The Effectiveness of Using the Jigsaw Model to Improve Students’ Economics Teaching-Learning Achievement

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Abstract
The objective of this study was to investigate whether the use of the Jigsaw model in teaching-learning Economics could improve the results of Senior High School Students in Banda Aceh, Indonesia. A quasi-experimental design was used in this study, which used 60 randomly sampled second year (Grade 11) High School students for the sample, divided into two classes of 30; one the experimental group (EG) and the other the control group (CG). The two groups were homogenous in terms of their initial ability. The instrument used in this study was an essay test. T-test was used to analyse the data collected. The results from the post-test showed that there was then a significant positive difference between the two groups in terms of the students’ achievements in economics; after the EG had been taught-learnt using the Jigsaw model for three months, they got significantly higher results in their economics essays than the CG students, who had been taught economics using the standard model and had not used Jigsaw. The implications of this study show that the use of the Jigsaw model in teaching-learning economics can be a model for improving students’ achievement.

Keywords: Jigsaw model, economics, achievements of students
Introduction

Improving the quality of education in Indonesia is one of the most important tasks that should be undertaken by the government in this era of globalization characterized by the e-economy. The institutional education in Indonesia has undertaken various strategies to enhance students' achievement. However, the quality of students' achievement is still insufficient. Besides, the government also insists that teachers should improve their competences so that they can solve teaching-learning problems in their classrooms. Training programs have also been developed by the educational institutions in Aceh to improve the quality of the teaching-learning processes of the teachers. In addition, teachers should also have a good knowledge of the character and needs of their students (Cercone, 2008). In addition, the teacher should know the learning styles of their students so that they can teach their lessons easily (Oxford, 2003). In relation to this, the subject of economics education is one of the compulsory subjects that are included in the National Curriculum of the Indonesian education system. Various kinds of policies and decisions have been made by the Education Department to improve students' achievement in their study of economics at Senior High School level.

The policies to improve the quality of teaching include ensuring that all teachers get certified as professional teachers and that better facilities to support the processes of teaching-learning are provided; also, that the role of the principal to provide guidance to teachers in the teaching-learning processes is strengthened with in-service training. Therefore, when discussing the issue of human resources, priorities should be given to efforts to prepare and improve the skills and expertise of everyone to face the challenges and uncertainties of the future. In this context, students as the future human capital of the country need to develop a variety of skills and expertise to ensure that they are accepted and recognized as the most valuable future assets of the state and those skills can only be developed through education (Martin & Double, 1998). Teaching-learning strategies for students should be adjusted to the teaching strategies that generate a positive attitude in the learning process. The teaching-learning processes should be improved with innovative strategies and methods to ensure improved student results and creativity (Briggs 1994).

Thus, better student learning styles are needed to help students master the teaching-learning processes. Dunn & Dunn (2008) stated that teachers should no longer pre-suppose that students would apply their learning through other teaching methods. The new curriculum requires teachers to adapt to the unique nature of students as needed to achieve academic excellence and high achieve-
ments. According to Johnston et al., (2000), economics is one of the subjects that students find difficult, which is taught at the high school and university levels. Accordingly, Johnston et al., (2000) suggested that students of economics must necessarily develop the capacity to think abstractly to be able to adapt to these lessons. Students must also develop the ability to explain ideas seamlessly and logically. Economics teachers have to use various teaching-learning strategies to encourage students to continue to master economics. Many concepts studied in economics are taught with the use of quantitative methods, such as graphs, figures, equations and numerical examples. Schuhmann et al. (2005) stated that students who did not develop the ability to think quantitatively would have difficulties in mastering economics.

In addition, various teaching-learning methods (contextual teaching and learning, scientific approach, discussion, etc.) have been employed by teachers to improve student achievements, but the results are rarely good enough (Muslem & Abbas, 2017). Co-operative learning methods are commonly used in teaching-learning processes to improve student achievements (Hornby, 2009; Jalilifar, 2010). Co-operative learning models are attractive methods for teaching-learning in the classroom (Marburger, 2005). The use of co-operative learning in the teaching-learning process has indicated advantages such as increasing achievement, enhancing students’ critical thinking skills, a deeper understanding of learned materials, enhancing students’ attention and less disruptive behaviour in class, decreasing students’ anxiety and stress, and, not less important, increasing students’ motivation and self-confident. Besides, students can also improve their social skills and enhance their capacity to work productively together while working in a cooperative learning environment (Kam-Wing, 2004; Zain et al., 2009; Sahin, 2010; Majoka et al., 2011).

