THE EFFECT OF USING QUIZLET MEDIA ON TEAMS GAMES TOURNAMENT TYPE COOPERATIVE LEARNING ON THE MASTERY OF SCIENCE CONCEPTS IN PRE-SERVICE ELEMENTARY TEACHERS

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ABSTRACT

The success of science material in elementary schools depends on the teacher's mastery of the content so that science learning literacy can be maximized. This research was a pseudo-experimental investigation that intends to investigate the impact of Quizlet media use on the teams games tournament (TGT) learning model on the learning achievement of pre-service elementary teachers on atomic structure, chemical bonding, and periodic systems. Purposive sampling was implemented to select 156 respondents. The dependent variable was the utilization of Quizlet media on the TGT learning model, while the learning achievement of those three topics became the independent variable. Data retrieval was performed by evaluating the results of thirty multiple choices. The collected data was analyzed using data quality tests, classical assumption tests, and hypothesis testing. The results of classical assumption tests revealed that the data in the experiment and control group were distributed normally, and the data was a homogeneous population. Based on hypothesis testing, this research indicated a positive significance of Quizlet media on the cooperative learning model of TGT type on the science learning achievement of pre-service elementary teachers. This research suggests integrating educational technology, such as Quizlet, into the teaching and learning process.

Keywords: ***learning media, Quizlet, cooperative learning, elementary teachers***

INTRODUCTION

Education is a very important tool to preserve the value system in the reform era. Through the education process, not only are learners' knowledge, understanding, and skills formed, but also their attitudes, behaviours, and personalities need serious attention. Forming these attitudes, behaviors and personalities becomes very important because the flow of communication and information does not always positively influence students (Chiba et al., 2021; Harefa et al., 2019; Jagannathan et al., 2019). Through quality education, all aspects of development will certainly improve. Therefore, various efforts continue to be made through educational innovation which is an effort to change the learning process in the classroom for the better. The tangible form that can be seen today as a form of educational innovation in Indonesia is the change of the 2013 Curriculum to the Merdeka Curriculum (Maipita et al., 2021; Thijssen et al., 2022).

The learning process with conventional methods still applied in universities makes lecturers more active, while students are more passive or only listen to lectures given by lecturers. This has an impact on the learning outcomes of students who are not good because the

learning process makes the lecturer the center of learning (teacher-centered). While in the latest curriculum, the learning process is required to maximize the learning center, which is the learner (student-centered), so students must be able to think actively and develop their critical thinking skills both independently and with groups in solving a problem.

Pre-service elementary teachers as prospective elementary teachers must be able to understand the concepts given before becoming teachers in elementary schools. One of the courses that must be taken is the basic concepts of science which are divided into physics, chemistry, biology, and astronomy. Science-chemistry is a very important science because of its enormous role in the world of education and is closely related to everyday life. However, when compared to other fields, chemistry seems more difficult to learn for students. The characteristics of chemistry subjects examine three dimensions of reasoning, namely the macroscopic dimension (related to what is observed), the symbolic dimension (symbols, formulas, equations), and the submicroscopic dimension (atoms, molecules, ions, molecular structures). One of the materials in science-chemistry topics that are considered difficult by students is the chemical bonding topic. However, according to the analysis Hunter et al. (2022), the chemical bonding topic can be understood by students on the condition that students must be able to link the underlying concepts with the concepts to be learned. We already know that atomic concepts, especially atomic structure and periodic system, are basic concepts that must be mastered by students to understand further chemical concepts, especially in chemical bonding topic.

The difficulty of learning chemistry is not only caused by chemistry subject matter but the majority of chemistry learning is teacher-centered. Macariu et al. (2020) and Touli et al., (2012) stated that the character of science-chemistry as experimental science does not appear in chemistry learning activities because, generally, it is very rare for students to be stimulated to make observations of chemical phenomena and connect these phenomena with previously acquired theoretical knowledge. When the lecturer delivered the material, only a few students asked questions. During discussions, only certain learners actively answer questions. When students feel bored, they no longer listen to the material being explained by the lecturer, but some students chat with their friends or play on smartphones. In addition, the delivery of chemistry material that is less interesting makes students' motivation to learn in participating in learning is low (Al-Balushi et al., 2020; Brooks et al., 2021; Gashoot & Mohamed, 2022).

