

The Effectiveness of Jigsaw Method on the Academic Performance of Grade 12 students in Online Distance Learning

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Abstract

With the change in educational trends due to the pandemic, new approaches and strategies are applied in the teaching-learning process to provide quality education to learners continuously. One is the jigsaw method, a type of cooperative learning that enables students to work collaboratively with their classmates. This experimental study aimed to determine the effectiveness of the Jigsaw method on the selected Grade 12 students' cognitive ability and academic performance.

This aims to determine the mean performance of the control group's in cognitive ability as reflected by the pretest and post-test; the mean performance of the experimental group who used the jigsaw method in the pretest and post-test; the mean performance of the experimental group in the tasks after using the jigsaw method; and the significant difference in the performance of the control and experimental groups in the pretest and post-test.

Analysis revealed a negative t-test statistic for the control group's mean cognitive ability performance, i.e. the post-test scores are greater than the pretest scores, which are also evident in the computed means. The t-test statistic computed was beyond the critical t-value. For the experimental group, the mean performance for cognitive ability also incurred a negative t-test statistic. The t-test statistic computed across the tests was beyond the critical t-value. In addition, all the tests obtained a p-value <0.000 , which implies that the significance of the values is less than the significance alpha of 0.05. Hence, there is a significant difference observed.

Regarding performance tasks, students were willing to participate in every activity. The level of students' brainstorming, time on task, and interaction increased. However, keeping the camera open always got the lowest mean which implies that students' cognitive ability continually improved, and they coped with different performance tasks with the help of the jigsaw method.

Keywords: Jigsaw Method, Online Distance Learning, Academic Performance

1. Main text

Introduction

With the change in educational trends due to the pandemic, new approaches and strategies are applied in the teaching-learning process to provide quality education to learners continuously.

One is the jigsaw method, a type of cooperative learning that enables students to work collaboratively with their classmates. Using this strategy, students learn cooperation as group members share responsibility for each other's learning by using critical thinking and social skills to complete an assignment. Subsequently, this strategy helps to improve listening, communication, and problem-solving skills.

To a great extent, Jigsaw also allowed the students to engage in activities to actively participate and boost their motivation. It can also enhance their learning comprehension and critical thinking skills. Additionally, according to Dollard and Mahoney (2010), one of the primary advantages of the Jigsaw Method and most other cooperative learning strategies is that they tend to eliminate classroom competition and increase student cooperation. Using collaborative learning creates a kind of team atmosphere among the groups, which is more acceptable to peers. Academic work is valued because it leads to the success of the group.

Further study revealed that students who are engaged in cooperative learning like jigsaw activity tend to lessen peer pressure instead increase the level of their work. Crone and Portillo (2013) explored racial relationships at the primary and secondary educational levels. Their study found that the jigsaw technique increases the students' ability to communicate orally and their belief in themselves as scholars.

Moreover, an impressive body of research shows that cooperative learning methods can foster positive outcomes, ranging from increased motivation to improved academic achievement. From a cognitive perspective, assignment by ability or prior knowledge is exciting. One main research result is that neither form of ability grouping is uniformly superior for promoting the achievement of all students. From the viewpoint of cognitive elaboration, learners must try to adapt their knowledge structure to integrate new information. High quality of interaction in cooperation settings promotes fruitful learning by activation of strategies for deeper-level processing of data. (Berger and Hanze, 2016)

In connection with this, the research aimed to investigate the effectiveness of the Jigsaw method on the selected Grade 12 students in terms of cognitive ability and academic performance.

Theoretical Framework

There are theories that are included in this study and applying ideas to further support the study. Collaborative learning theory is rooted in Lev Vygotsky's idea, Zone of Proximal Development. Here, learners rely on one another to accomplish tasks that they otherwise wouldn't be able to complete individually. Collaborative learning is vital for developing critical thinking skills, with it suggested that students retain more information when working in groups. Involves peer-to-peer learning that fosters deeper thinking in the classroom. Collaborative learning theory suggests that group learning helps students develop their higher-level thinking, oral communication, self-management, and leadership skills. Students also have the opportunity to build upon their leadership and organizational skills. This theory explains the meaning and the essence of collaborative learning. Jigsaw is categorized as part of cooperative and collaborative learning. Therefore, it is stated that collaboration with peers and/or classmates can develop critical thinking skills. The more the students engage in this kind of activity, the more they will improve self-regulation and self-assessment and can also help enhance their own personalities as good leaders and students.