Research Problem

Jigsaw is one of the cooperative learning models usually used by teachers to teach in the classroom of Senior High School students in Indonesia. Most teachers in Indonesia use this model to teach English, Science and Math, Geography, Biology, Medicine, etc. And it has been proved that the use of this model improves student achievement in those lessons. Various strategies and models have been used by teachers to improve student achievement in economics, such as discussion, lecture, group work, etc. Many teachers use cooperative learning such as Team Game Tournament, STAD, Number Head Together, Think Pair Share, and Jigsaw. However, the Jigsaw model is rarely used by teachers of economics. Thus, the presented study attempts at investigating if the use of the Jigsaw model can
improve students’ achievements in economics at Senior High School in Banda Aceh. In other words, to what extent this model helps students enhance their performance in economics education.

**Research Focus**

The focus of this study was the implementation of the Jigsaw model to enhance students’ achievement in economics at Senior High School in Banda Aceh. The Jigsaw model is one of the cooperative learning models that enable students to improve their academic achievement. There are many kinds of cooperative learning models most widely employed in teaching and learning as such; Student Teams-Achievement Division (STAD) (Slavin, 1980), Teams-Games-Tournament (TGT; Slavin, 1980), Learning Together, and Group Investigation (Sharan and Hertz-Lazarowitz, 1980), Jigsaw (Slavin, 1980, as cited in: Kam-Wing, 2004). From these models, the jigsaw one was selected in the presented study to employ in the teaching and learning of economics in the classroom. This model can enhance cooperative learning by making each student responsible for teaching some of the learning issues to the group. In this model, students are members of two different groups, the ‘home group’ and the ‘jigsaw group’ (Kam-Wing, 2004). Principally, students meet in their home groups and each member of the group is assigned a portion of the learning issues to learn as an ‘expert’ (Slavin, 1980, as cited in: Kam-Wing, 2004). This model can promote students’ interaction, communication among students and teachers, and increase students’ performance (McDougall & Gimple, 1985; Kam-Wing, 2004; Lai & Wu, 2006). The process of teaching and learning in this model starts when the home groups break apart, like pieces of a jigsaw puzzle, and students move into jigsaw groups, which consist of members from the other home groups who have been assigned the same portion of the learning issues. While in the jigsaw groups, the students discuss their particular material to ensure that they understand it. Students then return to their home groups, where they teach their material to the rest of their group (Colosi and Zales, 1998; Kam-Wing, 2004; Slish, 2005; Soh, 2006; Doymus, Karacop, & Simsek, 2010; Sahin, 2010).

**Research Methodology**

**Research General Background**

The presented study was conducted at Senior High School in Banda Aceh. Banda Aceh is the capital of the Aceh province located at the westernmost tip of the Sumatra Island, Indonesia. The study used a quasi-experimental design with
The experimental study was conducted to compare the effectiveness of improving students’ academic achievement by using the Jigsaw model and the conventional model. The study involved two existing classes of the second grade students of Senior High School. The two classes were pre-checked and found to be homogenous and both groups used the same media but each group was taught differently. Thus, the authors selected any class to be experimental and control groups. Two groups of students were given pre-tests prior to the treatment. A set of essay tests was used as the pre-test.