Smartphone, as a mobile-based learning media or commonly referred to as mobile learning, has several advantages. Smartphones are mobile devices connected to the internet, so both learners and teachers will have no difficulty looking for various fields of knowledge that are widely available on the internet to be applied in the learning process to improve higher order thinking skills. One of the popular online web-based media today is Quizlet. The use of Quizlet media is considered to be able to improve student learning outcomes based on research results. Based on research conducted by Khotimah et al. (2020) it is concluded that the application of quizlet media can increase learning interest with the average results of pretest 50.88 and the average posttest 79.38. With increased interest in learning, it is hoped that it can also improve student learning outcomes. Köse et al. (2016) also reported that that majority of the students considered the Quizlet to be effective particularly at the initial stages of vocabulary learning considering L2 definitions, synonyms and pronunciation of the target words through repetition.

The use of learning media requires an appropriate model. Choosing the right model can also increase students' interest in learning. Teams games tournament (TGT) is one of the cooperative learning that consists of five main activities, namely class presentations, group (team) learning, games, tournaments, and team awards. Through these five activities, students can learn to understand the material independently, students are able to explain the material that

has been understood to their friends, students are able to solve or solve a question related to the basic competencies taught, students are able to answer questions in games, can compete and be more critical in answering questions in tournament activities (Fauzi et al., 2019; Juwita et al., 2017). This TGT learning model is a learning model that can be used to provide an understanding of concepts that are difficult or difficult to understand by students and can be used to determine the extent of students' knowledge and abilities in the material. For this reason, this research was conducted to examine the effect of Quizlet media and integrated into the teams games tournament type cooperative learning model by reviewing student learning outcomes.

METHOD

This study used a type of quasi experimental design (Creswell, 2017) that aimed to determine the effect of using quizlet media on the cooperative learning model type teams games tournament (TGT) on student learning outcomes on atomic structure material, periodic systems and chemical bonding. The participants of this study were 156 elementary school teacher education students. The participants were divided into two groups, namely the control group of 78 students and the experimental group of 78 students with purposive sampling. The instruments used in this study were research observation sheets and learning outcome tests that had been tested for validity using item validity and content validity. The data analysis technique used was descriptive analysis and inferential statistical analysis.

The achievement of the learning outcomes test for the experimental group and control group is presented in the form of tables, graphs and images in the form of mean scores, standard deviations, highest scores, lowest scores, as well as the completeness of each indicator and the completeness of student learning outcomes. The application of the TGT type cooperative learning model using Quizlet media is expected to increase students' interest in learning, students' involvement in finding concepts and improving students' learning outcomes. The data analysis technique used in this study was multiple linear regression analysis which will be carried out using the SPSS 27.0.0 program. The reliability test was carried out simultaneously on all questions with the reliability test method using the alpha-Cronbach method. After the data was declared valid and reliable, then the data was tested using the classical assumption test and hypothesis testing. The hypothesis was divided into two parts, namely H_0 was there is no effect of quizlet media on the TGT type cooperative learning model on the learning outcomes of pre-service elementary teachers on the subject matter of atomic structure, periodic system and chemical bonding, and H_1 was there is a significant effect of quizlet media on the TGT type cooperative learning model on the learning outcomes of pre-service elementary teachers on the subject matter of atomic structure, periodic system and chemical bonding.

RESULTS AND DISCUSSION

Descriptive Statistical Analysis Results

The highest scores of the pre-test in the control group and the experimental group were 86.67 and 83.33 respectively, while the lowest scores of the pre-test in the control group and the experimental group were 56.67 and 60.00 respectively.

Table 1 shows that the highest score obtained by students in the experimental group was 100, and the lowest score was 86.67, with an average score of 93.63. Meanwhile, the control group obtained the highest score of 96.67 and the lowest score of 70.00 with an average score of 85.21. The students' learning outcomes are then grouped based on the criteria for the completeness of the students' learning outcomes.

