The EffectivenessOf The Jigsaw Type Cooperative Learning Methods On Students` Critical Thinking Skills

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Abstract. This study aims to determine the effectiveness of the Jigsaw type cooperative learning method on students`critical thinking skills in Child Nursing course. The sample in this study was the 4th-semester students of the Nursing Science study program at Universitas Muhammadiyah Kalimantan Timur. Thesample of study was separated into two classes with multiple sampling techniques and the arrangement of the two classes was chosen randomly.The participating students were identified as the Jigsaw Group (n=45) and as the Control Group (n=45). The research instrument used was CTDSRF to assess critical thinking skills and observation sheets. This studywas an experimental research with Post-test Only Control Design. The data obtained were analyzed using the Independent Sample T-Test**..** Based on the results of the Independent Samples T-Test, it was found that the t value was 2.852 and the probability value (Sig.) was 0.005, so H0 was rejected. Thus, it can be concluded that there are differences in the effectiveness of the jigsaw type cooperative learning model and conventional learning models towards students' critical thinking skills. The mean of critical thinking skills of students` who get Jigsaw type learning model 79.22 higher than the mean value of critical thinking skills of students taught with conventional learning models that is 72.22. The mean of the critical thinking skills of the group that received the Jigsaw model was higher than the mean of the group's critical thinking skills that received the conventional learning model.

Keywords: Cooperative Learning, Jigsaw, Critical Thinking, Education

1 Introduction

Education is a place to develop the potential that exists in individuals or students and pass on their knowledge, values and behavior, so that changes and improvements in the field of education are needed that ultimately can produce output in accordance with the needs in society)[1]. Learning activities are designed to provide learning experiences through interaction between students, students and lecturers, students with the community and the surrounding environment and other learning resources in the context of achieving applicable basic competencies. Achievement of intellectual abilities and academic values needs to be accompanied by instilling moral values. Character education can be instilled through the example of the civitas academica of lecturers, employees, and senior students through disciplined, creative, and critical behavior. [2]states that character education can be developed through the selection of science learning models, assessment models, instructional media, and the selection of teaching materials. The learning model is an innovative learning model in which the learning process is student-centered, including the cooperative learning model. The

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cooperative learning model has a high contribution in developing students' character. The cooperative learning model contributes to the development of the character of democratic attitudes, responsibility, cooperation, discipline, honesty, empathy, openness, social care, and tolerant attitude [3].

Based on real experience in the field, it was found that some students were less able to think critically in analyzing cases provided by lecturers, especially in the Child Nursing subject. This is because so far students are accustomed to learning conventional methods, namely the lecture method so that they have difficulty if they are given a case analysis problem. In general, lecturers have implemented the learning process using the discussion method but there is no variation so that it still seems monotonous and only a few students are active in the discussion. From this phenomenon, the researcher deems it necessary to conduct a research on the effectiveness of the Jigsaw type cooperative learning model on students' critical thinking skills in child nursing courses.

At present, there are various cooperative learning methods that are applied in the learning process at various levels of education throughout the world and in various fields of study [4]. This model differs from one another in terms of several important aspects such as collaboration between groups and group competition [5]. Cooperative learning is formed as a learning innovation that can improve the achievement of cognitive, affective, and social learning. Cooperative learning is based on five elements such as positive interdependence, individual accountability, promotive interaction, group processing, and the development of small group interpersonal skills [6]. One of the most common methods of cooperative learning is Jigsaw. This type has special characteristics in terms of group formation [7]. Jigsaw type cooperative learning methods have become teaching activities that can be used by lecturers from all classes in their classrooms. Jigsaw techniques have been designed to encourage cooperation between students in solving a problem or case. In this technique, each student is responsible for learning part of the learning topic and teaching it to other students[5].Jigsaw learning encourages students to remember and understand the subject matter by explaining the contents of the material to the study groups. Therefore, it is necessary to present problems in the Jigsaw learning model so that students can develop their critical thinking skills. Jigsaw as a method of cooperative learning can be used at any time and learning material can be divided into separate components [8]. The Jigsaw method was developed by Slavin which emphasizes the interaction between students to motivate each other and help each other in mastering subject matter to achieve learning goals [9].

