ANALYSIS OF STUDENT COGNITIVE RESULTS USING THE TEAM GAMES TOURNAMENT MODEL INTEGRATED ON THE FERRIS WHEEL MEDIA FOR BUFFER SOLUTION SUBJECTS

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Abstract

This study aims to determine the effect of the Teams Games Tournament (TGT) learning model using the Ferris wheel on students' cognitive learning outcomes on the buffer solution. The form of research is a quasi-experimental design using the posttest only design method with non-equivalent groups. The sampling technique used purposive sampling technique. The population in this study were all students of class XI Mathematics and Natural Sciences, State High School 1 Lhokseumawe Year 2019/2020, totaling 294 students. With a research sample of 50 students. Data collection methods in the form of observation, interviews, and tests. Before conducting the research, the questions that will be used are first tested to a school that is equivalent to the place of research. The questions tested are viewed in terms of the level of problem difficulty, discriminatory power, validity, reliability, to test distractors. The results showed that there was a significant difference in the Experiment I class and the Experiment II class. Cognitive, shown from the average of the experimental class I was 85.37 while the experimental class II was 79.58. Cognitive results sig. (2-tailed) t-test for equality of means on equal variances assumed is 0.008 according to the existing criteria if the value of sig <0.05 then Ha is accepted. It was concluded that the use of the TGT model using the Ferris wheel had a positive effect on student learning outcomes in the material for the buffer solution for class XI MIA SMA Negeri 1 Lhokseumawe.

Keywords: TGT, Ferris wheel, Buffer Solution, Cognitive

I. INTRODUCTION

Science that analyzes natural phenomena within the reach of the senses and the human mind which is classified as logic and can be tested, studied, or studied and the truth can be formulated in detail is a general description of Natural Sciences (Science) (Mulyono, 2005). Chemistry is a branch of science that generally discusses science that is based on facts and can be tested for truth (Hidanurhayati et al. 2018). Abstract concepts that are absorbed by students at school in a limited time result in chemistry lessons being categorized as difficult for students (Retno et al. 2015). A buffer solution is a solution of a weak acid or base and its salt which reacts with a small amount of a strong acid or base without changing the pH much (Keenan et al. 1990).

The results of pre-research observations at State Senior High School 1 Lhokseumawe showed that the average daily test scores of students in the buffer solution material for the 2018/2019 school year were 69.96. While the student's completeness score is 80. According to Purnamawati et al. (2014), there are several causes of student learning success, namely internally originating from within students in the form of physiological and psychological factors. As well as externally from outside students who come from the social and national environment. Teachers play an important role in supporting the level of student learning success. Therefore, a teacher is endeavored to be able to innovate in the presentation of learning materials, both the models used and the media in the classroom (Mudrika et al. 2018).

Based on this, the researcher wants to make a new innovation in chemistry learning, especially the buffer solution material so that students are interested in learning by using a learning model. One that can be practiced is the cooperative model. This model provides opportunities for students to be able to relate liberally and create an exciting learning environment so that they are positive, self-assessment, and can develop psychomotor and affective students (Galura et al. 2016). Teams Groups Tournament (TGT) is a type of cooperative that can support learning on buffer solution material.

According to Sumiati et al. (2019) said that TGT can foster a social spirit among students in the learning process. Some of the benefits of TGT are motivating students because of the freedom of opinion and interaction between students so that students become more confident and reduce outside factors that interfere with the learning process (Ismah et al. 2018). A teacher must have creativity in explaining learning material to make it interesting by using media aids (Sandi et al. 2016). One of the supporting media tools in this TGT method is a Ferris wheel.

Previous research, Wiwit et al. (2012) have examined the same model with the help of the media. From this study, it was found that the cognitive value for the experimental class (87.43) was better than the control class (74.73). With the media, the response values are 69.2% (positive) and 30.8% (neutral).

One of the terms that are the same as the Ferris wheel media is the buffer circle, where the game system is the same, namely by rotating it clockwise (Kusumawardani et al. 2015). Ferris wheel has the advantage that this media has many varied questions. The TGT model assisted by the Ferris wheel is expected to not only be innovative learning, but also to influence student learning outcomes.