Table 1. Results of descriptive statistical analysis of learning outcomes in the

experimental group and control group.

No.	Statistical indicators	Statistical scores	
		Experimental Group	Control Group
1	Number of participants	78	78
2	Highest score	100	96.67
3	Lowest score	86.67	70.00
4	Average score	93.63	85.21
5	Median	93.33	86.67
6	Mode	96.67	80.00
7	Standard deviation	4.98	7.88

Based on Table 2, it can be seen that the completeness of student learning outcomes on the subject matter of atomic structure, periodic system and chemical bonding, for the experimental group and control group has different completeness. The highest completeness was obtained by the experimental group. Table 3 shows that the learning outcomes achieved by students in the experimental group taught using Quizlet media through the TGT type cooperative learning model are higher than the learning outcomes obtained by students in the control group taught using the cooperative learning model TGT type without Quizlet media. The learning outcomes obtained by students in the experimental group and control group, if categorized based on the indicators of completeness criteria, the percentage is obtained as shown in Table 3.

Table 2. Criteria for completion of student learning outcomes

Score	Criteria Classification	Experimental Group		Control Group	
		Number of participants	Percentage	Number of participants	Percentage
≥ 75	Pass	78	100.00%	70	89.74%
< 75	Not Pass	0	0.00%	8	10.26%

Table 3. Criteria for completion of student learning outcomes

Sub-topics	Percentage	
	Experimental Group	Control Group
Describe the model of Dalton, Thomson, Rutherford, Bohr, and Wave Mechanics.	76.67%	46.67%
Determine the number of protons, electrons, and neutrons of an atomic element based on atomic number and number atomic mass	100.00%	83.33%
Determining isotopes, isobars and isotones of some elements	80.00%	53.33%
Determine the configuration of electrons and electrons valence	73.33%	26.67%
Analyze the properties of periodic properties of elements in one group and one period	66.67%	50.00%

Determine the type of bond chemical bonding of a compound	83.33%	80.00%

Results of Inferential Statistical Analysis

The requirement that must be met before testing the hypothesis is to conduct an analysis prerequisite test, namely the normality test and homogeneity test. The normality test is carried out to determine whether the data obtained comes from a normally distributed population or not. The normality test in research uses the Kolmogorov-Smirnov test statistic, where the data is concluded to be normally distributed if the value of Sig. > 0.05. Based on the results of the analysis on the SPSS 27.0.0 program, the Sig. value in the experimental group and control group during the pre-test is 0.157 and 0.153 respectively, while the Sig. value in the experimental group and control group during the post-test is 0.216 and 0.130, respectively. This shows that collected data in the research are normally distributed.

The homogeneity test is a statistical test procedure that aims to show that two or more groups of sample data that have been taken come from populations that have the same variance. In other words, the homogeneity test is carried out to determine whether the data set being studied has the same characteristics or not. Homogeneity test in this research using Levene's test method where if the Sig. value of Based on Mean > 0.05, then the data variance is homogeneous. Based on the results of SPSS 27.0.0, it is found that the Sig. value of Based on Mean in the experimental and control groups is 0.178 and this shows that the the experimental and control groups is 0.178, and this indicates that the experimental group and control group collected from a homogeneous population.

The research hypothesis was tested using infrential statistical analysis. Hypothesis testing is used to test whether H_0 and H_1 formulated in the statistical hypothesis are accepted or rejected. Based on the results of the prerequisite test, it is known that the data from the experimental group and the control group come from a normally distributed population and have a homogeneous variance, so the hypothesis is accepted or rejected. Then hypothesis testing can be continued using the t-test. Based on the results of the post-test calculation using the independent t test, it can be seen that the Sig. (2-tailed) of 0.039 at the significance level of 0.05. The significance value which shows 0.039 < 0.05, then H_o is rejected and H_1 is accepted. Based on the results obtained, it can be concluded that there is an effect of media Quizlet media on cooperative learning model type teams games tournament (TGT) on the learning outcomes pre-service elementary teacher on the atomic structure, periodic system and chemical bonding topic.