The process of teaching and learning by using the jigsaw model was conducted by the teachers after they had been taught the model by the authors. They had been taught the model during two weeks with the expectation that they were successful in doing the treatment. Two teachers of economics participated in the study; one teacher acted in the experimental group and another one acted in the control group. The reason why this study involved the teachers to conduct the experiment was to avoid the subjectivity of research results. The experimental group was taught with the use of the Jigsaw model and the control group was taught with the use of the conventional model. Both lessons lasted one hour a week. The experimental and control groups were taught during 14 weeks. The authors were the facilitators and observers of the process of teaching and learning during the treatment. The authors did not involve in the treatment to avoid bias and also to ease the control of internal and external validity. After finishing the treatment, each group was given the same new post-test. The post-test consisted of five essay questions that related to the economics lessons, namely macro- and micro-economics, national income, inflation and price index, consumption and investment, money, bank and monetary policy. The students were asked to answer the questions that related to these topics in the post-test.

**Research Sample**

Two classes of second grade students of senior high school in Banda Aceh were the sample of the study. The two classes were checked for equivalency in their academic achievement in economics. The authors tested the students’ economics achievements to ensure that they were homogenous in terms of their ability. Both classes were homogenous in terms of their prior ability. The sample of this study consisted of 60 second grade (year 11) senior high school students in Banda Aceh. Each group consisted of 30 students. Since the level of the students’ academic achievement in the previous examination in economics were the same, the authors determined the two classes as an experimental group and control group. The authors used random sampling to ensure objectivity and avoid bias.
The Effectiveness of Using the Jigsaw Model

**Instrument and Procedures**

The instrument used to collect data for the presented study was test, pretest and posttest. Five essay questions were distributed to both classes. The instrument used had been tested prior to distributing it to the students to ensure its validity and reliability. In order to achieve good validity and reliability of the instrument used in this study, the authors adapted the model from Abdul Halim et al. (2010). The procedures of the model are as follows: First, the authors analysed the previous study then analysed the theory and concepts related to the instrument construction. Next, they constructed the definition and developed the first draft of essay items. And then, they sent the model to experts and revised it based on the comment given by the experts. After that, the authors designed a pilot project to ensure the validity and reliability of the instrument. And then it became a draft of the instrument prior to the real instrument used to collect data (cf., Figure 1). After achieving the validity and reliability of the instrument, the authors started collecting data.

![Diagram of research instrument process](image)

**Figure 1.** Procedure of research instrument (Adapted from Abdul Halim et al., 2010).

**Data Analysis**

The data from the tests was analysed by using descriptive and inferential statistics, which involved a t-test. It was conducted to compare the two groups, in this case, which group performed better after finishing the treatment.
Research Results

The objective of the presented study was to find out if the use of the Jigsaw Model can improve students’ academic achievements in economics at Senior High Schools in Banda Aceh. Analysis of the findings showed that there was a significant positive difference in terms of the ability of the EG students in economics after using the Jigsaw model as compared to the CG students following the traditional model for teaching-learning economics. Table 1 shows the mean and standard deviation of the pre-test results from both the CG and the EG. It shows that there was no significant difference in the pre-test results of both groups in terms of the students’ achievements in both groups as shown below:

Table 1. Mean and standard deviation (S.D.) of the pre-tests of the two groups

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Method</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students’ achievements in economics</td>
<td>Conventional</td>
<td>30</td>
<td>41</td>
<td>8.959</td>
</tr>
<tr>
<td></td>
<td>Jigsaw</td>
<td>30</td>
<td>44</td>
<td>9.471</td>
</tr>
</tbody>
</table>

Table 2 presents the means and standard deviation of the post-test results for both the CG and the EG. It shows that there was a significant difference between the two groups in terms of the students' achievements. The students in the EG obtained a significantly higher mean score than the students in the CG. This means that the use of the Jigsaw model can significantly improve students’ achievements in economics.

Table 2. Post-test results: means and standard deviation of the two groups

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Method</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students’ performance in economics</td>
<td>Conventional</td>
<td>30</td>
<td>51</td>
<td>9.517</td>
</tr>
<tr>
<td></td>
<td>Jigsaw</td>
<td>30</td>
<td>75</td>
<td>4.571</td>
</tr>
</tbody>
</table>

Table 3 shows the result of the t-test of the dependent variable in terms of the students' achievements in economics. There was a significant difference in the means in terms of the students' achievements in economics in which $t(29) = 26.32$, $p= 0.05$. Therefore, the null hypothesis was rejected. This means that the use of the Jigsaw model in teaching economics significantly improved the EG students’ results.

