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Comparative Study with Card Media on Learning Outcomes in Vhemical Bonding Materials at SMA Negeri 1 Peusangan

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Abstract: This study aims to see the comparison of learning outcomes between TGT type learning models with STAD type learning models with STAD type learning models equipped with question card media. Comparative causal research types with causal pattern design. The sampling technique in this study used purposive sampling. The sample in this study is class X IPA 1 as an experimental class 1 that applies the TGT learning model and X IPA 3 as an experimental class 2 that applies the STAD learning model, each class totaling 24 students. Based on the results of data analysis, the average value of cognitive learning outcomes in the pretest-posttest in experimental class 1 was 38,33 and 75,42, while the average value of cognitive learning outcomes in the pretest-posttest in experimental class 2 was 34,17 and 69,79. T-test was carried out using independent sample test assisted with SPSS 17.0 software and obtained a significant value (2-tailed) of 0,03 < 0,05, it means that H_0 is rejected and H_a is accepted. Based on the results of the study it can be concluded that there is a comparison of learning outcomes of students who use the TGT and STAD learning model with a question card media on chemical bonding material.

Keywords: Card words, Learning outcomes, Ikatan Kimia, STAD, TGT.

Abstrak: *Penelitian ini bertujuan untuk melihat perbandingan hasil belajar antara model pembelajaran tipe TGT dengan model pembelajaran tipe STAD yang dilengkapi media kartu soal. Jenis penelitian kausal komparatifdengan desain pola kausal. Teknik pengambilan sampel pada penelitian ini menggunakan purposive sampling. Sampel dalam penelitian ini yaitu kelas X IPA 1 sebagai kelas eksperimen 1 yang menerapkan model pembelajaran TGT dan X IPA 3 sebagai kelas eksperimen (2) yang menerapkan model pembelajaran STAD yang masing-masing kelas berjumlah 24 peserta didik. Berdasarkan hasil analisis data diperoleh nilai rata-rata hasil belajar kognitif pada pretest-posttest di kelas eksperimen 1 sebesar 38,33 dan 75,42 sedangkan nilai rata-rata hasil belajar kognitif pada pretest-posttest di kelas eskperimen 2 sebesar 34,17 dan 69,79. Uji t-test dilakukan dengan teknik independent sampel test berbantuan software SPSS 17.0 diperoleh nilai signifikan (2-tailed) adalah sebesar 0,03 < 0,05, artinya H0 ditolak dan Ha diterima. Berdasarkan hasil penelitian dapat disimpulkan bahwa terdapat perbandingan hasil belajar peserta didik yang menggunakan model pembelajaran TGT dan tipe STAD yang dilengkapi media kartu soal pada materi ikatan kimia.*

Kata kunci: *Hasil Belajar, Ikatan Kimia, Kartu Soal, STAD, TGT.*

- **INTRODUCTION**

Students at the initial level of high school (SMA) are often overcome by the impression of the difficulty of chemistry lessons, thus affecting learning achievement. For some students, chemistry is a boring lesson because they study material that is considered abstract, namely atoms (small particles) that cannot be seen from chemical reactions that can only be seen from their symptoms so that students are not interested in studying chemistry further (Putri, 2018:74).

Chemistry lessons become a complicated thing because of the wrong view of chemistry itself. Based on the results of interviews conducted by researchers on March 28, 2019, with teachers who teach the field of Chemistry in class X SMA Negeri 1 Peusangan, information was obtained that students are less able to convey the information obtained, students tend to be less able to listen to teacher explanations and answer teacher questions. and most students are less enthusiastic and less enthusiastic in participating in the learning process. Based on the problems above, it is necessary to improve in the form of learning that can attract the attention of students so that students will be more active in the learning process. Ahriani, F (2014:3) and Aka, K.A. (2015:5) states that one solution that can be used is to apply a cooperative learning model which is considered to be able to overcome various learning problems.

