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THE EFFECT OF COOPERATIVE LEARNING MODEL TGT-TYPE ASSISTED BY CROSSWORD PUZZLE MEDIA ON BIOLOGY CONCEPT MASTERING

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Abstract: This study aims to determine the effect of the cooperative learning model of the Teams Games Tournament (TGT) type assisted by crossword puzzle media on the mastery of biological concepts in class X students at SMAN 3 Kota Bima. This study used a quasi-experimental research method with a nonequivalent control group design (pretest and posttest). The population in this study were students of class X, consisting of class X 1 to X 4. The sampling technique used purposive sampling. The samples used were students of class X 3 as the control class and class X 4 as the experimental class. Data collection techniques using test instruments in the form of multiple-choice questions. The analysis technique used is the t-test with a significance level of 5% with the help of SPSS 25 for Windows. The t-test results show that the value of (2.347 > 2.010). Based on these results, it can be interpreted that the cooperative learning model of the TGT type assisted by crossword media affects the mastery of biology concepts in class X students at SMAN 3 Kota Bima.

Keywords: *Teams Games Tournament Learning Model, Crossword Puzzle Media, Concept Mastery*

INTRODUCTION

Learning is one aspect of education that has an impact on improving the quality of individuals. Learning is a series of activities involving information and systematically organizing the environment to facilitate student learning [1]. The environment in question is not only a place of educational activity but also the methods, media, and equipment needed to provide information. One of the factors that can affect student learning activities is mastery of concepts in the teaching and learning process.

Biology learning is part of natural science as a science that studies living things and their environment. Biology learning produces learning outcomes in the form of products in the form of cognitive domains and the realm of processes (psychomotor) and affective domains. Biology learning often experiences obstacles in the learning process, namely, the understanding of the material needs to be maximized and the lack of student motivation in learning. Students are expected to master the material and develop thinking skills by actively involving students in exploring the subject matter and creating their ideas derived from observation and discussion.

The results of observations and interviews of grade X students at SMAN 3 Bima City showed there were several problems during the learning process: students seemed less interested in attending biology lessons, students were primarily sleepy, students rarely asked, and did not listen to the teacher's explanation. It is due to the lack of interaction between students and teachers, which causes learning to be one-way (teacher-centered). Meanwhile, the results of an interview with a biology teacher of SMAN 3 Bima City obtained information that can be concluded that many students get unsatisfactory scores during exams because students' mastery of concepts is still lacking in the material of the animal kingdom, which students do not understand. They are interested in participating in biology learning.

The Teams Games Tournament (TGT) learning model is one of the learning models that is easy to implement, including the activities of all students regardless of status, the role of students as peer educators, and containing games, reinforcement, and rewards. Learning activities with games designed for TGT-type cooperative model learning allow students to learn more relaxed, foster responsibility, cooperation, healthy competition, and learning commitment, and easily adapt to all concepts. This learning model is used in various subjects and is best suited for teaching clearly defined learning with correct answers, such as calculations and using science facts and concepts. In addition, there must be variations in learning to reinforce memory to students of a concept that has been taught by developing a learning medium [2]

Learning media is a tool to convey information through learning materials from teachers and pass it on to students as recipients of information. Sari et al. [3] stated that learning media is a tool that can be used to distribute the material delivered so that students can easily understand the material delivered by the teacher. The role of the media can help students understand the concept of material in the learning process. The part of learning media in learning is an inseparable whole; learning media is a tool used to channel learning material to students to stimulate students' thoughts, attention, and interest in learning [4]. Success in the learning process is also influenced by learning media, so a learning media is needed that can make students more active when learning because they are directly involved.

One of the learning media that teachers can develop is crossword puzzles. Crossword puzzle is a learning media in the form of a game filled by students

in an empty box that has been provided to answer questions that can stimulate students' curiosity to find and find answers to each question given [5]. Crossword puzzle media can foster a sense of fun for learning so that it can hone students' memory and creativity in matching the right words to fill the number of boxes [6]. Based on the description above, it is necessary to research the effect of the TGT-type cooperative learning model assisted by crossword puzzle media on mastery of biological concepts in grade X students at SMAN 3 Bima City.

RESEARCH METHODS

The type of research used is a quasi-experimental design with a nonequivalent control group design. A quasi-experimental design is a form of experimental design that has a control group but cannot function fully to control outside variables that affect the conduct of experiments [7]. The design of this study has two groups, namely the first group that received treatment (treatment) while the second group is control (control). A pretest is carried out before learning using the TGT learning model. Posttest is conducted after learning using the TGT learning model assisted by crossword puzzle media [8]. The research design is presented in Table 1.