II. RESEARCH METHODS

This study uses a quantitative approach. The type of research method is quasi-experimental design. The design of this research is the posttest only design with nonequivalent groups. In this design the experimental group I and experiment II were selected by purposive sampling.

Table 1. Research Design the posttest only design with non equivalent groups.

Class	Treatment	Posttest
Experiment I	X_1	O1
Experiment II	X_2	O2

Notes: The experimental group I was given learning treatment with the TGT model with the help of a Ferris wheel and the experimental group II used learning with the TGT model without a Ferris wheel. The effect of this treatment (treatment) is by giving test questions to the experimental group I and experiment II at the time of the posttest.

The research is collated at SMA Negeri 1 Lhokseumawe with a population of all students in class XI Mathematics and Natural Sciences (MIA) for the 2019/2020 school year with a total of 294 people. The sampling technique used was purposive sampling with the consideration of the chemistry teacher teaching class XI. In this study, the number of samples to be studied as the experimental group I (XI MIA 5) was 25 students and the experimental group II (XI MIA 4) was 25 students.

Research data collection techniques sourced from observations, unstructured interviews with teachers and students, and students' cognitive tests. The instruments in the research are: The posttest item test is in the form of multiple choice which represents the students' cognitive results. This item test consists of Bloom's taxonomic levels, namely C1-C4. The first data analysis technique carried out was to analyze the items first by experts, then for the empirical test it was carried out by testing the level of difficulty of the questions, power discriminatory, validity, reliability, and distractor questions. Based on several multiple test validation tests that have been tested, several criteria are obtained for every 50 multiple questions. From these criteria, 29 multiple questions were obtained which were said to be feasible to be used as posttest questions.

Prerequisite test the analysis that will be used is an independent t-test with data normally distributed (using the Shapiro-Wilk test) and homogeneous. The data to be tested is entered using the help of the Statistical Package for the Social Science (SPSS) PASW 21. The basis for making decisions in this test is if the value of sig. > 0.05 then Ho is accepted and Ha is rejected and vice versa. There are several hypotheses as follows:

H_a: There is no significant difference in students' cognitive abilities on the buffer solution material between experimental classes I and II.

Ho: There is a significant difference in students' cognitive abilities in the buffer solution material between experimental classes I and II.

III. RESULTS AND DISCUSSION

In the learning process, the Ferris wheel is used as a tool in learning using the TGT model. Previously, the TGT model had its own media, namely the card as a support. However, researchers innovate by making Ferris wheel media as a substitute for the card media. For the

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study, the researcher used 2 classes as an experiment. The first class of researchers used the TGT model with the help of a Ferris wheel while the second class of researchers only using the TGT model only. Before being used for research, the Ferris wheel media was first tested for validation by media expert lecturers.

A. Cognitive Research Results

This research was conducted by students of class XI MIA 5 (experiment I) using the TGT model with the aid of a Ferris wheel with 25 students and XI MIA 4 (experiment II) using the TGT model with 25 students at SMA Negeri 1 Lhokseumawe. Students' cognitive scores were obtained through multiple test questions given at the posttest. To see the difference in the posttest scores of students' cognitive results between experimental classes I and II, you can clearly observe Figure 1.

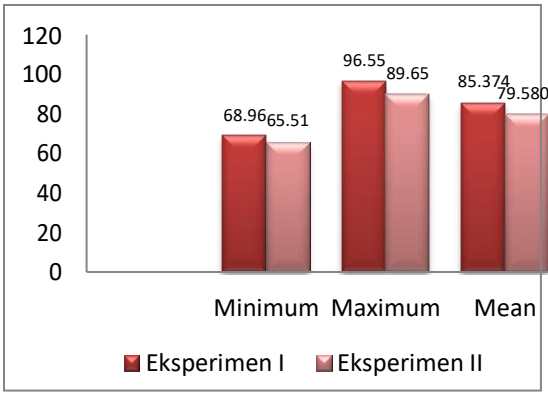

Figure 1. Student Cognitive Posttest Score

Next, a prerequisite test is carried out to meet the requirements for the hypothesis test that will be used. The following are the requirements (assumption test) before testing the hypothesis (1) In this study there are three dependent variables, namely cognitive, (2) The independent variable is a learning model consisting of two categories, namely TGT models and Ferris wheel media. (3) Sufficient number of samples, namely 25 students of experimental class I and 25 students of experimental class II.