Learning models that are considered to be able to attract the attention of students so that they can improve cognitive learning outcomes and can improve students' skills are the Student Teams Achievement Divisions (STAD) and Teams Games Tournament (TGT) models. This is supported by research conducted by Lubis (2018: 33) which says that in cooperative learning the TGT and STAD types can lead to student motivation, especially for students with fewer ability levels to be involved in learning. Furthermore, research conducted by Ahriani (2014: 8); Overton & Randles (2015) shows that there is an effect of cooperative learning models of the TGT and STAD types on the chemistry learning outcomes of class X students of SMK Negeri 2 Bantaeng on the subject matter of chemical bonds. TGT and STAD learning is a question card media. This agrees with Astuti (2013: 87) who says the use of question card media can be called a game in a learning that will eliminate boredom and create a competitive atmosphere. In addition to involving elements of the game, the media of question cards also involves elements of education, because it contains information about the material to be taught. Furthermore, Hasibuan, et al (2019); Qurniawati & Saputro (2013); dan Günter (2017) The ability, interest, and creativity of student participation in receiving a lesson increased through the NHT type cooperative learning model equipped with card media which was proven by Ha accepted with the conclusion that there were differences in student learning outcomes and activities taught by the questions. the card-based learning model is compared with the student learning outcomes taught through the NHT-type cooperative learning model with card media.

Based on the description above, the researcher intends to conduct a study with the title "Comparative Study Equipped with Media Cards on Learning Outcomes in Chemical Bonding Materials at SMA Negeri 1 Peusangan".

- **METHOD**

Rangkuti (2014) and Sugyono (2010) state that the type of research used in this study is a causal-comparative type of research (ex post facto). The research approach used is quantitative.

This study uses a causal pattern research design. The research design is described in the following Table:

Tabel 1. Causal research design

Group	*Pretest*	Treatment	*Posttest*
Exsperimental group 1	O_1	X_1	O_2
Exsperimental group 2	O_3	X_2	O_4

Source: Kusaeri (2014:150)

Description:
O_1 = Pretest learning outcomes in the experimental class 1
O_2 = Posttest learning outcomes in the experimental class 1
O_3 = Pretest learning outcomes in the experimental class 2
O_4 = Posttest learning outcomes in the experimental class 2
X_1 = Learning using the TGT learning model equipped with question card media.
X_2 = Learning using the STAD learning model equipped withquestion card media.

1) Value Analysis for Each Item Pretest-Posttest

Presenting students' answers for each item with using the formula:

$$\text{Score} = \frac{\text{Total Score Correct}}{\text{Total Score}} \text{ x } 100\%$$

(Sumber: Abdillah, 2018:25)

2) Analysis of Student Skills

Data on the value of students' skills were analyzed using the formula:

$$\text{Score Student} = \frac{\text{Total Score}}{\text{Score maxsimum}} \text{ x } 100 \; = \; \text{Final Score}$$

Table 2. Psychomotor Assessment Criteria for Students

Skill Value	Criteria
$80 \leq SB \leq 100$	Very good
$70 \leq B \leq 79$	Well
$60 \leq C \leq 69$	Enough
≤ 60	Not enough

Sumber: Laili (2015:65)

2) Hypothesis Prerequisite Test

The data analysis technique using t-test can be done if it meets the following prerequisite tests:

Normality Test and Homogeneity Test

Normality test aims to determine whether the data obtained in the study from data that is normally distributed/homogeneous or not (Menanti, 2015:47). The normality test was analyzed using statistical tests using the Shapiro Wilk technique assisted by SPSS 17.0 software for windows with a significant level of 5% or 0.05. Test homogeneity is used to

determine whether the data obtained is homogeneous or not. In this homogeneity test using the Homogeney of Variance test at a significant level of 5% or 0.05.
*If sig. > 0.05 then the data is normal/homogeneous
*If sig. < 0.05 then the data is not normal / not homogeneous
(Wahyudi, 2015:32).

Data Hypothesis Test (T-Test)

The average similarity test is carried out so that it is known that the sample group to be given treatment is known whether their initial average ability is the same or different. The test used is the t-test because it compares two groups of samples. Tests are used to determine whether there is a comparison if a character is given different treatments. The data analysis technique using t-test is carried out if it meets the prerequisite tests such as normality test and homogeneity test. This test was carried out on the final test of the first group and the second group. To be calculated using SPSS 17.0 software for Windows with a significant level of 0.05. The formulation of the hypothesis uses a two-tailed test with a right-hand decision test, namely:
H_0: $\mu_1 = \mu_2$
H_a: $\mu_1 \neq \mu_2$
Keterangan:
μ_1 = mean of first group data
μ_2 = average data of the second group

The hypotheses to be tested are:

a. H_0: $\mu 1 = \mu 2$: There is no comparison of the learning outcomes of students who use the TGT learning model equipped with question card media with students who use the STAD type equipped with question card media on chemical bonding material.
b. H_a: $\mu 1 \neq \mu 2$: There is a comparison of the learning outcomes of students who use the TGT learning model equipped with question card media with students who use the STAD type equipped with question card media on chemical bonding material.