Table 1. Research Design

Group	Pretest	Treatment	Posttest
Experimental Class (X4)	O1	X	O2
Control Class (X3)	O3	-	O4

Class X study population consisting of X 1 to X 4. The sample used was class X 3 as a control class, totaling 25 students, and class X 4 as an experimental class, totaling 25 students. Sampling techniques using purposive sampling are based on certain objectives according to the specific characteristics of the sample. This specific characteristic is that students have the same ability based on the average score of UTS. The difference between the two classes lies in the treatment. The experimental class (X4) was given treatment using the TGT learning model assisted by crossword puzzle media, while the control class (X3) was given treatment using a direct learning model.

Data collection instruments and techniques use a concept mastery test of valid and reliable multiple-choice questions totaling 20. The data of the concept mastery test results are tested by prerequisite tests, namely homogeneity and normality tests. Furthermore, the data was analyzed using a statistical test, an independent sample t-test, with a significance level of 5%. The test is used because the results of the homogeneity test and the normality test of the data are normally distributed, and the variance of the data is homogeneous [9]. The independent sample t-test formula is used as follows [7]:

$$t_{hitung} = \frac{X_1 - X_2}{\sqrt{\frac{(n_1 - 1)s_1{}^2 + (n_2 - 1)s_2{}^2}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Information:
X_1 = experimental class sample mean
X_2 = average sample control class
n_1 = number of experimental class samples
n_2 = number of control class samples
s_1 = experimental class variance
s_2 = Control class variance

RESULTS AND DISCUSSION'

Concept Mastery Test Results

Mastery of student concepts before being given treatment can be seen from pretest scores, and mastery of concepts after being given can be seen from posttest scores. The concept mastery test results from both classes are presented in Table 2 as follows.

Table 2. Pretest and Posttest Data Mastery of Concepts

	Experimental Class		Control Class	
	Pretest	Posttest	Pretest	Posttest
Top Rated	60	90	60	85
Lowest Value	25	55	20	50
Average	44.2	76.8	39.2	63.6
Number of students	25		25	

Table 2 shows the pretest and posttest mastery of concepts in the experimental class (X 4) and control class (X3) of 25 students. The average pretest score of students using the TGT-type cooperative learning model assisted by crossword puzzle media was 44.2, which increased to 76.8 in the posttest. In contrast, students who followed the learning with a direct learning model had an average pretest score of 39.2, which increased to 63.6 on the posttest.

Normality Test Results

The normality test results are presented in Table 3 as follows:

Based on Table 3. The significance values for the experimental class were 0.143 and 0.204, while for the control class, they were 0.170 and 0.133. The decision had a significance value of > 0.05, so it can be concluded that the data is normally distributed.

Table 3. Normality Test Results

	Kolmogorov-Smirnov			Shapiro-Wilk		
Class	Statistics	Df	Sig	Statistics	Df	Sig
Pretest experiments	0.115	25	0.200	0.939	25	0.143
Post-test experiment	0.156	25	0.121	0.946	25	0.204
Pretest control	0.168	25	0.067	0.943	25	0.170
Post-test control	0.161	25	0.093	0.938	25	0.133

Homogeneity Test Results

The homogeneity test results are presented in Table 4. as follows:

Table 4. Homogeneity Test Results

Class	Significance	Level of Significance	Criterion
Experiment Control	0.598	0.05	Homogeneous

Based on Table 4. The significance value is 0.598 > 0.05, so it can be concluded that the variance of the experimental class and the control class is homogeneous.

Results of Hypothesis Test Analysis

The hypothesis test in this study was conducted to determine the effect of the TGT-type cooperative learning model assisted by crossword puzzle media on students' mastery of biological concepts using an independent sample t-test assisted by SPSS 25 for Windows. The results of the hypothesis test are presented in Table 5 below:

Table 1. Hypothesis Test Results

Class	t_{count}	t_{table}	Information
Experiment Control	2.347	2.010	H_a Accepted

Based on Table 4.4, it is known that the value t count in the experimental class and control class is 2.347 with a significance value of 0.023 and the value at the significance level of 0.05 is 2.010, so that > (2.347 > 2.010), it can be concluded that there is an influence of the TGT type cooperative learning model assisted by crossword puzzle media towards mastery of biological concepts in students.

Research that has been carried out using a Teams Games Tournament (TGT) type cooperative learning model assisted by crossword puzzle media on the animal kingdom material in grade X students of SMAN 3 Bima City shows that students' mastery of concepts increases. The increase in students' mastery of concepts can be seen from the average score of students' pretest before learning activities with the TGT type cooperative model assisted by crossword puzzle media is 44.2, which increases to 76.8 in the posttest or the average score after learning activities with the TGT type cooperative model assisted by crossword puzzle media. In contrast, students who followed the learning with a direct learning model had an average pretest score of 39.2, which increased to 63.6 on the posttest. From these two averages, it can be seen that the increase in mastery of the concepts of students who participated in learning with the TGT type cooperative model assisted by crossword puzzle media (experimental class) was higher than students who followed learning with the direct learning model (control class). It follows research conducted by Suwirda [10] that applying the TGT-type cooperative learning model assisted by crossword puzzle media can effectively improve student learning activities.