Cooperative learning theory is an offshoot of constructivism, the practice of building new knowledge upon the foundation of previous learning. It incorporates the idea that the best learning occurs when students of mixed levels of ability are actively engaged in the learning process and collaborate with other students to accomplish a shared goal. While constructivism focuses on personal experience as the foundation for learning new material, cooperative learning utilizes not only the student's own experience to solidify knowledge but also uses the experiences of others. Both theories emphasize the importance of interactivity in the design and implementation of lesson plans. Cooperative learning can incorporate constructivist techniques that encourage and/or require students to experiment, hypothesize, and do real-world problem-solving. Students then reflect on the new knowledge they have gained and discuss what they are doing and how their understanding has changed. Cooperative learning theory further supports the study as it explains the importance of peer teaching and learning within their environment. Students will be at their best when they can learn and discover from their own experiences.

Cognitive psychology sees the individual as a processor of information, in much the same way that a computer takes in information and follows a program to produce an output. The information processing

approach characterizes thinking as the environment providing input of data, which is then transformed by our senses. The information can be stored, retrieved, and changed using "mental programs", resulting in behavioral responses. Cognitive psychology has influenced and integrated with many other approaches and areas of study to produce, for example, social learning theory, cognitive neuropsychology, and artificial intelligence (AI). It is stated in this theory that cognitive ability will be enhanced through learning experiences from the environment. Information process effectively when students are engaging in activities that help them actively participate. When their opinion is heard, their interest and motivation for learning also increase. They tend to be more hardworking and believe on their own capabilities to gain more knowledge.

Statement of the Problem

The study's primary aim is to determine the effectiveness of the Jigsaw method on the selected Grade 12 students in terms of cognitive ability and academic performance.

Specifically, it seeks answers to the following questions:

1. What is the mean performance of the Students in the control group in cognitive ability in terms of pre-test and post-test with regards to:
 - 1.1 Reasoning;
 - 1.2 Comprehension;
 - 1.3 long term memory;
 - 1.4 visual processing
 - 1.5 problem-solving;
 - 1.6 logical thinking?
2. What is the mean performance of the students in the experimental group who use jigsaw method in cognitive ability in terms of pre-test and post-test with regards to:
 - 2.1 Reasoning
 - 2.2 Comprehension
 - 2.3 long term memory
 - 2.4 visual processing
 - 2.5 problem-solving
 - 2.6 logical thinking?
3. What is the mean performance of the students in the experimental group with regards to performance tasks after using the jigsaw method?
4. Is there a significant difference in the performance of the students in the control and experimental group in cognitive ability in terms of pre-test and post-test?

Research Methodology

The study was conducted at Biñan Integrated National High School for school year 2021-2022. A descriptive research design was used to determine the effectiveness of Jigsaw Method on the academic performance of Grade 12 students in online distance learning. In order to analyze and interpret the data gathered, weighted mean, standard deviation, and t-test were utilized in the study.

Results and Discussion

Table 1. Mean Performance of the Students in Controlled Group in Cognitive ability in terms of Pretest and Posttest

TEST	MEAN	SD	Verbal Interpretation
Reasoning			
Pre-Test	3.67	1.56	Fairly Satisfactory
Post Test	5.93	2.26	Satisfactory
Comprehension			

Pre-Test	3.43	1.30	Fairly Satisfactory
Post Test	5.87	1.70	Satisfactory
Long Term Memory			
Pre-Test	4.30	1.84	Satisfactory
Post Test	6.70	1.47	Very Satisfactory
Visual Processing			
Pre-Test	3.30	1.54	Fairly satisfactory
Post Test	5.97	2.20	Satisfactory
Problem Solving			
Pre-Test	3.07	1.23	Fairly satisfactory
Post Test	5.63	2.41	Satisfactory
Logical Thinking			
Pre-Test	3.20	1.49	Fairly satisfactory
Post Test	5.67	1.92	Satisfactory

It shows that the pre-test and post-test has different scores in terms of students' cognitive ability. Since they are from a controlled group, they just undergone the traditional classes wherein they are taught and learned their lesson on a way they used to do.

Table 2. Mean Performance of the Students in Experimental Group in Cognitive ability in terms of Pretest and Posttest.