To test the hypothesis, the processed output of SPSS 17.0 for windows is used.
1) Testing Criteria:
1) Using the coefficient Sig. under the condition:
a. If sig. Calculate (probability) < 0.05 then reject H0
b. If sig. Count (probability) > 0.05 then accept H0 (Wahyudi, 2015:34)

2) Using the t-calculated coefficient, provided that:
a. If the coefficient t count > t table then reject H0
b. If the coefficient t count < t table then accept H0 (Wahyudi, 2015:34)

The results of the calculation of the hypothesis test using the Independent Sample Test. Independent t-test is a parametric statistical test method used to analyze the comparison of two unpaired samples (Apriyono, 2013: 82). The t-test Independent Sample Test is carried out if the data obtained are normally distributed and if the data obtained are not normally distributed, then the t-test can be performed using the Man Whitney test.

- **RESULTS AND DISCUSSION**

The results and discussion of this research are described as follows:

1) Comparison of Pretest-Posttest Average Values on Cognitive Learning Outcomes
   Based on the results of the pretest and posttest of the two experimental groups, data can be obtained as shown in Table 3.

Table 3. Learning Outcome Data

Learning model	Average		Difference pre-post test	Value Comparison Posttest TGT-STAD
	Pretest	Posttest		
TGT	38,33%	75,42%	37,09%	5,63%
STAD	34,17%	69,79%	35,62%	

The comparison of the average posttest scores in the two classes shows that the average value of learning after the TGT model was applied in experimental class 1 was higher than the average value in the experimental class 2 after the STAD model was applied. This is because during the implementation of the TGT learning model with the help of question cards it can make students learn while playing, feel more enthusiastic in learning, and students are also easier to remember and understand the subject being taught. This agrees with Damayanti's research (2017); Ariani and Agustini (2013); Astuti, et al. (2017) and Imanda, dkk. (2017) stated that the TGT type cooperative learning model provides opportunities for students to get interesting learning materials and can interact more broadly. Fun learning and motivates students to compete in answering the questions given with a cheerful mood and the creation of team competencies based on the responsibility of each individual. The comparison of the average value of the Pretest-Posttest learning outcomes for the experimental class 1 and experiment 2 can be seen in graph 1.1.

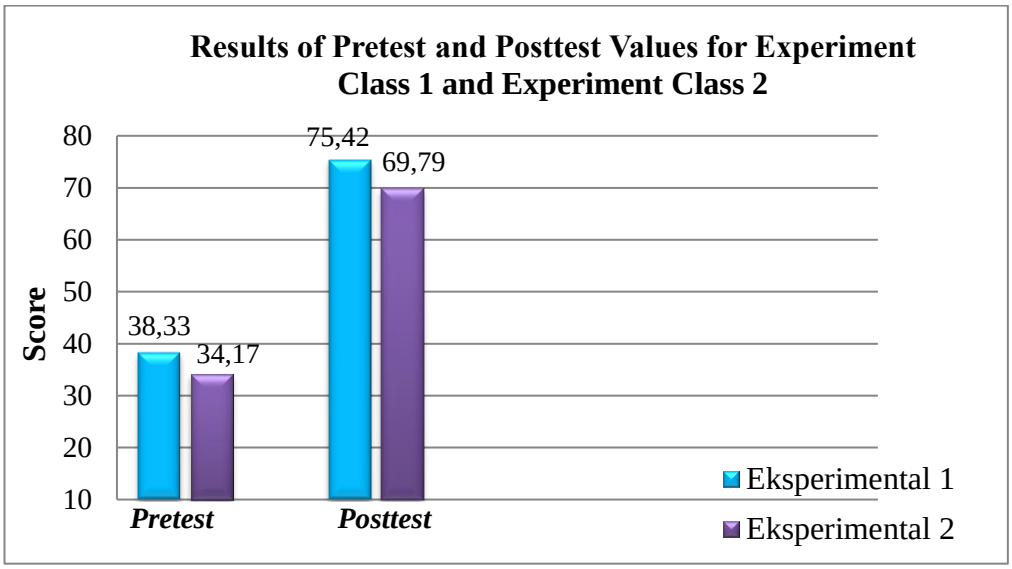

Figure 1. Graph of Results of Comparison of Pretest-Posttest Average Scores on Cognitive Learning Outcomes for Experiment Class 1 and Experiment Class 2

