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The Effect of Contextual Teaching and Learning Model with Quiz Card Mastery Strategy on Cognitive Student Learning Outcomes on the Material Classification of Living Things

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ABSTRACT

This study was motivated by some teachers who tend to teach by giving examples of problems and solving them directly without providing opportunities for students to convey ideas. The material is delivered more through the lecture method, so many students have difficulty remembering what has been taught by the teacher. This study aims to determine the application of the Contextual Teaching and Learning learning model with the Quiz Card Mastery strategy to student learning outcomes on the Classification of Living Things material. The research design used is the Pretest-Posttest Control Group Design using a quantitative approach and random sampling sample selection consisting of 64 students. The location of this research is at junior high school 4 lamongan. Data collection techniques using student learning outcomes tests, learning implementation observation sheets, and student response questionnaires then data analysis techniques using paired sample t-test, n-gain test, learning implementation analysis, and student response questionnaires. The results of this study are: 1) The implementation of learning in teaching modules using the Contextual Teaching and Learning model with the Quiz Card Mastery strategy is in the very good category with an average of 94%. 2) There is a significant influence between learning with the Contextual Teaching and Learning model with the Quiz Card Mastery strategy on student learning outcomes with significant results from the paired sample t-test of 0.00 <0.05. 3) Students' responses after applying the Contextual Teaching and Learning model with the Quiz Card Mastery strategy were very positive with an average percentage of student responses of 90.00%.

Keywords: Cognitive Learning Outcomes; Contextual Teaching and Learning Model; Quiz Card Mastery.

INTRODUCTION

In current education, human resources (HR) are the most important factor in the educational process (Mukhlison Effendi, 2021). Efforts to improve the education sector can be made by strengthening various aspects of human resources (HR), such as skills, attitudes, and knowledge. Education plays an important role in shaping students' character and broadening their understanding, which also contributes to maintaining national unity (Sari Putri E, 2022).

The teaching and learning process involves interactions between teachers, students, and the school environment. The goal is to convey learning materials and encourage students to receive, understand, and develop ideas (Komang I Winata, 2021). The success of this process greatly depends on the teacher's ability to select appropriate teaching models and engage students' interest. Professional teachers must be able to vary teaching methods so that students do not feel bored (Akbar, 2021).

The results of the 2022 Programmer for International Student Assessment (PISA) survey showed a decline in learning outcomes globally due to the pandemic. Indonesia's ranking in 2022 rose by 5-6 positions compared to 2018 (Kemendikbudristek, 2023). Therefore, an effective teaching model is

needed, such as the Contextual Teaching and Learning model with the Quiz Card Mastery strategy, which encourages students to actively share thoughts and ideas. This teaching model can significantly improve student learning outcomes (Widiyono, 2021).

From observations made at junior high school 4 lamongan, there are several issues in the teaching and learning process in the classroom. Teachers tend to provide instruction by giving example problems and solving them directly without giving students the opportunity to express their ideas. Students are less active in the classroom learning process, and some students still score below the Minimum Completeness Criteria (Kriteria Ketuntasan Minimal or KKM). At this school, the KKM score is 75, and the highest score obtained by a student was 77. Additionally, the way material is delivered in class is still monotonous, with material mostly conveyed through lectures, making it difficult for many students to remember what was taught during the lesson.

Based on the issues outlined, the researcher aims to study the impact of the Contextual Teaching and Learning (CTL) model, as this model encourages students to understand and determine what they are learning, as well as to increase their engagement and learning outcomes, particularly in science education at the junior high school level (Wayan et al., 2020). One of the strategies in the CTL model is Quiz Card Mastery, which activates students through discussions, presentations, and filling out cards. This strategy provides students with the opportunity to ask questions, share opinions, and express their knowledge (Nur et al., 2023). Thus, teachers can assess students' level of understanding and encourage them to participate more actively. The Quiz Card Mastery strategy creates a dynamic and engaging learning environment that involves physical movement, which can enhance student participation and learning outcomes (Putri, 2019). Moreover, this strategy also helps foster mutual respect among students and provides opportunities to ask about things they do not understand, whether individually or in groups (Bugi et al., 2023). Ultimately, science learning becomes more enjoyable and rewarding with the implementation of this strategy, as students can improve their understanding and skills more effectively, leading to better learning outcomes (Ansya, 2023).