Observation Results

Learning outcomes are supported by the results of observations of student learning activities using Quizlet media in the teams games tournament type cooperative learning model in the experimental group and learning without using Quizlet media in the teams games tournament type cooperative learning model assessed by observers. The percentage of student activity in the experimental group and control group are presented in Table 4.

Table 4. Percentage of student activities in the experimental group and control group.

No.	Indicators	Percentage	
		Experimental Group	Control Group
1	Introduction	95.83	100
2	Class involvement	90.50	77.66

3	Teams	96.00	77.00
4	Games	96.00	81.00
5	Tournament	96.00	81.00

DISCUSSION

The results of descriptive analysis show that there are differences in learning outcomes between the experimental group and the control group as shown in table 1 and table 2. Based on table 2, it is obtained that the average value of student learning outcomes in the experimental group is higher than the control group. This is because students in the experimental class who conducted learning with the help of Quizlet media in the cooperative learning model of teams games tournament (TGT) had participated and were more active in the learning process when answering the quiz given compared to the control class who conducted learning with the cooperative learning model of teams games tournament (TGT) without the help of Quizlet media (Harefa et al., 2019; N et al., 2021; Thurston et al., 2019). The factor that causes the experimental class to be more active is that in Quizlet media, there are several features in the form of flashcards, learn, match, write, and test. These features can help students better understand the material being taught. The flashcards feature, which provides an easy-to-understand summary of the material, helps learners during class presentations. The matching feature of in-class games can invite learners to be more active and hone teamwork in the classroom. The test feature retests learners' understanding and trains them to answer questions. These results are in accordance with the opinion of (Abdulrahaman et al. (2020) and Mutambara & Bayaga (2021) that the media used in learning can motivate students to actively participate in the learning process. In addition, the results of research by Fadda et al. (2022) and Zhan et al. (2022) showed that high participation and motivation in learning will improve student learning outcomes.

The presentation of class completeness also supports higher learning outcomes in the experimental group. Based on Table 2, it can be seen that the value of student learning outcomes shows the percentage of completeness of the experimental class (100%) or as many as 80 students who are equal to or more than the minimum completeness criteria (≥ 75) where this figure is greater than the control class (89.74%) or only 70 students who are completely on the material of the atomic structure, periodic system and chemical bonding. In addition to the data above, calculating the completeness of each indicator is also done to see the effect of using Quizlet media in the cooperative learning model of teams games tournament (TGT) type seen in table 3. Based on the table, it can be seen that all experimental class indicator completeness percentages are higher than the control class. In the experimental class, there were 4 indicators that were completed out of 6 learning indicators from the material of atomic structure, periodic system and chemical bonding. While the control class only has 2 indicators that are complete out of 6 indicators. So based on these data, Quizlet media can affect the completeness of indicators. This is possible because by using Quizlet media, such learners need a longer time to be able to build their own knowledge so that student-centered learning is realized even though this application media is indeed interesting and has been combined with a fun learning model (Katawazai, 2021; Korte et al., 2016; Lahdenperä et al., 2022).

CONCLUSION

This research found that in the pre-service elementary teachers perceived the use of Quizlet in learning science concept, especially atomic structure, chemical bonds, and periodic systems. The students thought and felt that using Quizlet as the online flashcard was useful and it helps them

easier to understand the science materials more easily. The students also felt if the use of Quizlet could help them in learning, comprehending, and memorizing science concepts. They were not suppressed and hesitated while they learned the science through the Quizlet. Even, they felt fun because they could play while learning. The students realized that learning science through reading the online flashcard in Quizlet was their need, to achieve their understanding of atomic structure, chemical bonds, and periodic systems topic. For future research, the researcher recommended being more increase the number of participants to get a more diverse student opinion and hope can strengthen the statements of previous research. Moreover, future researchers can conduct similar research with participants with different education levels. Future research also should search for the other types of websites and applications as learning media to be researched to find the most suitable method or technique for university students.

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