assumption was not violated in the computation of the T-test. As observed from Table 3, there was a significant difference between the pre-test scores {(M = 52.500, SD = 14.900) and post-test scores (M = 80.000, SD = 16.900); T(df = 28) = 4.730, p < 0.01}. This T-test value was associated with a fairly large and exciting effect size (ES) of 0.666 which was more than two-thirds of a standard deviation. These results proved beyond doubt that the students performed significantly much better after being exposed to the use of the jigsaw-based cooperative learning in their lessons. Figure 8 is a pictorial or visual representation of the positions of the two mean scores.

Table 3. Results of pre-and-post T-test analysis

	N	Mean	Std. Deviation	t	df	p
Pre-test	15	52.50	14.90	4.726	28	0.000***
Post-test	15	80.00	16.90			

***p <. 000.

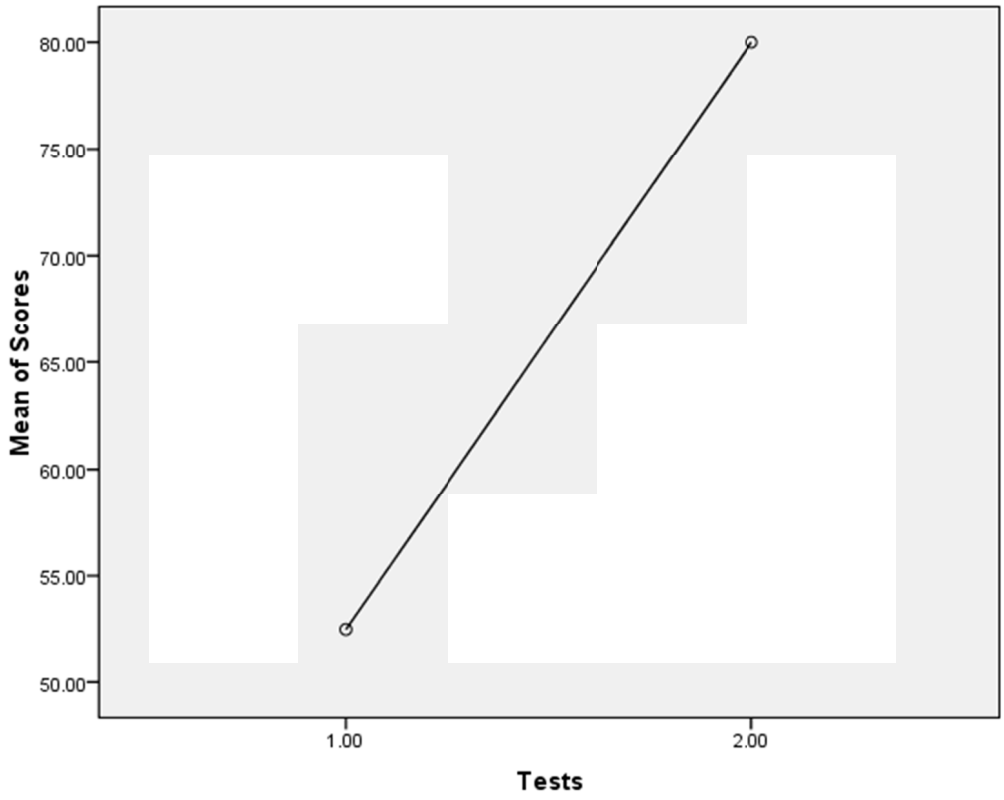


Figure 8. Diagrametic illustration of how far apart the two mean scores were (1 = Pretest; 2 = Posttest)

3.2 Open-Ended Questionnaire

The questionnaire included three open-ended questions: In your opinion, (1) what were the benefits of using the jigsaw strategy in learning the topic given? (2) What were the problems you faced when you use jigsaw-based cooperative learning? (3) Do you enjoy learning using this method?

Based on the students' responses, the data from the three open-ended survey questions were analyzed by deriving common themes and categorizing them under positive and negative views towards the use of jigsaw-based cooperative learning. Table 4 summarizes the common themes found in the student responses from the open-ended questions. In reference to the third question of the questionnaire, all the students (N=16) in the class agreed that they enjoyed learning by the Jigsaw method.

Table 4. Summary of themes derived from the questionnaire

Types of opinions	Theme	Description	Examples of categories
Positive views	Better understanding	Learning and understanding new ideas from their peers	"Jigsaw helps to focus one thing at a time and enhance our understanding"
	Meeting new people	Establishing new friendships	"The lesson won't make you feel sleepy and your workload is shared and can make new friends"
	Proactive	Being more alert and active in class	"It is fun to go around and do more physical stuff rather than sitting down looking at slides"

	Increased confidence	Feels more confidence communicating knowledge to their peers	"The use of jigsaw is enjoyable. We are able to share our knowledge and at the same time boost our confidence level"
	Group size	The decrease in group size affects their discussion	"There are times when some of the members in my group become absent and we have less member than the others"
Negative views	Confusion	Information conveyed may be confusing	"Sometimes information gathered back in the home group isn't clear"
	Free-rider	Some students do not contribute their ideas in the group discussion	"I don't like it when other people in the group just keep quiet and do not help us by giving ideas"

Based on the derived themes, it can be seen that most students reported positive views more than negative views in their experience of the jigsaw-based cooperative learning. Overall, the students reported enjoying the jigsaw method as part of their lesson despite some of the problems that they may have faced during the process:

> *"It is fun when I really understand what I'm talking about and tell my friends about it. Overall I enjoy learning using the jigsaw method"*
>
> *"jigsaw is interesting as it is something new to us and never been done before"*
>
> *"The lesson become interesting when working together because we get many suggestions from the people in the group"*

Some students expressed their interest towards the jigsaw strategy by stating how it had helped them boost their confidence levels and become more proactive than they were in the previous lessons.