The topic of the Classification of Living Things helps organize the diversity of organisms based on certain characteristics. It provides an essential foundation for biology education, helping students understand biodiversity and the interactions among organisms within ecosystems. Additionally, classification is important for environmental conservation and understanding human impacts. Observations at the school under study revealed student misconceptions about this topic, leading to low academic achievement. Therefore, more attention is needed in the presentation of the material and teaching strategies to improve student understanding and performance.

In this study, there are several differences compared to previous research, particularly in the naming of the Quiz Card Mastery strategy, which is adapted from the Giving Question and Getting Answer strategy. Additionally, there are differences in the media used and the steps implemented in teaching. Based on several research perspectives on the application of the Contextual Teaching and Learning model and the Quiz Card Mastery strategy, which have been shown to potentially improve student learning outcomes, the researcher innovates by combining these two teaching methods, which could potentially provide more optimal student learning outcomes. Therefore, the aim of this study is to determine the effect of the Contextual Teaching and Learning model on students' cognitive learning outcomes through the Quiz Card Mastery strategy on the topic of the classification of living things.

RESEARCH METHODS

Time and Place of Research

This research was conducted from May 27 to 31, 2024, with three meetings. The time allocation was 3 x 40 minutes and 2 x 40 minutes per meeting. The research took place at junior high school 4 lamongan, specifically in the eighth-grade class.

Method

This study employs a quantitative approach. The type of research used is experimental research, which aims to determine the effect of the Contextual Teaching and Learning model with the Quiz Card Mastery strategy on students' learning outcomes in the topic of the Classification of Living Things. Experimental research is a type of study that tests how an independent variable affects a dependent variable or research outcome in a controlled environment. The experiment treatment is applied as the

intervention. Thus, the experimental research method is a way to determine how a particular action impacts others in a controlled situation (Sugiyono, 2019).

Research Design

The research design applied is the pretest-posttest control group design. In this design, both randomly selected groups are given a pretest and a posttest to determine if there are initial differences between the experimental and control groups.

Table 1. Pretest-Posttest Control Group Design

Sample	Pretest	Treatment	posttest
R_1	O_1	X_1	O_3
R_2	O_2	X_2	O_4

Description:

R_1 R_2 : experimental and control class samples
O_1 O_2 : pretest of experimental and control class
X_1 X_2 : contextual teaching and learning with strategy qiiz card mastery
O_1O_2 : posttest of experimental and control class

Population and Sample

The population in this study includes the students of classes VII A-G at junior high school 4 lamongan, with a total of 224 students. In quantitative research, a sample is a small portion of the entire population (Sugiyono, 2019). The sample for this study involves two classes designated as the experimental and control classes.

In this study, the sampling was done using the random sampling technique. Random sampling is considered simple because the sample members are selected randomly from the population without considering the population strata (Sugiyono, 2019). According to Arikunto (2012), if the number of subjects is less than 100, it is advisable to use the entire population as the research sample. However, if the number of subjects exceeds 100, approximately 10-15% to 15-25% or more of the population can be taken as the sample (Hatmoko, 2015). Since the population reaches 224 students, the researcher took more than 25%, specifically 29% of the total population, which includes 224 students. The sample for this study consists of 64 students.

Data Collection Techniques

The data collection techniques in this study include observation, tests, and questionnaires. Observation involves observing and recording data objectively by the researcher to obtain accurate data. The tests in this study consist of pretest and posttest essay questions to measure students' learning outcomes. The researcher conducts a pretest to determine students' initial abilities. After obtaining the initial ability data, the researcher applies different treatments to the experimental and control classes. The experimental class uses the Contextual Teaching and Learning model with the Quiz Card Mastery strategy, while the control class receives conventional teaching. The final step is conducting a posttest to assess the students' final abilities.

Questionnaires are used to determine students' responses to the implementation of the Contextual Teaching and Learning model with the Quiz Card Mastery strategy. In quantitative research, the quality of the research instrument includes the validity and reliability of the instrument, as well as the quality of data collection, including the accuracy of the data collection method (Sugiyono, 2019). Validation sheets are used as a reference for refining the research instruments and learning tools. The goal is to assess the validity of the teaching materials used during the learning process. The evaluation sheets will be given to three expert lecturers subject matter experts, language experts, and media experts who will evaluate the teaching modules, student worksheets, learning media, test questions, and student response questionnaires.