This study is important to be done to increase student`s motivation, develop critical thinking skills, and provide the ability to work with friends and the environment throught Jigsaw type cooperative learning. In addition, this study can provide information to lecturers about the importance of applying the Jigsaw cooperative learning model as an alternative in the teaching and learning process.

2. Method

This study was a simple experimental design with Post-test Only Control Design.With this design, in this study there were two groups chosen randomly. The first group was not given treatment called the control class and the second group was given treatment called the experimental class. The treatment applied in the learning process used the Jigsaw cooperative learning model. Then at the specified time period, the experimental group was given a treatment. After the treatment was completed, measurements were made to both groups. Comparison of results between the two groups showed the effect of the treatment that has been

given. The control group functions as a comparison with the experimental group that has been given treatment for a certain period of time.

This study was conducted in Samarinda City, East Kalimantan Province, Indonesia. The sample in this study was the 4th semester students of the Nursing Science study program at Universitas Muhammadiyah Kalimantan Timur. The study sample was taken two classes with multiple sampling techniques and the determination of the two classes was chosen randomly. The participating students were identified as the Jigsaw Group (n=45) and as the Control Group (n=45). A number of 45 students (11 males and 34 females) was identified as Jigsaw Group, while, 45 students (20 males and 25 females) were considered as a Control Group.

Table 1. Respondent Data By Gender

Group	Male	Female	Total
Experimental (Jigsaw)	11	34	45
Control	20	25	45
Total	31	59	90

The research instrument used was CTDSRF to assess critical thinking skills and observation sheets.Critical Thinking Dispotition Self-Rating Form (CTDSRF) was a tool to measure the tendency of critical thinking that is self-assessment that is done by the research subjects / respondents themselves. This instrument was in the form of a questionnaire with 20 question items that have the intention to assess the tendency of critical thinking in the last 2 days.

In conducting the Treatment Group, the assigned teachers applied the Jigsaw Technique by implementing as shown below.

Step 1 : The objectives of the subject matter were clearly identified to the students.

Step 2 : The learning materials (Module, Worksheet & Score sheet) were distributed to each of the students.

Step 3 : The students were divided into nine heterogeneous groups (home groups) of five studentswere formed from the nine home groups.

Step 4 : The lecturer explained how the entire unit is structured and organized. The Jigsaw Strategy Module content comprised two units, each unit was divided into different sub-units, and each sub-unit was assigned to each member of home group to study. Each student studied the task assigned so as to become acquainted with the procedure of the learning materials.

Step 5: When the students` in the home groups understood the learning structure, they were asked to move to new group called expert groups. The expert members brainstormed and learned the task by understanding the content materials. They rehearsed on how to convey the information learned to their home group members. While in the expert group, the assigned lecturer asked the students` to help one another to learn the task assigned to them. While the observer is monitoring the activities in the classroom.

Step 6: After students` in the expert groups learned assigned task, they were asked to return to their home groups to teach their members what they have learnt in the expert groups.

Step 7: After the students understood the entire unit, they were asked to do the self-assessment questions independently. The whole process was repeated for each unit. The treatment group and control group used the same instructional material throughout the treatment period.

Step 8: At the end of the three self-assessments (formative test), the students were asked to write post-test together with their counterparts in the Control Group.

Before the data were analyzed, the researcher tested the analysis prerequisites namely normality test, homogeneity test, hypothesis test. Normality test is carried out using the Saphiro Wilk test which aims to determine the harmony or suitability of the data with normal distribution or not. Homogeneity test is used to determine whether the variance of the two data are the same or not. In addition, this test is performed as a condition in the analysis of the Independent Samples Test or t test for two interconnected samples. If the data is normally distributed and homogeneous, then hypothesis testing was performed with parametric statistics using the Independent Samples T-Test to facilitate data calculations.

4. Result and Discussion

Before the hypothesis testing was conducted, firstly the pre-requirement test should be performed (normality and homogeneity test). With the significance level of $\alpha = 0.05$, the data can be categorized as a normal (normal test) and homogeny (homogenity test) distribution if $p > 0.05$ and the data is not normal and non homogeny distribution if $p < 0.05$.