Table 3. The results from the t-test of the post-test scores

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Df</th>
<th>T</th>
<th>P</th>
<th>Result</th>
<th>Hypothesis</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students’ achievements in economics</td>
<td>29.00</td>
<td>26.3</td>
<td>0.00</td>
<td>Significant difference in means</td>
<td>Ho</td>
<td>Reject</td>
</tr>
</tbody>
</table>
Table 4 shows the mean scores for the dependent variable, i.e., the post-test economics test results for both the CG and the EG. The means and standard deviations for both groups were used to determine the size of the effect according to the method of Cohen (Cohen, 1988). According to Wolf (1986), generally if Cohen's d value is greater than 0.25 it indicates a significant positive learning effect. Cohen's value for the variables of the dependent variable (students' achievements) in the economics test was 0.734. This indicates that the effect of the Jigsaw model was significant. It can be concluded that the use of the Jigsaw model significantly improved the students' achievements in economics. Hence, the hypothesis for this study was confirmed and the null hypothesis was rejected as there was a significant positive difference between the results in economics obtained by the EG students, who were taught with the use of the Jigsaw model, and the CG students, who were taught with the use of the traditional model.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>CG Mean Score</th>
<th>(N = 30) S.D.</th>
<th>EG Mean Score</th>
<th>(N = 30) S.D.</th>
<th>Size Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic performance of economics students</td>
<td>51</td>
<td>9.517</td>
<td>75</td>
<td>4.571</td>
<td>0.734</td>
</tr>
</tbody>
</table>

**Discussions**

The objective of this study was to investigate whether the use of the Jigsaw model could improve the achievements of economics students. Analysis of the results shows that the use of the Jigsaw model can improve the results of economics students’ achievements. Jigsaw is one of the co-operative learning models that can be used in the teaching-learning of economics (Marburger, 2005; Sahin, 2010). The finding of this study is in line with those from previous research which found that the use of the Jigsaw model could improve the results of economics students (Zain et al., 2009; Sahin, 2010; Majoka et al., 2011). This model enables students to work collaboratively so that they can share and give ideas in the processes of teaching-learning in the classroom (Briggs 1994). The finding of this study is in line with the previous research findings in which the use of the jigsaw model enhanced students’ academic achievements (Slish, 2005; Soh, 2006; Doymus, Karacop, & Simsek, 2010; Sahin, 2010). Thus, this model can be applied by teachers, especially the teachers of economics, in the classroom to enhance either students’
achievements or style of learning. This is also supported by the previous study that reported that the use of the jigsaw model improved students’ attitude to learning (Lai and Wu, 2006).

The findings of this study also show that the students’ ability to solve problems in economics by using statistical analysis and mathematic formula is enhanced. Besides, the understanding of econometric concepts in economics was also improved. The quality of cooperative learning in solving the problems of economics was also high. In addition, the study also found that the students’ attitude towards the learning process in class was positive after using the Jigsaw model. And those findings were the merit of this study. The study has also contributed an alternative and effective way to improve students’ achievements in economics through the use of the Jigsaw model, in particular how to easily solve the problems related to econometrics. The results also appear to benefit low achievers, enabling them to improve their performance. Also, Jigsaw enables students to work co-operatively to enhance their understanding of economics. The most important result of this study was that the Jigsaw model enables the learners to study more smartly and independently. As a result of this study, the jigsaw model has been applied by the teachers of the school when teaching economics lessons. Therefore, the model can help low achievers to improve their learning performance.

Conclusions

The presented study investigated the results of using the jigsaw model in the teaching-learning of economics to second grade (year 11) senior high school students in Banda Aceh. The finding showed that the students’ achievements and learning styles changed after using the Jigsaw model in the teaching-learning processes. The Jigsaw model of cooperative learning was the key factor in the positive changes in the students’ achievements in economics. This study showed a significant positive difference between the EG and the CG post-treatment in terms of academic achievement in economics. Thus, there was a significant positive improvement in the students taught with the use of the Jigsaw model compared to those taught with the use of the traditional model in terms of achievement in economics.
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References