Data Analysis Techniques

In this study, the data analysis techniques include first validating the feasibility test of the research instruments and learning tools. Next, the data analysis technique for the implementation of learning is applied, where the analysis of the learning implementation is recorded in the observation sheets of the teaching modules. There are prerequisite tests including normality and homogeneity tests. The normality test evaluates the assumption that data from each variable being analyzed follow a normal distribution. This test uses the Kolmogorov-Smirnov test with SPSS statistical software. If the significance value is greater than 0.05, it can be concluded that the data has a normal distribution.

Conversely, if the significance value is less than 0.05, it can be concluded that the data does not follow a normal distribution. The homogeneity test is used to assess whether the variance of a specific population is similar or different. In this study, the Levene's test is used in SPSS. If the significance value is <0.05, it indicates that the variances of two or more groups of populations or sample data are not homogeneous. If the significance value is >0.05, it indicates that the variances of two or more groups of populations or sample data are homogeneous.

In hypothesis testing, the t-test is used to evaluate the effect of implementing the Contextual Teaching and Learning model with the Quiz Card Mastery strategy on student learning outcomes. A paired sample t-test is analyzed with the help of SPSS software. This test determines whether variable X (Contextual Teaching and Learning model with Quiz Card Mastery strategy) affects variable Y (students' cognitive learning outcomes). Hypothesis evaluation is conducted by accepting the null hypothesis (Ho) if the significance level is greater than 0.05, indicating that there is no change between variables X and Y. Conversely, the alternative hypothesis (Ha) is accepted if the significance level is less than 0.05, indicating a change between variables X and Y.

After collecting the posttest and pretest data, the next step is to calculate the scores using the N-Gain test to assess the improvement in learning outcomes after the learning activities. Students' responses to the learning process conducted in class using the Contextual Teaching and Learning model with the Quiz Card Mastery strategy are measured through a questionnaire. Descriptive analysis with a Likert scale is used to describe student responses.

RESULTS AND DISCUSSION

Result

The implementation of learning with the Contextual Teaching and Learning model and the Quiz Card Mastery strategy was observed by two observers: a student from the Science Education program at Unisla and a science teacher from junior high school 4 lamongan. The observation covered the activities of both the teacher and the students from the beginning to the end of the learning process. The observers marked a checklist (√) in the provided scoring columns. The results of the implementation of learning can be seen in Table 2.

Table 2. Percentage of Learning Implementation

aspects observed	**Assessment score (%)**			**Average**
	Meeting 1	**Meeting 2**	**Meeting 3**	
Introduction	92	97	95	95
Core activities	90	92	91	91
Closing	92	95	98	95
Average				**94**

The normality test aims to determine whether the results of the Pretest and Posttest follow a normal distribution or not. In this testing, normality is assessed using the Kolmogorov-Smirnov analysis. The results of the normality test for the pretest data can be seen in Tables 3 and 4.

Table 3. Results of the Normality Test for Pretest Data

	Class	Statistic	df	Sig.
Learning outcomes	Pretest of experimental class	144	32	091
	Pretest of control class	144	32	088

Based on the Kolmogorov-Smirnov test above, the normality test for the pretest data shows a significant probability of 0.091 for the experimental class and 0.088 for the control class. Thus, the pretest data is normally distributed, allowing for data analysis using parametric statistics.

Table 4. Normality Test Results for Posttest Data

	Class	Statistic	df	Sig.
Learning outcomes	Posttest of experimental class	141	32	186
	Posttest of control class	154	32	061

The significance probability for the experimental class is 0.185 and for the control class is 0.061. Thus, the posttest data is normally distributed, allowing for data analysis using parametric statistics.
The homogeneity test aims to determine whether two or more sample groups come from populations with the same variance. The criterion for testing indicates that data is homogeneous if the significance probability > 0.05, meaning Ha is accepted and the data variance is homogeneous. Conversely, if the significance probability < 0.05, Ho is rejected, indicating that the data variance is not homogeneous. The results of the homogeneity test for the pretest and posttest data can be seen in Tables 5 and 6.

Table 5. Homogeneity Test Results for Pretest Data

		Lavene statistic	Df1	Df2	Sig.
Pre-Test of Experimental Class and Control Class	Based on mean	749	1	62	390
	Based on median	848	1	62	361
	Basen on median and with adjusted df	848	1	61.691	361
	Based on trimmed mean	736	1	62	694

The pretest data has a significance probability of 0.390, or 0.390 > 0.05. Thus, the pretest data has homogeneous variance.