The normality test of the initial ability data acquired the significance value of 0.066 in the experimental class (Jigsaw), meanwhile the significance value of the control class was 0.122. The significance value was above the significance standar ($p > 0.05$) then it could be concluded both data have normal distribution. The resume of the normality test result is presented in Table 2.

Table 2. The Normality Test Result

Research Subject	Sig.	P	Information
Experimental Group (Jigsaw)	0.066	> 0.05	Spread Normally
Control Group	0.122	> 0.05	Spread Normally

The homogeneity test is used to show if two or more sampling data group come from the population which has the homogeny variety. The result of the initial ability data acquired the significance value of 0.085. This significance value was above the standard of significance ($p > 0.05$), then it could be concluded if the data were homogeny. The resume of the homogeneity test result is presented in Table 3.

Table 3. Homogeneity Test Result

Statistic Test	Sig.	Information
Levene`s Test	0.085	Homogen

In table 4, it can be seen the results of a descriptive analysis of the students` critical thinking skills of the two learning groups. These results illustrate that the quality of students` critical thinking skills who get Jigsaw type learning were higher compared to students who get conventional learning. This was indicated by the average value of critical

thinking skills of students who get Jigsaw learning 79.22higher than the average value of students` critical thinking skillstaught with conventional learningthat was 72.22.

Table 4. Deskriptive Statistic Group Result

Research Subject	Class	N	Mean	Std. Deviation	Std. Error Mean
critical thinking skills	Experimental Class (Jigsaw)	45	79.22	9.997	1.491
	Control Class	45	72.22	13.080	1.950

The effectiveness of the Jigsaw cooperative learning model and the conventional learning method on the students` critical thinking skills will be tested for significance, with the following statistical hypotheses.

H0 : $\mu 1 = \mu 2$ (There is no difference in the effectiveness of Jigsaw type cooperative learning methods and conventional learning methods on students' critical thinking skills)

H1 : $\mu 1 \neq \mu 2$ (There are differences in the effectiveness of Jigsaw type cooperative learning methods and conventional learning methods on students' critical thinking skills)

With $\mu 1$ is the average increase in students 'critical thinking skills after receiving a Jigsaw type cooperative learning model and $\mu 2$ the average increase in students' critical thinking skills after getting a conventional learning model. The significance test used to test the students' critical thinking skills from the two learning groups is to use the Independent Samples T-Test.

Based on the results of the Independent Samples T-Test it can be seen that the value of t arithmetic (2,852)> t table (1,987) and the value of Sig. (0.005) <α (0.05) so H0 is rejected.. Thus, it can be concluded that there were differences in the effectiveness of the Jigsaw cooperative learning model and the conventional learning model on the critical thinking abilities of students. Therefore, by looking at the average value of critical thinking skills obtained from the two learning groups, it can be seen that the average value of the ability of critical thinking skills of students who get Jigsaw learning is higher than the average value of critical thinking skills of students who get conventional learning. So, it can be said that the Jigsaw learning is more effective in improving students' critical thinking skills compared to conventional learning. Independent T-Test statistical test results can be seen in Table 5 below.

Table 5 Independent T-Test Result

t-Test for Equality of Mean						
t	df	Sig.	Mean Diference	Std. Error Diference	95% Confidence Interval Of The Difference	
					Lower	Upper
2.852	88	0.005	7.000	2.454	2.123	11.877

The learning model factor used by the lecturer influences the activities of students in the class during the learning process. In conventional learning, the lecturer is a model, the center of the learning process activity, a source of knowledge, and does not involve students actively in learning activities. As a result, students become lazy, they are not

interested in paying attention to the material being studied, bored, they do not like learning child nursing, and they do not understand child nursing in depth so that they forget quickly or meaningless learning. Students feel that learning to follow the instructions of lecturers, does not need to be creative, and the important thing is that all lecturers are mastered. Learning like this is less challenging, less interesting, and less developed in students' thinking potential. As a result, students are unable to solve more challenging and difficult problems that require higher-order thinking processes such as critical thinking skills.