Based on Figure 1, shows that the average posttest value of experimental class 1 is higher than the average posttest value of experimental class 2. This means that in this study there is a comparison of cognitive learning outcomes between the experimental class 1 and the experimental class 2, indicating that the TGT learning model affects learning outcomes applied to the experimental class 1.

2) Psychomotor Learning Outcomes for Experiment 1 and Experiment Class 2

The results of the average scores obtained from the two classes for all students in the three meetings obtained a comparison between experimental class 1 and experiment 2. Where the percentage (%) of the average skills for the experimental class 1 was greater than the percentage (%) score. the average skill in the experimental class 2. This happened because the TGT learning model applied to the experimental class 1 had games and tournaments with question cards distributed to each student at the tournament table. This supports the learning activities of students to be more enjoyable so that students are more enthusiastic in participating in the learning process. The above results are supported by research conducted by Aka (2015: 109) who argues that with the TGT learning model, it is possible to activate students, both in group discussions, games, and tournaments. This makes students learn by themselves without having to memorize the material repeatedly. The comparison of the average percentage value (%) of psychomotor learning outcomes from 3 meetings for experimental class 1 and experiment 2 can be seen in Figure 2.

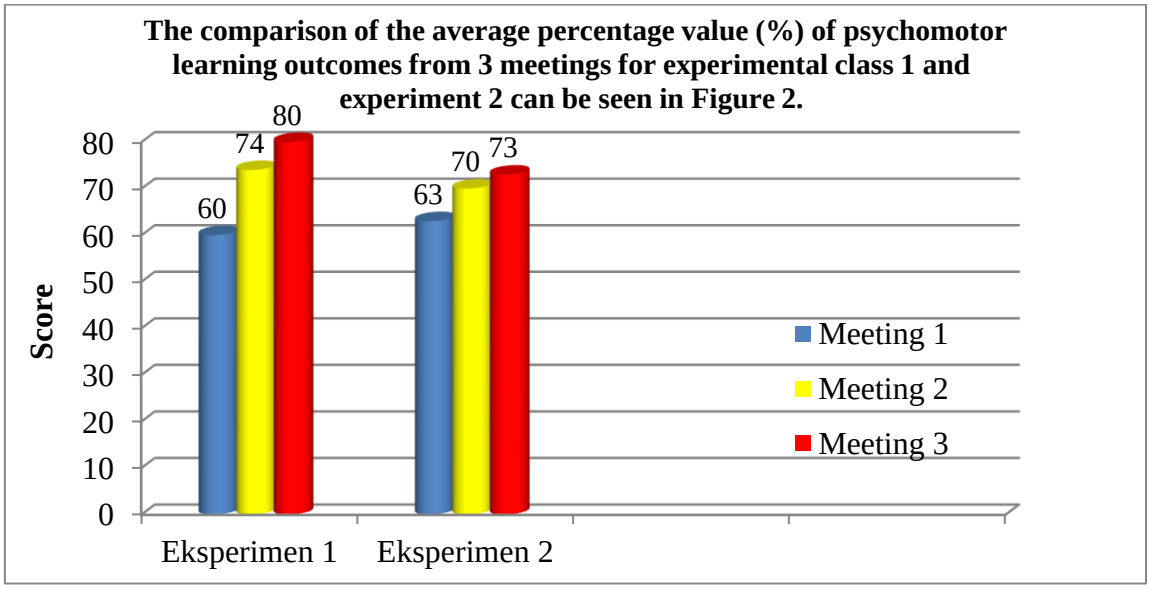

Figure 2. Results Percentage (%) of average psychomotor learning outcomes in experimental class 1 and experiment 2

2) Normality Test Results

The normality test was carried out using the normality test analyzed using statistical tests with the Shapiro Wilk technique assisted by SPSS 17.0 software for windows with a significant level of 5% or 0.05.