Table 6. Homogeneity Test Results for Posttest Data

		Lavene statistic	Df1	Df2	Sig.
Pre-Test of Experimental Class and Control Class	Based on mean	047	1	62	829
	Based on median	111	1	62	740
	Basen on median and with adjusted df	111	1	61.228	740
	Based on trimmed mean	051	1	62	822

The posttest data has a significance probability of 0.829, or 0.829 > 0.05. Thus, the posttest data has homogeneous variance.

Table 7. Paired Sample t-Test for the Experimental Class

Data	Mean	t	Df	Sig. (2 tailed)	Sig value
Experimental Class Pretest-Posttest	68.52234	33.182	32	.000	0.000 < 0,05

Table 8. Paired Sample t-Test for the Control Class

Data	Mean	t	Df	Sig. (2 tailed)	Sig value
Control Class Pretest-Posttest	-33.98437	-25.152	32	.000	0.000 < 0,05

Hypothesis calculations show that the null hypothesis (Ho) is accepted if the significance level > 0.05, which means that variable X does not affect variable Y. Conversely, the alternative hypothesis (Ha) is accepted if the significance level < 0.05, indicating an effect of variable X on variable Y. Based on the table above, the 2-tailed significance is 0.000, which is < 0.05. This means that variable X affects variable Y, or in other words, the implementation of the Contextual Teaching and Learning model with the Quiz Card Mastery strategy has an effect on student learning outcomes. Therefore, Ha is accepted and Ho is rejected, indicating a significant effect of using the Contextual Teaching and Learning model

with the Quiz Card Mastery strategy on student learning outcomes for the topic of Classification of Living Things.

The N-Gain calculation is used to measure the improvement in learning outcomes that occurs after the learning activities. The students' learning outcomes are presented in Table 9.

Table 9. Average Student Learning Outcomes

Class	N	Pretest	Posttest	Gain	N-Gain
Experimental Class	32	51,07	85,25	34,19	0,70
Control Class	32	50,59	85,05	22,99	0,66

The student response questionnaire regarding the learning process is filled out by students after the learning activities are completed, specifically after the learning sessions using the Contextual Teaching and Learning model with the Quiz Card Mastery strategy on the topic of Classification of Living Things.

Table 10. Percentage of Student Response Questionnaire Results

No	Student Questionnaire Indicator	Student Response	Category
1.	Feelings of pleasure	90,62%	Very positive
2.	Student interest	88,44%	Very positive
3.	Student engagement	87,50%	Very positive
4.	Media display	93,75%	Very positive
Average		**90,00%**	**Very positive**

Discussion

Implementation of Learning Using the Contextual Teaching and Learning Model with the Quiz Card Mastery Strategy

During the first meeting, the researcher brought samples of flowers, crickets, and rocks, and took the students to the garden in front of the classroom, where a question-and-answer session was conducted. The researcher then presented the material on Characteristics of Living Things and divided the students into 5 groups, with one group consisting of 6 and 7 students. Next, the researcher provided student worksheets (LKPD) and the results were presented. The researcher and students then used the Quiz Card Mastery media.

In the second meeting, the researcher took the students to the garden in front of the classroom to observe the grouping of living things. The researcher then asked the students to attempt grouping the living things and applied the material on grouping living things using a tabular identification key. The students worked on the LKPD in their respective groups as arranged in the first meeting and then presented their results. Following this, the researcher and students used the Quiz Card Mastery media.

During the third meeting, the researcher showed images of taxonomic sequences and explained the taxonomic order while students observed and listened. The students then worked on the LKPD in their respective groups as in the first meeting, presented their LKPD results, and provided feedback to each other. The researcher and students then used the Quiz Card Mastery media. The implementation of the learning process can be seen in Figure 1.