The ability to think critically is not easy to do. Therefore, we need a learning model that can help students develop these abilities. That learning model is cooperative learning. In cooperative learning there is positive interdependence among students to achieve learning goals. Every student has the same opportunity to succed. Learning activities are centered on students in the form of dicussion, working together, helping each other and supporting each other in solving problems. Through effective learning interaction, students are more motivated, confident, able to use thinking strategies, and able to build interpersonal relationship [10].

Cooperative learning is a method in which small groups of four to six students work together to accomplish a common educational goal. Cooperative learning is intended to deliver motivations for group members when they participate in a group wide task. It brings about positive emotions since individuals have a sense of belonging and accomplishment. Students become more satisfied learners in cooperative learning situations as opposed to the traditional lecture. Cooperative learning demonstrates its' strength from the three basic elements of positive interdependence, interaction, and accountability [11].

The cooperative learning model allows all learners to master the material at a relatively equal or parallel level of mastery. Such work relationships allow for positive perceptions about what students can do to achieve learning success based on their individual abilities and the contribution of other group members during group learning. To achieve maximum results, five elements of the mutual learning model must be applied, namely: positive interdependence, individual responsibility, face to face communication beetween members, and evaluation of group processes. The cooperative learning model used in this study is the Jigsaw cooperative learning model [10].

The Jigsaw method is not only proven to build understanding, but also fosters cooperation among students. Cooperative learning in the form of Jigsaw activities has been tried and tested in various fields of education, but is less so applied in the field of nursing education [12]. In this study, Jigsaw learning activities are carried out with the aim of providing opportunities for students to interact and work together in studying the topics of Low Birth Weight and Asphyxia in child nursing courses. After that, students will be assessed for their critical thinking skills using a validated feedback questionnaire.

In table 4, it can be seen that the result of this study indicated the mean of students` critical thinking skills who get Jigsaw learning 79.22 higher than the mean of students` critical thinking skills taught with conventional learningthat was 72.22. This is in line with [6] who conducted research on 116 students with 57 students given teaching using the cooperative learning strategy method (Jigsaw) and 59 students given teaching with traditional methods so that the results were obtained that increased students' ability to think critically with a mean of 77.60 compared with students who received traditional teaching methods with a mean of 74.78. It may, therefore, be concluded that Jigsaw Method was significantly superior to traditional Method in developing critical thinking skills.

[13] also conducted the same research by comparing learning methods with Problem Based Learning, Jigsaw, and a combination of Problem Based Learning and Jigsaw. The results showed the mean score in critical thinking analysis at Problem Based Learning class was 68.85, the mean score in critical thinking skills in Jigsaw class was at 69.35, and the mean score in critical thinking skills in Problem Based Learning combined with Jigsaw was 69.80.

In this study using the Jigsaw learning method, where students play an active role in the learning process, students are required to discuss a topic of discussion and must master because it will be conveyed to other groups, so students are motivated to learn. In the control group, the method used is the conventional learning, which is the center of learning centered on the lecturer or using the lecture method. Students become the object of these learning activities, so students become passive because they only listen to the lecturer explain in front of the class. The results of this study also showed that cooperative learning methods affect students' critical thinking skills. The mean of the critical thinking skills of the treatment group was greater than the control group. This means that the Jigsaw type of cooperative learning method influences students' critical thinking skills. The treatment group had the ability to think critically better than the control group.

Jigsaw is a type cooperative learning which consist of several members in a group that is responsible for mastering learning material and able to deliver that material into other members in his or her group. The students are wished to be able to help each other, discuss, and argue for honing the knowledge that they mastered at that time and close the gap in each understanding. The cooperative learning of Jigsaw encourage students to be active and help each other in mastering the learning material to achieve maximum achievement [13].

The results of the Independent Samples T-Test in this study can be explained in table 5 that the value of t arithmetic (2,852)> t table (1,987) and the value of Sig. (0.005) <α (0.05) so H0 is rejected. This study is in line with research conducted by [14] on 40 junior high school students with 20 students as the experimental group and 20 students as a control group, P values of 0.000 <0.05 indicate that there are differences in critical thinking skills students use the application of a jigsaw cooperative model with conventional learning about the concept of environmental pollution, where the critical thinking skills of students in the experimental group increases during pre-test by 46 and post-test 75.25.