> *"I felt confident after the discussion in my group because I know what to explain to my friends afterwards"*
>
> *"The presentation after our discussion helps us to voice out our ideas and build our confidence level because we have to speak in front of the class"*
>
> *"The lesson allows us to move around the classroom making me feel more energetic because I am not just sitting down in one place facing the whiteboard the whole time"*

However, a recurring theme found in their negative views toward the jigsaw strategy was that they reported having free-riders in their group, in which some students refuse to give their full cooperation in the home and expert group discussions.

> *"Sometimes, when one member is not helpful and not doing their reading or writing notes, it really disrupts the whole group"*
>
> *"The barrier I face in this jigsaw-method was when one of our group members did not do his work so we had to ask help from the other groups".*

4. Discussion

The results in this study have revealed there is a statistically significant difference in students' performance after the Jigsaw-based cooperative learning lesson, suggesting that this method has improved the student performance and could possibly lead to better learning outcomes. Furthermore, the findings from the open-ended questionnaire also showed that all the students enjoyed learning by this method and reported more positive views than negative views towards it. This indicated that the jigsaw method was favorable to students. These findings are important to the educational stakeholders such as school principals and teachers because they could help to explain a type of student-centered learning that may be better suited to the needs of the students as the method incorporated some of the 21st century skills such as discussion and presentation.

4.1 Student Performance

Many previous studies show that the jigsaw method improved student performance across different levels of education (Aronson, 2005; Dori, Yeroslavski, & Lazarowitz, 1995; Honeychurch, 2012; Killic, 2008; Sahin, 2010, Slish, 2005). Findings from the present study concur with many studies that reported improvements in the score differences between pre-and-post test results after implementing the jigsaw method. For example, Killic's (2008) findings on the effectiveness of the jigsaw method showed that the score difference increased by 25.75

points from the pre-test scores, indicating a significant difference. He attributed the success of the jigsaw method to monitoring the students' work carefully during the process.

Meanwhile, Aronson, Bridgeman, and Geffner (1978) and Aronson and Bridgeman (1979) suggested the improvements in student performance in the jigsaw method were possibly due to: (1) students become active learners in the classroom; and (2) the jigsaw method promotes interdependent learning and has a collaborative structure. Correspondingly, the findings of the present study were also in agreement with those of Sahin (2010) who focused on student achievement on a writing course. However, the present Brunei study also measured the students' ability to write an evaluative essay. Johnson and Johnson (1994) supported the effectiveness of the jigsaw method because it permitted students to have individual accountability and allowed students to actively interact with their peers.

However, differences in the implementation of the jigsaw method could contribute to the differences in performance (some studies with significant increases and others subtle changes). For example, Dollard and Mahoney (2010) used true-and-false item questions in their pre-and-post tests, whereas the present study used essay-based questions. Dollard and Mahoney (2010) found that there was a 0.9% test score improvements in favor of the jigsaw method and contended that it was not enough to determine whether the method was more effective than the traditional method of learning.

4.2 Student Views towards Jigsaw-Based Cooperative Learning

The findings pertaining to students' views towards the jigsaw method suggest that this method has positive impact on students in various ways but it also acknowledges the existence of negative impacts which should not be disregarded. The positive views towards the method help foster a sense of group identity and a supportive learning environment (Slavin, 1996). However, in light of the negative views, teachers should take into consideration the stated problems because these hiccups may lead students to dislike working cooperatively as it may not be the best instructional design for some (Arra, D'Antonio, & D'Antonio, 2011).

One of the most recurring themes was increased confidence level, a result that appears to parallel many of the previous studies in the literature (Akinbobola, 2009; Mills, 2003; Sahin, 2010; Ulmer & Cramer, 2005; Zariski, 1997). Kirby (2007, as cited in McLeish, 2009) found that students were more comfortable sharing information. The jigsaw method also proved helpful enhancing students' understanding as the method requires discussing in a relaxed learning environment (McLeish, 2009), and the exposure to different ideas results in greater understanding (Zariski, 1997). Furthermore, the method also helped students in establishing friendships and networks (Dollard & Mahoney, 2010). The issue of having free riders in the group is apparently a common problem in the Jigsaw method (Slish, 2005) because one slacker would cause the group to miss out on important information. Joyce (1999) proposed a group-member rotation to solve this free rider problem. Hence, the teacher should emphasize and ensure that positive interdependence and individual accountability exist during the activity to avoid such problems (Johnson & Johnson, 1994). In particular, care must be taken to ensure that the needs of high achieving students are met (Robinson, 1991; Johnson, 1998). Using the jigsaw method over a longer time can allow the students to familiarize themselves with the strategy (Tarim & Akdeniz, 2007) and develop the needed skills to engage effective cooperative learning group work.

5. Conclusion

In a nutshell, findings from the present study support the use of jigsaw-based cooperative learning in classrooms. The procedure helps students to perform better. Furthermore, students benefit from the technique by developing social skills. Despite the positive findings gained from the study, it should be noted that the jigsaw method is only one of the many types of cooperative learning methods and it is not a completely infallible teaching tool. Moreover, this method is still novel in the Brunei education system and requires frequent in-depth theoretical and practical appraisals.

6. Limitations

The present study was limited by one main problem. The sample used was too small (although in laboratory experimental research small exploratory samples and studies are also acceptable). In view of this, the study needs to be replicated using large samples, many schools, and different taught subjects for the results to be generalizable. Despite this limitation, the study had practical significance for improving the effectiveness of teaching.

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