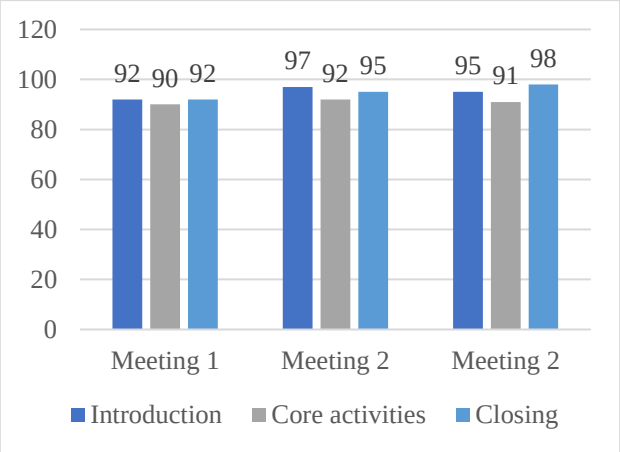

Figure 1. Diagram of Learning Implementation Results

The implementation of learning (teaching modules) using the Contextual Teaching and Learning model with the Quiz Card Mastery strategy can be evaluated based on whether it is implemented or not. The implementation of learning is also assessed to determine whether it falls into the categories of very good, good, fair, poor, or very poor. Based on the percentage of learning implementation (teaching modules) shown in Figure 1 above, the observation results regarding the implementation of learning indicate that all activities in the teaching module were executed, starting from the introduction (95%), core activities (91%), to the conclusion (95%), with an overall average of (90%). This suggests that the implementation of learning in the teaching module using the Contextual Teaching and Learning model with the Quiz Card Mastery strategy falls into the very good category.

Previous research indicates that implementing the Contextual Teaching and Learning model can improve learning outcomes and make learning enjoyable while stimulating students' curiosity about the material being taught, as it includes contextual aspects related to daily life (Lestari et al., 2023). There is a positive relationship between the implementation of learning and student learning outcomes. The use of LKPD in learning has been shown to enhance students' knowledge as they become familiar with the application of the material being studied and can discover knowledge within a contextual framework (Masnijar, 2023). Previous studies also show that learning with the Contextual Teaching and Learning model not only improves students' abilities but also motivates them to remain confident and enthusiastic about learning (Rokayah, 2023).

The Effect of the Contextual Teaching and Learning Model with the Quiz Card Mastery Strategy on Students' Cognitive Learning Outcomes

Based on the data from Table 7, the significance value from the paired sample t-test is 0.00, which is less than 0.05. This indicates that the alternative hypothesis (Ha) is accepted and the null hypothesis (Ho) is rejected, meaning there is a significant effect of learning with the Contextual Teaching and Learning model combined with the Quiz Card Mastery strategy on students' learning outcomes in the Classification of Living Things subject.

According to Table 9, the average pretest score for the experimental class is 51.07, and for the control class, it is 50.59. These pretest average scores show that the initial learning abilities of students in the experimental and control classes were similar. After the intervention, the experimental class showed an improvement of 34.19%, with an average posttest score of 85.25, which falls into the moderate category. In contrast, the control class, which did not receive the intervention, showed an improvement of 22.99%, with an average posttest score of 84.57, also in the moderate category.

The N-gain test results for the experimental class indicate a moderate category, suggesting that the applied teaching method successfully enhanced students' understanding significantly. This shows that the strategy used is effective in improving the quality of student learning. Although these results have not yet reached the high category, this achievement is a positive indication that the method applied has significant potential for further improvement. With additional adjustments and enhancements in implementation, more optimal results are expected in future research.

Overall, hypothesis testing results demonstrate that the Contextual Teaching and Learning model with the Quiz Card Mastery strategy significantly affects students' learning outcomes. This model influences student learning because, during the learning process, students are fully engaged in understanding the material and relating it to real-life situations. This engagement encourages them to apply the knowledge in their daily lives, discuss and work through the LKPD tasks, and present their results effectively.
The results of this study are the same as research conducted by Thomas Kemil Masi (2023) which states that students acquire new knowledge through active learning activities by finding, experiencing, and analyzing material. They then apply these skills to other situations. In practice, learning is done both inside and outside the classroom. The application of this model is also able to increase student learning activities (Masi, 2023).
Learning by using the Contextual Teaching and Learning model with the Quiz Card Mastery strategy is also able to improve student learning outcomes. This improvement can be seen in the learning outcome indicators. The first indicator is that students can distinguish the characteristics of living things and valid inanimate objects has increased which initially obtained 58.59 to 88.27. The second indicator is that students can understand the meaning of classification and differences in the characteristics of living things also increased which initially obtained 51.95 to 83.19. The third indicator is that students can mention animal classes also increased which initially obtained 46.09 to 85.54. The fourth indicator is to describe the opinion about the characteristics of living things also increased, which initially obtained 47.65 to 83.98. The increase can be observed in Figure 2 below.