TEST	MEAN	SD	Verbal Interpretation
Reasoning			
Pre-Test	3.60	1.33	Fairly Satisfactory
Post Test	6.33	2.19	Satisfactory
Comprehension			
Pre-Test	3.73	1.48	Fairly Satisfactory
Post Test	6.30	1.78	Satisfactory
Long Term Memory			
Pre-Test	4.43	1.96	Satisfactory
Post Test	7.53	1.59	Very Satisfactory
Visual Processing			
Pre-Test	3.30	1.37	Fairly satisfactory
Post Test	6.47	1.59	Satisfactory
Problem Solving			
Pre-Test	3.10	1.47	Fairly satisfactory
Post Test	6.17	2.39	Satisfactory
Logical Thinking			
Pre-Test	3.30	1.29	Fairly satisfactory
Post Test	6.43	1.87	Satisfactory

The finding shows that there are also differences on the result of the pre-test and post-test in the experimental group. Almost all of the variables came from fairly satisfactory turned to be satisfactory. However, it doesn't appear to be outstanding, maybe because students are not that familiar with the jigsaw method. They might find it hard to adapt in new activities that they are not used to doing.

Table 3. *Level of Students Performance in Task 1 (Break the Tension)*

PERFORMANCE TASK CRITERIA	MEAN	SD	Verbal Interpretation
1. Brainstorming	4.15	0.96	Very Satisfactory
2. Time on Task	4.13	1.36	Very Satisfactory
3. Keeping the camera open	2.07	1.46	Fairly Satisfactory
4. Interaction	3.60	1.19	Very Satisfactory
Overall	3.53	1.53	Very Satisfactory

Finding shows that students somehow participated on their activities. Nevertheless, since the online distance learning began, it is very noticeable that most the students are not opening their cameras. One of the reasons is it is not required as respect to their privacy. Second, teachers can't force the students due to load/internet resources they have. For some reasons like these, students became used to not opening their camera even during the time of doing activities, some also are shy and does not feel comfortable to show their faces on screen.

Table 4. *Level of Students Performance in Task 2 (Water Structure and Properties)*

PERFORMANCE TASK CRITERIA	MEAN	SD	Verbal Interpretation
1. Brainstorming	3.87	1.36	Very Satisfactory
2. Time on Task	4.40	1.30	Outstanding
3. Keeping the camera open	2.27	1.53	Fairly Satisfactory
4. Interaction	3.87	1.25	Very Satisfactory
Overall	3.60	1.56	Very Satisfactory

Finding shows that students finished their task on time, maybe they do not find it difficult and too challenging. They also show interest on doing the learning task 2 which is water structure and properties. Topic is not that hard and they can easily follow the instructions given by the teacher. Though, keeping the camera open still found to be fairly satisfactory which may due to their internet connection, distractions from learning environment and privacy aspects.

Table 5. *Level of Students Performance in Task 3 (I Need Water)*

PERFORMANCE TASK CRITERIA	MEAN	SD	Verbal Interpretation
1. Brainstorming	4.24	1.24	Outstanding
2. Time on Task	4.33	1.21	Outstanding
3. Keeping the camera open	2.77	1.53	Fairly Satisfactory
4. Interaction	3.87	1.36	Very Satisfactory
Overall	3.67	1.56	Very Satisfactory

Finding shows that two variables in performance task 2 which is I need water turned to be outstanding, which can implies that as students goes into more activities and task, they can practice more collaborative learning, brainstorming and builds good interaction with each other. They may also find this

task as interesting one and boost their motivation to learn more.

Table 6. *Level of Students Performance in Task 4 (Concentration of Solution)*

PERFORMANCE TASK CRITERIA	MEAN	SD	Verbal Interpretation
1. Brainstorming	4.24	1.24	Outstanding
2. Time on Task	4.33	1.21	Outstanding
3. Keeping the camera open	2.77	1.53	Fairly Satisfactory
4. Interaction	3.87	1.36	Very Satisfactory
Overall	3.67	1.56	Very Satisfactory

The result of the study reveals that in performance task 4, which is the concentration of the solution, students' performance is also outstanding and very satisfactory which implies that they enjoyed doing their task and shows progress on their performances. However, open camera still found out to be the lowest, maybe because students become used to not open their cameras during their classes. It cannot be controlled by the teachers since they are given rights that this is not a mandatory in online distance learning.

Table 7. *Significant Difference on Student Mean Performance in Control Group as to Cognitive Ability in terms of Pretest and Posttest*

TESTS	Mean	Mean Difference	t-value	p-value	Analysis
Reasoning					
Pre-Test	3.67	2.26	-6.48	0.000	Significant
Post Test	5.93				
Comprehension					
Pre-Test	3.43	2.44	-5.70	0.000	Significant
Post Test	5.87				
Long Term Memory					
Pre-Test	4.30	2.40	-5.67	0.000	Significant
Post Test	6.70				
Visual Processing					
Pre-Test	3.03	2.94	-5.80	0.000	Significant
Post Test	5.97				
Problem Solving					
Pre-Test	3.07	2.56	-5.60	0.000	Significant
Post Test	5.63				
Logical Thinking					
Pre-Test	3.24	2.43	-5.68	0.000	Significant
Post Test	5.67				

Pre-test and Post-test are significantly different on each other. Results shows that cognitive ability of controlled group maybe varied depending on the knowledge that the student have and the knowledge they have gain from their lesson.