Learning activities in experimental classes using the TGT type cooperative learning model assisted by crossword puzzle media can help students learn independently, think critically, and take part in learning activities by showing interested and enthusiastic behavior or enthusiasm in following learning, not only during group division but because there will be crossword puzzle games. It follows what Tyasning stated that, the TGT learning model involves students as peer tutors and contains elements of play that can excite students' learning enthusiasm [11]. Students can learn more calmly while fostering responsibility, cooperation, and learning engagement. In addition, learning process activities in experimental classes involve more students to be active in learning activities. Student involvement is important in learning activities as evidence that students strive to develop cognitive and knowledge abilities they have [1,2]. On the other hand, student involvement is very important because it can affect student success in learning achievement and aspects of student character building.

Crossword puzzles used as learning media in applying the TGT-type cooperative learning model aim to make it easier for students to understand the material that researchers delivered using game media, using crossword puzzle media as a game media to improve students' memory to think of appropriate and appropriate answers so that vertical and horizontal crossword puzzle box answers can be unified. The application of crossword puzzle media can improve student activities and learning outcomes because by filling in the crossword puzzle, a clear, relaxed, and calm state of mind will strengthen the brain's memory so that memory increases [13]. Crossword puzzle media is only used in experimental classes, while researchers only explain and provide LKPD in the control class. It includes the stages that distinguish learning in the control and experimental classes.

The difference in the results of the concept mastery test in the two classes where the experimental class is higher than the control class is influenced by several factors, one of which is caused by different treatments both in terms of the learning model used, learning media, teaching materials, teacher attitudes in teaching, and student environment. These factors are included in external factors. External factors come from outside the individual so factors can affect the learning process, and outcomes usually come from the student's environment [14]. In addition, the concept mastery test is also influenced by several internal factors such as encouragement in learning, student activeness during learning process activities, and motivation of deep curiosity. Internal factors are factors contained in the human person itself [1,5].

Based on the hypothesis test analysis, it shows that there is a significant influence on aspects of mastery of biological concepts between experimental classes that learn using the TGT-type cooperative learning model assisted by crossword puzzles and control classes that know using direct learning models. The TGT-type cooperative learning model has games, tournaments, and rewards stages that do not exist in the direct learning model stage. The TGT learning model assisted by crossword puzzle media can increase student activeness in learning because there is a tournament stage that can give students the responsibility to pay attention to the presentation from the teacher and all students are actively involved in the learning [1,6].

The results of the t-test analysis found that the two classes had a difference, namely at the significance level of 5%, $t_{count} > t_{table}$ $2.347 > 2.010$, then H_0 rejected and accepted. It means that the TGT-type cooperative model assisted by $H_a$crossword puzzle media influences the mastery of biological concepts in SMAN 3 Bima City grade X students for the 2022/2023 academic year. This result is in line with research by Kristiana et al. [1, 7], which proves that there is a significant influence on students' cognitive learning outcomes using a TGT-type cooperative learning model assisted by crossword puzzle media on excretory system material at MTSN 1 Semarang. The TGT-type cooperative learning model assisted by crossword puzzles significantly improves student learning outcomes on chemical compound governance materials [1,8].

In this study, the TGT-type cooperative learning model assisted by crossword puzzles positively influences mastery of biological concepts in the animal kingdom material. In line, the TGT type cooperative learning model with crossword puzzle media has a positive effect on the learning outcomes of students in the human development material experimental class in class VIII MTS Darul Ulum Palangka Raya [19-20]. It is because, during learning, teachers always provide opportunities for students to express what is in their minds related to the material of the animal kingdom. Students actively ask questions when there is material that needs to be understood because the teacher gives a positive response when students ask.

Students are active in solving problems given to the group. In addition, students are motivated to get as many scores as possible for the victory of their respective groups when games and tournaments are held so that each student will be serious about understanding the teaching material and following the course of learning well. There are no students who are passive and lack enthusiasm for participating in learning. The TGT-type cooperative learning model can arouse students' enthusiasm for learning, so it is good to use; a pleasant atmosphere will arouse students' interest in learning. The TGT-type cooperative model makes high-ability students more active in learning, and students with lower academic ability also participate actively and have an important role in their group [21-22].

It is very relevant based on previous theories and research associated with this research. In this study, the TGT-type cooperative model assisted by crossword puzzle media proved to affect mastering biological concepts in grade X students at SMAN 3 Bima City for the 2022/2023 academic year.

CONCLUSION

The conclusion from the results of data analysis and discussion is that there is an influence of the use of the TGT-type cooperative learning model assisted by crossword puzzle media on the mastery of biological concepts of grade X students at SMAN 3 Bima City. The effect in question was a significant increase in value in the experimental class (X 4) compared to the control class (X 3). This statement is supported by the results of data analysis, which shows that the value ($t_{count} > t_{table}$ $2.347 > 2.010$).

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