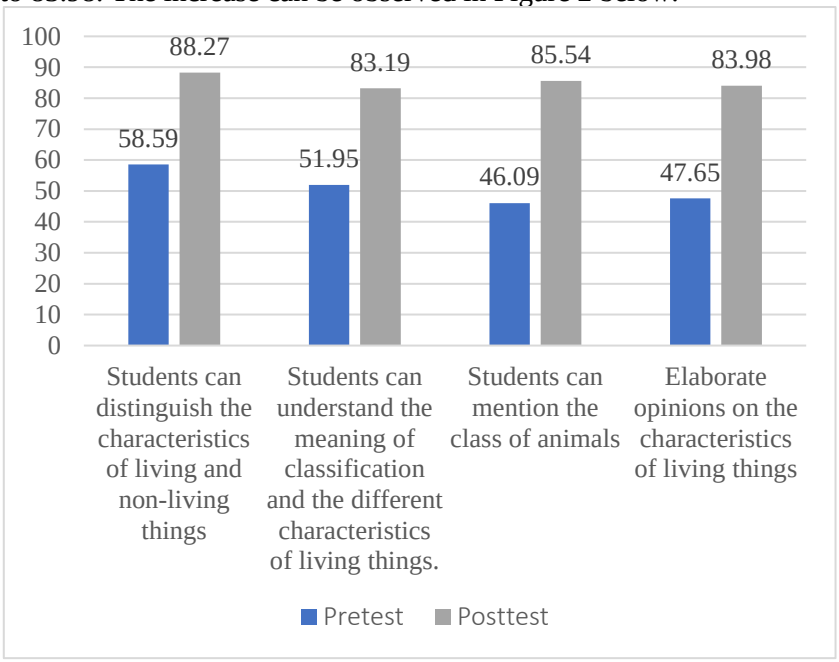

Figure 2. Diagram of Improvement in Students' Cognitive Learning Outcomes

The improvement value is taken from the students' pretest and posttest. The highest indicator in student learning outcomes is achieved by the first indicator, namely students can distinguish the characteristics of living and non-living things. This happens because students are able to understand the concept of material in the problem well. Meanwhile, the second and third indicators, namely students can understand the meaning of classification and differences in the characteristics of creatures and describe opinions about the characteristics of living things, obtained the lowest scores because students had not produced the right answers.

Student Responses After Implementing Contextual Teaching and Learning Model with Quiz Card Mastery Strategy

To determine students' responses to the application of Contextual Teaching and Learning model with Quiz Card Mastery strategy on the material of Classification of Living Things, a questionnaire with a Likert scale was used. Student responses were given after the Contextual Teaching and Learning learning stage with the Quiz Card Mastery strategy was completed. The average percentage of student

responses is 90.00% which indicates that their responses are very positive after the implementation of the Contextual Teaching and Learning model with the Quiz Card Mastery strategy.
Students' responses to the implementation of the Contextual Teaching and Learning model with the Quiz Card Mastery strategy which consists of 4 indicators, the first indicator of feelings of pleasure, as many as 90.62% of students were able to express opinions or feelings of pleasure when the teacher applied the Contextual Teaching and Learning model with the Quiz Card Mastery strategy. The second indicator of student interest, as many as 88.44% of students were able to express a sense of interest in the Contextual Teaching and Learning model with the Quiz Card Mastery strategy during the learning process. The third indicator of student involvement, as many as 87.50% of students actively discuss in the learning process. The fourth indicator of media display, as many as 93.75% of students feel happy and interested in the Quiz Card Mastery media so that it is easily understood by students. The percentage of student response questionnaire results can be seen in table 10.
very positive towards the application of the Contextual Teaching and Learning model with the Quiz Card Mastery strategy. This is in line with research showing the success of the field trial, where students completed classroom learning with a score of 83.3% and were supported by very positive feedback (Ilyas, 2019). According to Ram Balram's research (2017) there is a change in the percentage of creative thinking skills obtained from the pretest and posttest of students. Each question showed a change, where the learners' posttest answers were superior compared to their pretest answers (Balram, 2017).

CONCLUSIONS

Based on the results and discussion explained above, the following conclusions can be drawn:

1. Based on the research findings regarding the implementation of teaching in the teaching module using the Contextual Teaching and Learning model with the Quiz Card Mastery strategy, an overall average score of 94% was obtained. This indicates that the implementation of teaching with this model falls into the category of "very good."
2. Based on the hypothesis test concerning the effect of the Contextual Teaching and Learning model with the Quiz Card Mastery strategy on student learning outcomes, a value of 0.00 < 0.05 was obtained. This indicates that this model has a positive effect on the learning outcomes of 7th-grade students at SMP Negeri 4 Lamongan in the Classification of Living Things material.
3. Based on the analysis of the student response questionnaire after the implementation of teaching using the Contextual Teaching and Learning model with the Quiz Card Mastery strategy, a value of 90.00% was obtained, which falls into the "very positive" category.

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