

Analysis of Significant Differences in The Cognitive Ability of Students with Ferris Wheel Media Based on TGT in Buffer Solution Lessons

Sandy Yudha¹, Nur' Athiyyah Muyassar Siregar²

^{1,2}Chemistry Education, Medan State University, Indonesia

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ABSTRACT

Learning media is one way to improve student learning outcomes. The Ferris wheel is one of these media that has many varied questions. It is hoped that the Ferris wheel-assisted TGT model will not only be innovative learning, but can also influence student learning outcomes. The purpose of this study is to determine the impact of the Teams Games Tournament (TGT) learning model on students' cognitive learning outcomes for the buffer solution using the Ferris wheel. A quasi-experimental design with non-equivalent groups and the posttest alone design approach is the research methodology used. Purposive sampling was employed during the sample process. All 294 students in class XI Mathematics and Natural Sciences at State High School 1 Lhokseumawe in the academic year 2022–2023 made up the population of this study. with a 50-student research sample. ways for gathering data, including tests, interviews, and observation. The research questions are evaluated with a school that is similar to the research location before being used in the study. The difficulty of the problems being examined, the discriminatory capacity, the validity, and the dependability of the tests are all taken into consideration. The outcomes revealed a sizable distinction between the Experiment I class and the Experiment II class. Cognitive ability as measured by the experimental class I average of 85.37 and experimental class II average of 79.58. If the value of sig 0.05, then H_a is acceptable. Cognitive findings sig. (2-tailed) t-test for equality of means on equal variances is assumed to be 0.008. The material for the buffer solution for class XI MIA was found to have a good impact on student learning outcomes when the TGT model using the Ferris wheel was used SMA Negeri 1 Lhokseumawe.

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Correspondence Author:

Sandy Yudha

Email: sanyudha97@gmail.com

1. 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).

Pre-research observations at State Senior High School 1 Lhokseumawe revealed that pupils' typical daily test scores in the buffer solution material were lower than expected for the 2022/2023 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. The purpose of this study is to determine the impact of the Teams Games Tournament (TGT) learning model on students' cognitive learning outcomes for the buffer solution using the Ferris wheel.

2. METHOD

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 in Table 1.

Table 1. Research Design The Posttest Only Design With Non Equivalent Groups.

Class	Treatment	Posttest
Experiment I	X1	O1

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 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 2022/2023 school year with a total of 294 people. Purposive sampling was employed with care for the chemistry instructor teaching class XI. 25 students from the experimental group I (XI MIA 5) and 25 students from the experimental group II (XI MIA 4) were the samples for this study.

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 questions are in the form of multiple choices with a total of 40 questions that represent students' cognitive results. This test question consists of Bloom's taxonomy 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 forevery 50 multiple questions. From these criteria, 29 multiple questions were obtained which were said to be feasible to be used as posttest questions.

Requirement test An independent t-test with homogenous and normally distributed data (as determined by the Shapiro-Wilk test will be utilized for the study. The Statistical Package for the Social Science (SPSS) PASW 21 is used to enter the test data. If the value of sig. > 0.05, then H_0 is accepted and H_a is refused, and vice versa, serves as the basis for decision-making in this test. The following are a few hypotheses: The cognitive capacities of the experimental classes I and II pupils on the buffer solution material did not significantly differ. H_a : Experimental groups I and II showed significantly different cognitive capacities in the buffer solution material.

3. RESULT 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 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. 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.

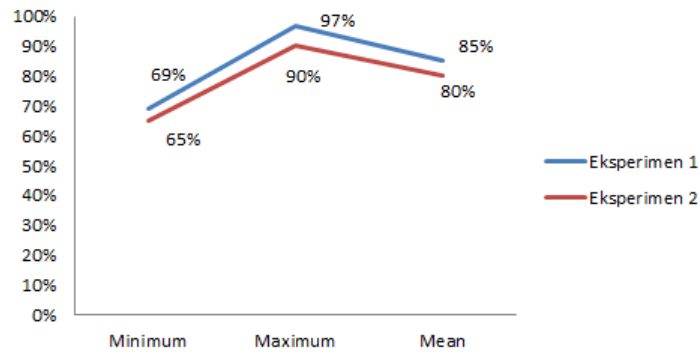


Figure 1. Student Cognitive Posttest Score

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 in Table 2.

Table 2. Tests of Normality

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

The next step is to use an independent t-test to assess the hypothesis after the data has been certified to be normally distributed Table 3 provides the test findings.

Table 3. Independent t-test Cognitive Result

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

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 H_a is accepted and H₀ is rejected.

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 study was conducted over the course of four meetings. The tournament phases were conducted in both experimental classes at the fourth meeting. The tournament stage in the experimental class I received assistance from the Ferris wheel media, whereas the tournament stage

in the experimental class II did not. The groups that won each experimental class in the competition are awarded prizes at the conclusion of the meeting. The researcher then used multiple choice questions to administer a posttest.

According to the study's findings, there was a difference in the average value between the experimental classes I and II, with the experimental class I experiencing a significant rise 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 schoolchildren to communicate their information as they study. According to the research, this is the case of Sari and Yudha (2023) 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. Learning media is therefore crucial to the teaching and learning process since it helps to focus on learning success indicators, Nurrita (2018) perspective, which claims that using learning media in the learning process aids in clarifying the meaning or message delivered, so it can better meet learning objectives, supports this claim. Kurniawan (2019) stated a similar thing, that the influence of the TGT model on increasing media-assisted learning outcomes was 23.3%.

4. CONCLUSION

The cognitive capacities of the students differ significantly 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 Students will be motivated to learn the information more thoroughly if it is presented in an entertaining style that keeps them engaged and prevents them from getting easily bored. The restrictions of this study are the use of Ferris wheel media can only be used when the material is a buffer solution. Based on the conclusions above, the advice that can be given is that in the learning process one can use appropriate learning media to create an enthusiastic, active, fun and effective learning atmosphere so that it is hoped that student learning outcomes can be maximized and improved.

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