B. Independent T-Test Results

Before conducting the t-test, the data normality test was conducted first. The goal is that both classes are normally distributed. The normality test used is the Shapiro-Wilk test. The following are the results of the normality test for the two classes.

Table 2. Tests of Normality

Class	Shapiro-Wilk		
	Statistic	df	Sig.
Eks. I	,902	25	,020
Eks. II	,897	25	,016

After the data is declared to be normally distributed, the next step is to test the hypothesis using an independent t-test. The test results are stated in Table 3.

Table 3. Independent t-test Cognitive Results

	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Kognitif Equal variances assumed	,359	,552	2,764	48	,008
Kognitif Equal variances not assumed			2,764	48,000	,008

Based on Table 3. the cognitive results obtained by sig. (2-tailed) t-test for equality of means on equal variances assumed is 0.008 according to the existing criteria, if the value of sig < 0.05 then Ha is accepted and Ho is rejected.

C. Discussion

This study aims to determine the effect of the Ferris wheel-assisted TGT model on student learning outcomes in the buffer solution material. In the process, researchers carry out activities that begin with several validation instruments that will be used during the research. The instrument that was validated was multiple choice questions which were validated by material experts and students, and finally the researcher validated the questionnaire to media experts. After all the instruments are declared valid with a minimum sufficient difference power criterion, then the instrument can be said to be feasible to use at the time of the study.

The research was carried out for four meetings. At the fourth meeting, the tournament stages were carried out in both experimental classes. In the experimental class I, the tournament stage was assisted by the Ferris wheel media while in the experimental class II the tournament stage did not use the Ferris wheel media. At the end of the meeting, the groups

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the winner of each experimental class in the tournament is given a prize. Next, the researcher conducted a posttest in the form of multiple choice questions.

Based on the results of the study to measure the level of students' cognitive abilities, there was a difference in the average value between the experimental class I and the experimental class II, where the experimental class I experienced a significant increase in the average value of cognitive learning outcomes compared to the experimental class II. This is due to the use of the TGT model with a Ferris wheel which can help students understand the basic concepts of buffer solution material more efficiently in a limited time. Because, students are trained in solving problems both individually and in groups.

This is also inseparable from the role of the teacher in guiding students to convey knowledge during the learning process. This is in accordance with the research of Sari and Supardi (2013) which said that students besides relying on the existing literature during the learning process, students also has its own initiative in writing notes from what was conveyed by the teacher during the learning process. The value of students who do not pass the KKM can be caused by the demands of each child with the same learning speed so that it affects the child's personality such as low self-esteem, forced to study, lack of interest, and other negative effects. This is in accordance with the opinion of Nasution (1982) who said that every child has a different learning speed and the child's personality characteristics affect learning outcomes.

Media games that are done repeatedly and in turns make students slowly understand little by little the meaning of the questions presented. This is also justified by Ali (2008) who says that by doing exercises, it can shape student behavior which is achieved through the learning process, both behavior in thinking (cognitive). Because to improve these skills required certain exercises.
Therefore, learning media is very necessary in the teaching and learning process so that it helps target indicators of success in learning. This statement is supported by the opinion of Nurrita (2018) which says that with the help of learning media in the learning process it helps in clarifying the meaning or message conveyed, so that it can achieve learning objectives better.

IV. CONCLUSION

There is a significant difference in students' cognitive abilities on the buffer solution material between the class that applies the TGT model with the aid of a Ferris wheel and the class that only applies the TGT model without the aid of a Ferris wheel. Based on the presentation of the data and statements that have been presented, it can be said that the researchers succeeded in implementing the TGT learning model assisted by the Ferris wheel in the Chemistry subject of buffer solution material in an interesting and fun way so that students do not get bored quickly and are active, and get good cognitive learning outcomes so that motivate students to better understand the material that has been delivered. The limitations of this study are the use of Ferris wheel media can only be used when the material is a buffer solution.

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