Table 4. Normality Test Results for Experiment 1 and Experiment 2

Class	*Shapiro Wilk*		Conclusion
	Sig.	α	
Pretest Experiment1	0,398	0,05	Normal
Posttest Experiment 1	0,204	0,05	Normal
Pretest Experiment 2	0,082	0,05	Normal
Posttest Experiment 2	0,179	0,05	Normal

Sumber: *Software SPSS 17.0 for Windows* (2019)

Homogeneity test results the homogeneity test uses a homogeneous of variance test with a significant level of 0.05 and the provisions of the homogeneity test if the significant value is >α so that the data is homogeneous, while if the significant value is <α so the data is not homogeneous.

Table 5. Homogeneity Test Results of Students' Pretest-Posttest Scores

Kelas	Sig.	α	Conclusion
Pretest Experiment 1 and Experiment 2	0,969	0,05	Homogen
Posttest Experiment 1 and Experiment 2	0,170		Homogen

Sumber: *Software SPSS 17.0 for windows* (2019)

Based on the data in Table 5, it can be concluded that the data is homogeneous. This is supported by Nurdiyanti (2010: 100) stating that the results of the pretest and posttest data calculations for experimental class 1 and experimental class 2 have homogeneous variances so that these results meet the requirements for a t-test.

2) Hypothesis Test Results

Table 6. Results of the Posttest Hypothesis Testing Experiment 1 and Experiment 2

Class	**Number Of Student**	α	**Sig. (*2-tailed*)**	**Conclusion**
Experiment 1	24	0,05	0,03	H_a diterima
Experiment 2	24	0,05	0,03	H_a diterima

Sumber: *Software SPSS 17.0 for windows* (2019)

Based on the data in Table 6, a significant value of 0.03 > 0.05 is obtained so that Ha is accepted, which means that there is a comparison of cognitive learning outcomes between the TGT and STAD learning models. This is supported by research conducted by Widyawati, (2016: 67) which concludes that there are differences in students' cognitive and affective learning achievement in the use of cooperative learning models of the TGT and STAD types on the subject matter of thermochemistry. The use of the TGT type of cooperative learning model provides better learning achievement in the cognitive and affective domains than the STAD type cooperative learning model. Research conducted by Menanti (2015:48); Frianto, dkk. (2016); Imanda, dkk. (2021) dan Tiantong & Teemuangsai (2013) concluded that the ability to understand mathematical concepts of students who used the TGT type cooperative learning model was better than the STAD type cooperative learning model at Khalifah Annizam Islamic Elementary School.

Based on the average value of the final test in the experimental class, the STAD learning model is 73.39 and in the experimental class, the TGT learning model is 79.39. The results of research conducted by Ahriani (2014: 8) also show that there are differences in chemistry learning outcomes between students who are taught with the STAD type cooperative learning model and students who are taught using the TGT type cooperative learning model on the subject matter of chemical bonds, on average The average learning outcomes of students taught with the TGT type cooperative learning model with the help of question cards were higher than those taught with the STAD learning model with the help of question cards. Similar to the research above, the results of research conducted by Sari (2013:1228); Qurniawati & Saputro (2013); dan Günter (2017) also showed that the learning outcomes of students who received learning with the TGT model with Tournament-Question Cards media were better than the learning outcomes of students who received learning with conventional models. Some of the opinions and research results above are in line with the results of this study, students who are taught with the TGT learning model get better cognitive learning outcomes. Through TGT steps such as presenting material by the teacher then teamwork, games, tournaments, and awards, students can learn while playing and can improve learning outcomes. Further Sholichah, et al. (2018) dan Van (2015) stated that implementing the STAD and TGT learning models in the hope of increasing student motivation and learning outcomes which was seen to increase in cycle I with high criteria and cycle II with very high criteria, besides that after the application of the STAD and TGT models, all students passed the eye lessons because they get a minimum standard score.

• CONCLUSION

There is a comparison of cognitive and psychomotor learning outcomes of students who use the TGT learning model equipped with question cards media with students who use the STAD type equipped with question cards media on chemical bonding material. This is as shown by the t-test analysis, that sig. 0.03 <0.05 which means H0 is rejected and Ha is accepted.

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