Another study conducted by[15] on 36 students also showed that the Jigsaw type cooperative learning methods was effective in increasing students' critical thinking skills with a P value of 0.000 <0.05. Critical thinking skills can be taught to everyone, one of them through the world of education because it has an important role in shaping one's cognitive, affective, and psychomotor [7].Knowledge needs to be constructed from this information which can be achieved when students are actively involved in processing, critically analysing this information and problem-solving[16]. Michael Scriven argues that critical thinking is an academic competency that is similar to reading and writing and is almost as important. Whereas Santrock states critical thinking (critical thinking) is to understand the meaning of the problem more deeply, keep the mind open to all different approaches and views, and think reflectively and not just accept statements and carry out procedures without understanding and evaluation which is significant[17].

Lecturers have an important role in selecting and applying appropriate learning strategies in the implementation of classroom learning. The ability of lecturers in choosing and using learning strategies has an impact on improving the success of learning.

Furthermore, it is said, the success of learning from the group depends on the ability and activities of group members, both individually and in groups. Cooperative learning puts students as part of a system of cooperation in achieving an optimal outcome in learning [18].

Cooperative learning makes students more active, students will work together and provide equal opportunities for each student to participate in the learning process.Based on the statement above, the cooperative learning strategy is appropriate to be applied in big classes with many students`. The cooperative learning has several teaching techniques, one of the techniques is Jigsaw[19].In cooperative learning, students need elaborative thinking to exchange information [20].

In this study, the students who learned with Jigsaw strategy of cooperative learning had greater critical thinking skills than those taught by conventional method of learning. The results also indicate that students` in Jigsaw group had higher participation in the process of learning than students in the comparison group because of the principles of Jigsaw strategy where students in the treatment group are required to read and learn the learning materials, to move from home groups to expert groups to assist each other to learn their assigned task, and go back to the other teammates what they learned in the expert groups. Consequently, students' personal involvement in the learning process contributed to their critical thinking skills, by exchanging and sharing ideas also enhancing skills, since every student was responsible for a small part of the learning material and had to learn and teach it to the other members.

In addition, [21]claimed that Jigsaw learning is more excellent rather than conventional learning. It encourage the students to be active and to think critically ini understanding the concepts of a lesson. Jigsaw learning focuses on the independence of the students inactive learning. They are no longer received the material is one direction.

By talking and discussing with others, the topic of the material is no longer an item to memorize, most students mentioned that the preparation and presentation of the results of the discussion was challenging and relevant, leading to participation between group members in the question and answer session to help them understand the topic better [22].

[23] in his book said that cooperative learning must be part of the lecturer learning plan. However, inexperienced lecturers must be careful and must know about the difficulties in applying cooperative learning to students. The Jigsaw method brings a new learning strategy to the nursing curriculum, allowing for discussion of a large amount of material in a short amount of time. Furthermore, students are given the opportunity to become "experts" in one field and are challenged to teach topics that they understand to other students who have no prior knowledge about the topic[24].

[25]said that Jigsaw method could motivate students to be active during teaching and learning process in classroom. It can be seen from their responses during teaching and learning process. The majority of the students took good involvement on working together with his or her partner in pairs. They could try to develop their critical thinking while they worked together in pairs. Students were not hesitant to speak and gave the idea while they discussed with their friends. Therefore, jigsaw method helped students to develop their critical thinking.

5 Conclusion

Learning by applying the Jigsaw method is carried out in one cycle consisting of two meetings. Students are involved in two types of discussion groups namely the initial group and expert groups. Through the Jigsaw learning model, students are required to cooperate,

take responsibility, and be honest in presenting the results of expert group discussions to the initial group. Based on the results of study, it can be concluded that the critical thinking skills of student`s with Jigsaw learning is better than conventional learning. This can be seen from the mean of student`s critical thinking skills with Jigsaw learning which reached 79.22 higher than conventional learning which is only 72.22.

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