From this, we can infer that at 0.05 level of significance, the null hypothesis "There is no significant

difference on student mean performance in control group as to cognitive ability in terms of pretest and posttest” is rejected. Thus, the alternative is accepted which incites that there is a significance.

Table 8

. Significant Difference on Student Mean Performance in Experimental Group as to Cognitive Ability in terms of Pretest and Posttest

TESTS	Mean	Mean Difference	t-value	p-value	Analysis
Reasoning					
Pre-Test	3.60	2.73	-6.50	0.000	Significant
Post Test	6.33				
Comprehension					
Pre-Test	3.73	2.57	-5.75	0.000	Significant
Post Test	6.30				
Long Term Memory					
Pre-Test	4.33	3.10	-6.32	0.000	Significant
Post Test	7.53				
Visual Processing					
Pre-Test	3.30	3.16	-9.83	0.000	Significant
Post Test	6.46				
Problem Solving					
Pre-Test	3.10	3.07	-6.78	0.000	Significant
Post Test	6.17				
Logical Thinking					
Pre-Test	3.30	3.13	-8.60	0.000	Significant
Post Test	6.43				

In terms of student mean performance in Experimental Group as to cognitive ability, pre-test and post-test are also significant wherein it implies that students effectively learned using the jigsaw method. They may find it fun and exciting since it is a new strategy of teaching, and it is more engaging.

From this, we can infer that at 0.05 level of significance, the null hypothesis “There is no significant difference on student mean performance in experimental group as to cognitive ability in terms of pretest and posttest” is rejected. Thus, the alternative is accepted which incites that there is a significance.

Summary of Findings

The following were the significant findings of the investigation:

The findings show that the pre-test and post-test has different scores in terms of students' cognitive ability. Since they are from controlled group, they just undergone from the traditional classes wherein they are taught and learned their lesson on a way they used to do.

Also, finding shows that there are also differences on the result of pre-test and post-test in the experimental group. Almost all of the variable came from fairly satisfactory turned to be satisfactory. However, it doesn't appear to be outstanding, maybe because students are not that familiar with the jigsaw method. They might find it hard to adapt in new activities that they are not use to do.

Moreover, with regards to performance task, students show willingness to participate in every

activity. The level of students' brainstorming, time on task and interaction is increasing, however open camera always got the lowest mean. It implies that students' cognitive ability is continually improving, and they are coping up with different performance task with the help of jigsaw method.

Lastly, across all the variables for the academic performance, a negative t test statistic was incurred which suggests that the post test scores are greater than the pre-test scores which are also evident in the computed means. Pre-test and post-test are also significant wherein it implies that students effectively learned using the jigsaw method. They may find it fun and exciting since it is a new strategy of teaching and it is more engaging.

Conclusion

On the basis of the foregoing findings, the following conclusion was drawn.

The study shows that there is a variation on the effects of jigsaw method in teaching students. Based on the findings, there are changes on student's performance before and after the utilization of jigsaw. The researcher therefore concludes that the null hypothesis stating that "There is no significant difference in the performance of the students in control and experimental group in cognitive ability in terms of pretest and posttest" is rejected. Hence, it implies that there is an effect in the cognitive ability of the students.

Recommendations

Based on the drawn conclusions resulted to the following recommendations:

1. It is highly recommended that there should be more studies to conduct about the jigsaw method so that they can further assess its effectiveness in terms of utilization and uses in teaching.
2. It is suggested that enhancement on the jigsaw method must be done to make it more functional and applicable on the level of the learners. It should not only focus on cognitive ability of the student rather can also enhance other skills of the students such as cognitive engagement, metacognition, etc.
3. Moreover, schools and teachers may also offer other approaches like jigsaw method so that students will be familiarize on these kinds of teaching strategies. Various engaging strategies should also be promoted and let the learners see its importance on their learning processes and improve their abilities.
4. Lastly, schools must provide other learning activities and supports students' different skills to enhance their cognitive abilities. Further research and studies related on this should also be given emphasis for the sake of both the learners and teachers.

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